

**STUDIES ON THE ANGIOSPERMIC FLORA OF PHEK  
DISTRICT, NAGALAND, INDIA**

**THESIS  
SUBMITTED TO  
NAGALAND UNIVERSITY**

**IN PARTIAL FULFILLMENT OF REQUIREMENTS FOR  
THE DEGREE OF  
DOCTOR OF PHILOSOPHY IN BOTANY**

**By  
NELIA LEA  
REGISTRATION NO. 583/2014  
DATED: 20.05.2014**



**DEPARTMENT OF BOTANY  
NAGALAND UNIVERSITY  
LUMAMI, 798627  
NAGALAND  
2022**

SI No. 093



# NAGALAND UNIVERSITY

HEAD QUARTERS : LUMAMI

 Department of Botany  
 Ph. D Course Work Marks 20.14
The following are the marks secured by Mr/Ms Nelia LeaRoll No. 03/13 of Ph. D Course Work Examination held in 20.13

Subject(s)/Paper(s)	Max. Marks	Minimum Qualifying Marks	Marks Scored
Course No. <u>B. Ph.D - I</u> Research Methodology	100	35	69
Course No. <u>B. Ph.D - II</u> Elective/Optional	100	35	59
Course No. <u>B. Ph.D - III</u> Review of Literature Reports/Seminar	100	35	64
Total Aggregate marks			192
Average Pass Mark - 55%			

Result	Rank/Class/Division	Percentage
<u>Passed</u>		<u>64%</u>

Marks Entered by

Dated .....

Marks Compared by

Dated .....

 Asst./Deputy Registrar (Examination)  
 Assistant Registrar (Exams)  
 Nagaland University  
 Hqs. Lumami

## NAGALAND UNIVERSITY

HEAD QUARTERS : LUMAMI

### PH. D COURSE WORK EXAMINATION

This is to certify that Mr/Ms Nelia Lea  
 of Nagaland University bearing Roll No. 03/13 is qualified in the Ph.D Course Work Examination  
 in the Department of Botany Nagaland University held in the Year 20.13

 Head of Department  
 Department of Botany  
 Nagaland University  
 Hqs. Lumami


 Dean  
 School of Sciences  
 Nagaland University  
 Hqs. Lumami

## **ACKNOWLEDGEMENT**

*At the outset, I give all the glory and honor to our Almighty God for what He has done to me throughout my research work. He has been my strength in every challenge that came along the way.*

*I would like to extend my heartfelt gratitude to my Supervisor **Dr. Limasenla**, Associate Professor, Department of Botany, Nagaland University, Lumami and her husband **Dr. Abhijit** without whom it would not have been possible to see this research work coming to its fruition. Their constant support in the forms of giving inputs, suggestions, directions, and instructions has enabled this work to come up to this form. I remain indebted to them.*

*I also would like to express my gratitude to **Prof. C.R. Deb**, Head, Department of Botany, Nagaland University, Lumami for his help, suggestions, and encouragement.*

*With great sense of gratitude and honor I thank all the Faculty Members of Department of Botany, **Professor Talijungla, Dr. Neizo Puro, Dr. Romeo Singh and Dr. A. Paul** for their valuable suggestions, encouragement, constructive criticism, and feedback that helped me in constructing my work to the present form.*

*Profound thanks goes to **Prof. J.R.I. Wood**, Oxford University, for his valuable help in identification of selected **Strobilanthes** sp.*

*A special thanks also goes to **Mr Arup Kumar Das**, GIS Division (Aaranyak, Gauwahati) for helping in preparing Plant Collection Map.*

*I would like to thank the officials and staff of BSI, Eastern Circle Shillong for enabling me to consult their herbaria.*

*I am immensely grateful to **Dr. Santanu Dey** for his help in plant identification.*

*My sincere thanks to the non-teaching staff, Department of Botany, **Mr. Rongpangzulu (S. T. A.), Dr. Bendangmenla (Laboratory Assistant) and Mr. Botoka** for their incredible help whenever I approached them during the period of this research work.*

*A special mention goes out to all those who have immensely helped me during my entire field work. From village leaders, churches, and guides to friends who accompanied me to field works and friends who coordinated my many field trips to villages.*

*My heartfelt thanks go to the research scholars of Taxonomy Laboratory who never said no to my numerous requests for help. I also thank all the **Research Scholars** of Department of Botany as well as to all the scholars of Nagaland University, Lumami, for their constant support and illuminating views during the course of my work. My sincere thanks goes to my dear friend **Dr. Jichule Seb** for her constant support and encouragements.*

*I would also like to acknowledge University Grants Commission, Govt. of India, New Delhi for the financial support through **UGC non NET and UGC-BSR Fellowship**.*

*I express my heartfelt gratitude to my **parents, husband, daughter, brothers, sister and relatives** for their love, support, encouragement and faith in me throughout my research work, without which I could not have completed my research.*

**(NELIA LEA)**



## List of tables and figures

Sl. No	Content	Page No.
Map 1.	India map showing North-East India, Nagaland State and Phek District	4
Map 2.	Plant collection locality map	6
Map 3.	Forest cover map of Phek District	10
Table 1.	Places visited during the present study with GPS coordinates	5
Table 2.	Comparative floristic analysis of Monocots and Dicots	611
Table 3.	Percentage composition of Monocots and Dicots	612
Table 4.	Ten dominant Families (Comparison with Flora of British India and Flora of Nagaland)	613
Table 5.	Ten dominant families by the number of Species of the present work	613
Table 6.	Ten dominant families by the number of Genus of the present work	614
Table 7.	Ten dominant Families of Dicots by number of Species (Comparison with Flora of Nagaland)	615
Table 8.	Ten dominant Families of Monocots by number of Species (Comparison with Flora of Nagaland)	615
Table 9.	Comparative account of taxonomic works on Nagaland and Phek District	616
Table 10.	An overview of the families in alphabetical order with number of genera, species, subspecies and variety	616

Table 11.	An overview of the floristic diversity of Phek district	620
Fig. 1	Pie chart showing the Family percentage of Dicots and Monocots	612
Fig. 2	Pie chart showing the Genera percentage of Dicots and Monocots	612
Fig 3.	Column chart showing 10 largest families by number of Genera in the present work	614
Fig 4.	Percentage showing floristic diversity in the present work	621

## CONTENTS

<b><u>CHAPTER</u></b>	<b><u>TITLE</u></b>	<b><u>PAGE NO.</u></b>
	Declaration	
	Certificate	
	Ph. D course work Marksheet and Certificate	
	Plagiarism free Undertaking	
	Acknowledgement	i
	List of Tables and Figures	iii
Chapter 1.	Introduction and Review of Literature	1-16
	Study Area	
	Review of Literature	
	Objective and Purpose of the Present Work	

Chapter 2.	Methods and Methodology	17-19
Chapter 3.	Key to the Families and Taxonomic Enumeration	20-606
Chapter 4.	Results and Discussion	607-628
	Analysis of the Flora	
Chapter 5.	Conclusion	629-630
	References	631-640
	List of paper publications and paper presented	
	List of seminars and workshops attended	
	Photo Plates	

# **CHAPTER 1**

## **INTRODUCTION**

Plant communities play a pivotal role in sustainable management by maintaining the biodiversity and conserving the environment. In the recent time it has become a very important aspect to understand, conserve and preserve the depleting plant wealth for the sustainability of the mother earth which is experiencing tremendous negative impact due to the unhealthy practice of random destruction of natural vegetation for various activities. And in the process of such activities a number of important plant species and their germplasm might have been affected or even been depleted before been studied or discovered. Thus, floristic study is important in understanding the diversity status and the conservation of biodiversity.

Flora refers to the systematic account of plants of any specific area and provides keys and description of plants for identification. It has become an important concern not only to taxonomists, but today floras are useful to a multitude of other agencies as well. The information gathered are useful for college and university students and teachers for future research works in areas of diversity assessment, forest and ecosystem management, agricultural development, pharmaceutical companies, etc (Rao & Chaudhary, 1999).

Biodiversity is the variety and variability of all the living organisms in a given area. It is fundamental to the fulfillment and sustenance of human welfare. Biodiversity provides human with vast benefits both direct and indirect by channeling essential services through natural ecosystem functions and stability. The biological resources provide basic need for survival of human life such as food, clothing, medicine, fuel, etc.

A great variety of climate and altitudinal variations coupled with varied ecological

habitats have contributed immensely to the rich vegetation wealth of India. A significant feature of the Indian flora is the confluence of species from the surrounding countries like Malaya, Tibet, China, Japan and Europe and even from widely separated continents like America, Africa and Australia. Though the area of the country is only 2% of the world's total landmass, India harbours as much as 11% of the world known flora (Mudgal & Hajra, 1997).

The North Eastern region of India is perhaps the richest and the most interesting floristic region in the country. It is a significant zone and represents the transition zone between Indian, Indo-Malaya, Indo-Chinese biogeographic region as well as meeting place of the Himalayan mountains with that of Peninsular India. Takhtajan (1969) cited this region as the “cradle of the flowering plants” on the basis of the concentration of a number of primitive plants, particularly of the Angiosperms. The region is known for its lush rainforest and rich vegetation. The fertility of the soil coupled with climatic condition favours the luxuriant growth of the plant population. The rich floristic diversity has earned the North-East region as one of the biodiversity Hotspot region in the world.

Nagaland one of the eight sisters state of Northeast India with its geographical area of 16, 579 km<sup>2</sup> lies between 25°06'-27°04' N latitude and 93°20'-95°15' E longitude. The state is bordered by Arunachal Pradesh in the north, Assam in the west, Manipur in the south and shares international boundary with Myanmar in the east. The state is blessed with a condition of tropical to alpine, humid forest with heavy rainfall and high humidity which provides a unique natural heritage. According to India State of Forest Report 2019, the forest cover of the state is 12,486.40 km<sup>2</sup>, which is 75.31 % of the state's geographical area and the Recorded Forest Area (RFA) is 8,623 km<sup>2</sup> of which 234 km<sup>2</sup> is reserved forest and 8,389 km<sup>2</sup> is unclassified forest. The forest in Nagaland is basically under the indigenous people

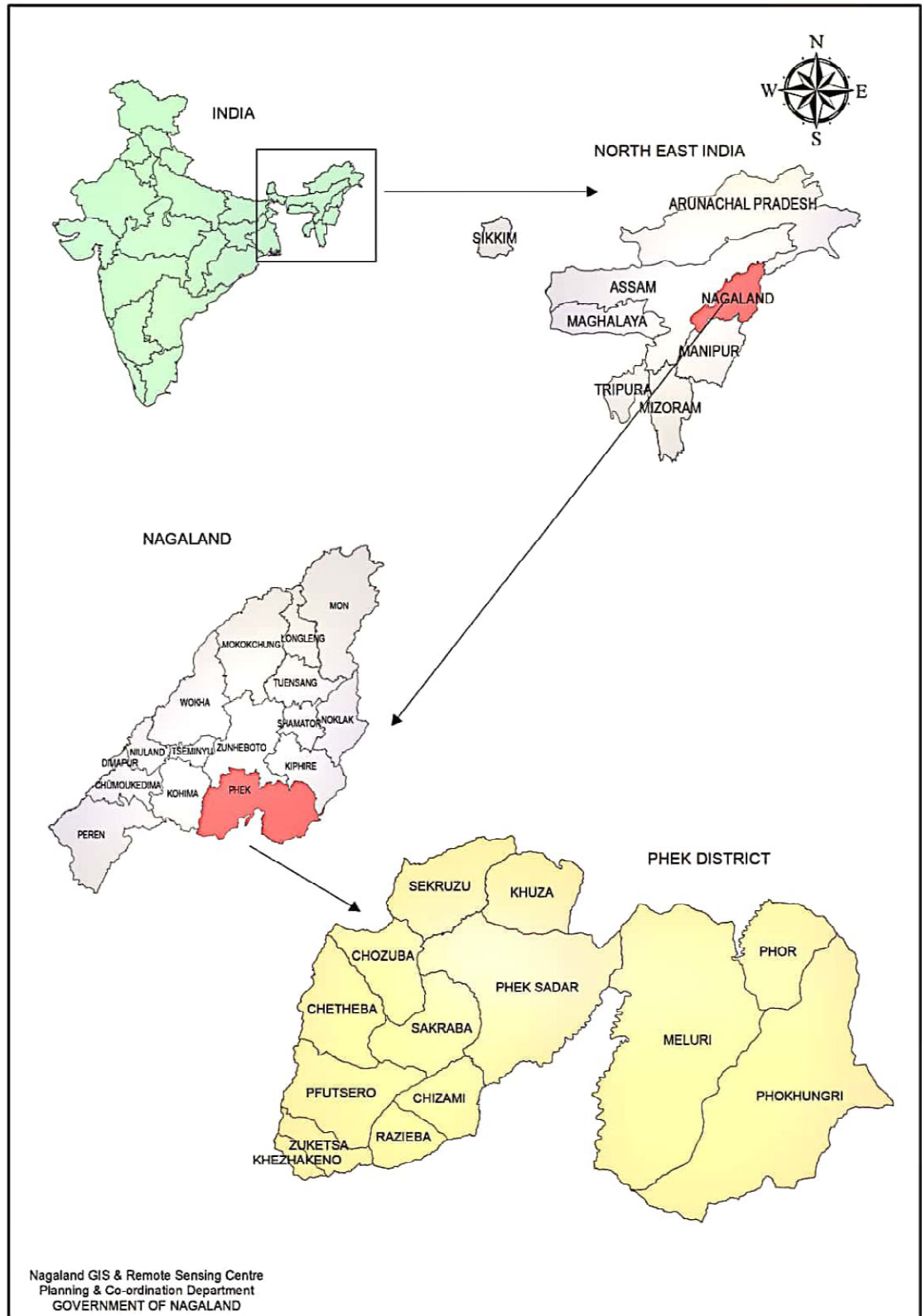


except for certain areas classified as protected area by the Forest Department. Almost every village has its own protected reserved forest. Since majority of the population lives in rural areas they are dependent on the natural resources for their livelihood and agriculture is one of the main occupations of the people here. The knowledge and uses of the plants are well preserved through oral tradition and is passed down from generation to generation.

## **STUDY AREA**

Phek district is one of the 16 districts of Nagaland State, inhabited by the Chakhesang and Pochury Tribe. Major dialects spoken by the people under Phek districts are Chokri, Khuzhale, Poula, Sumi, and Pochury. Its name came from the word “Phekrekedze” meaning “Watch Tower”. The District has 14 administrative circles, which are Pfutsero, Phek Sardar, Chetheba, Chozuba, Meluri, Sekruzu, Chizami, Sakraba, Razeza, Zuketsa, Phor, Khuza, Khezhakeno, and Phokhungri. There are 8 blocks namely Phek, Meluri, Pfutsero, Kikrumba, Sekruzu, Chizami, Chetheba, Weziho. The district has 98 villages. Majority of the villages are located in the hill-top. The important festivals of Chakhesang are Sukrunye, Tsukhenye, Thuni and Pochury is Yemshe. The main occupation is agriculture and they are also known for their adeptness in Terrace Rice Cultivation (TRC). Besides agriculture, people engage in salt making (in Meluri area), weaving, bamboo and wood carving, and in making fruit juice.

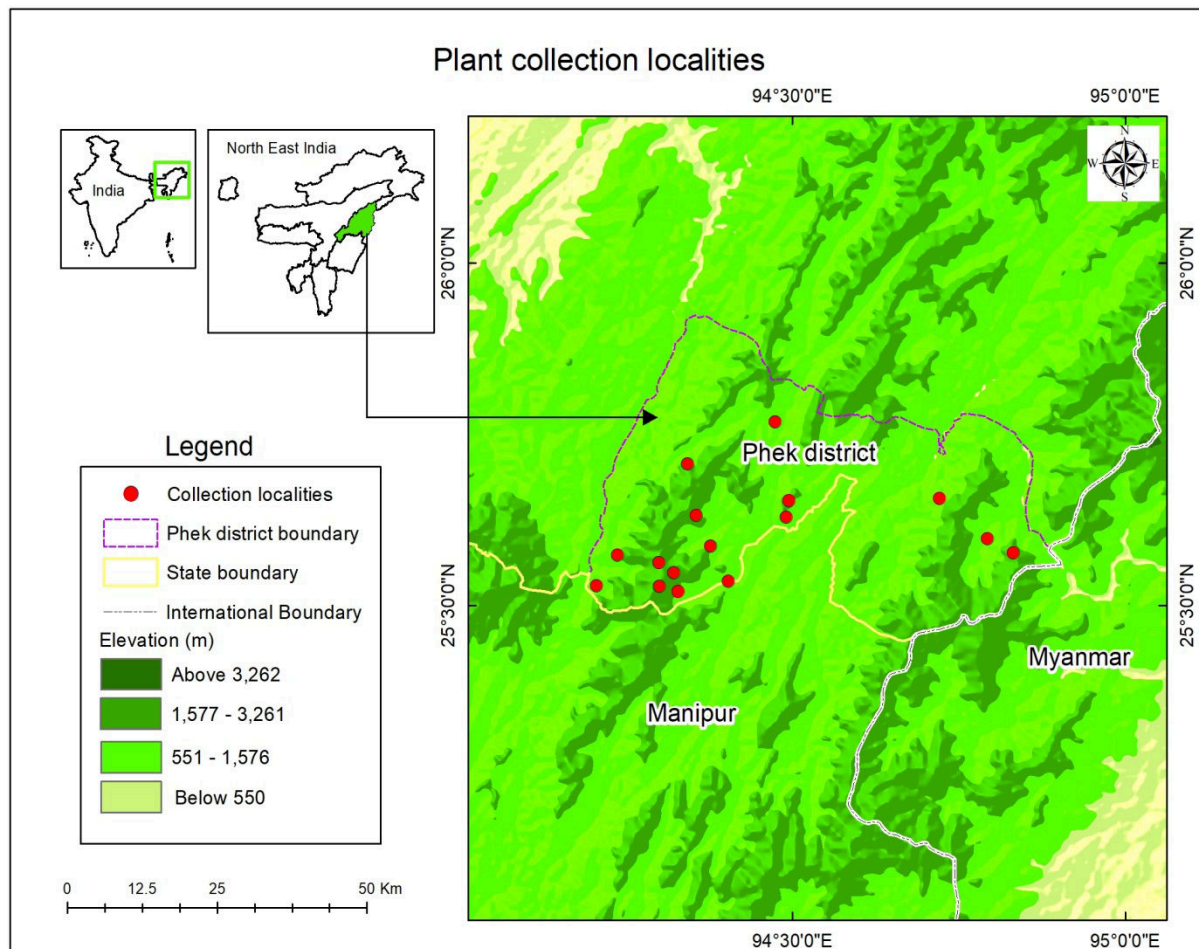
The district is located in the hotbed of rich biodiversity with lush and verdant sub-tropical rain forest which are treasure trove of flora and fauna as well as plethora of medicinal plant. It is also blessed with a very rich and diverse cultural and natural heritage with beautiful terrains with an extension of Patkai range. There are number of perennial streams flowing through the district. Some of the important rivers of the district are Tizu,



**Map 1.** India map showing North-East India, Nagaland State and Phek District

**Table 1:** The various places visited during the present study with GPS coordinates (See map2)

Sl. no	Place	GPS	Altitude
1.	Tsupfume	N 25° 32' 54.7" E 94° 19' 17.6"	1890 m
2.	Razeba	N 25° 31' 16.6" E 94° 19' 42.3"	1914 m
3.	Pfutsero	N 25° 33' 46.1" E 94° 17' 58.5"	2237 m
4.	Kikruma	N 25° 34' 27.4" E 94° 14' 16.1"	1726 m
5.	Khuza	N 25° 46' 07.6" E 94° 28' 27.8"	1206 m
6.	Kapamodzu	N 25° 31' 41.1" E 94° 18' 00.9"	2485 m
7.	Thuvopisu	N 25° 42' 25.7" E 94° 20' 33.1"	1790 m
8.	Chepoketa	N 25° 48' 32.6" E 94° 30' 15.1"	762 m
9.	Khezhakheno	N 25° 31' 46.6" E 94° 12' 22.0"	1248 m
10.	Phek Sadar	N 25° 37' 47.2" E 94° 29' 27.5"	1475 m
11.	Lozaphuhu	N 25° 38' 71.3" E 94° 29' 41.2"	1768 m
12.	Wazeho	N 25° 39' 23.5" E 94° 43' 14.3"	1400 m
13.	Sakraba	N 25° 37' 53.9" E 94° 21' 21.8"	1749 m
14.	Thetsumi	N 25° 32' 09.6" E 94° 24' 14.5"	917 m
15.	Chizami	N 25° 35' 14.6" E 94° 22' 38.4"	1485 m
16.	Phukhungri	N 25° 34' 39.3" E 94° 49' 53.4"	2172 m
17.	Shilloi	N 25° 35' 51.2" E 94° 47' 34.2"	962 m



Source: GIS Division (Aaranyak, Guwahati)

**Map 2.** Plant collection locality map

Lanye and Sedzu, and three important lakes namely Shilloi, Chida and Dzudu. Geologically, the district is predominantly occupied by tertiary rocks, comprising sandstone, shale, grit etc. The eastern part of the district is occupied by ultra basic and basic rocks comprising basalt, gabbro and granulitic rocks.

### **Topography**

The district lies between 25°37'37" to 25°39'47"N latitude and 94°35'18" to 94°38'09"E longitude and is bounded by Kohima district in the West, Zunheboto and Kiphire district in the North, Manipur state in the South and Myanmar in the South East. The geographical area of the district is about 2026 km<sup>2</sup>, with altitude ranging from 520-2400m above mean sea level. It is situated at a distance of 145km from state capital of Kohima to the District Headquarter with an altitude of 1524 meters.

### **Climate**

The district enjoys a humid sub-tropical climate characterized by cold winter and mild summer. January and February are the coldest months with the temperature dropping to 0° C at night at higher areas. Summers are moderately warm with the average temperature of 27° C without exceeding 32° C. The climate is warm in the lowland areas and temperate in the higher areas.

### **Rainfall**

Rainfall generally begins from April and continues till the end of September. The maximum rainfall occurs during the month of June and July. The average annual rainfall is 1,527mm.

### **Landmark**

**Khezhakheno Village** believed to be the originating place of many of the southern Naga tribes from where further migrations into the wild had begun. Legends speak of a slab of



stone in this village, which was supposed to multiply paddy when spread over it for drying. This stone is still preserved.

**Shilloi Lake** also known as the Lachem Lake, lies on the lower slopes of the hill ranges running along the Myanmar borders. Spread over 0.25 to 0.30 km<sup>2</sup> the lake has the shape of a footprint. The lake is believed to be the abode of spirits. The water is dark grey, perhaps because of the large amount of silt, adding to the mystery

### **Culture & Tradition**

The Chakhesangs and Pochurys are known for their rich cultures and traditions. There are varieties of traditional attires and ornaments. The melodies folk songs and the lively folk dances are feast for the ears and eyes. The people are expert craftsman and excel in making pots, baskets, sculptures and furniture. The societies are patrimonial but women enjoy a high status in their families.

The customary laws are unwritten but practise by all villages. These laws are binding to members of the society and were passed on from generation to generation orally. The elderly people of the village decide and passed judgment on disputes and matters concerning the village.

### **Availability of Minerals**

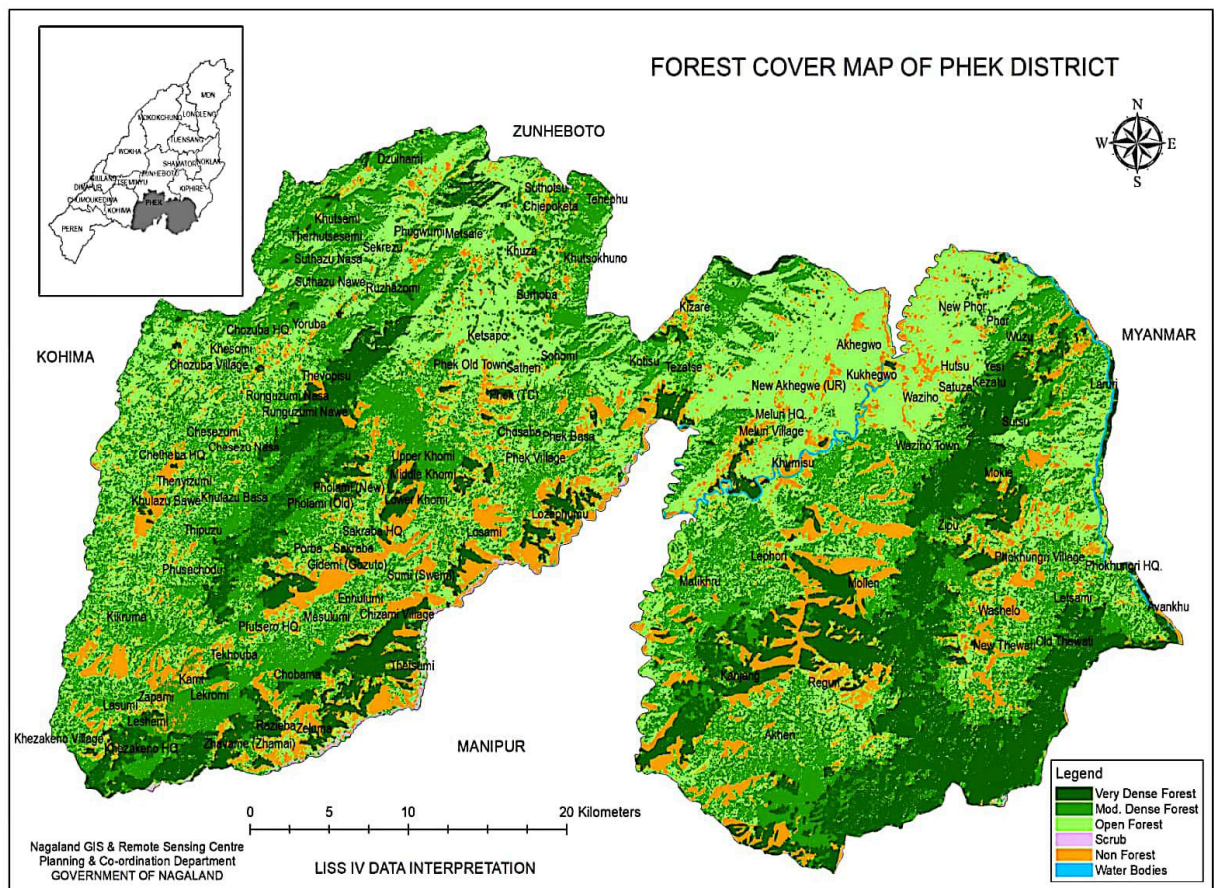
The Geological Survey of Nagaland reports that there is one million tons of reserved limestone at Wazeho, decorative and dimensional stones, coal in Akhegwo, Yesi, and Molen. Brine is also found in Meluri sub-division in the district. This locally baked salt, as per medical experts, are goitre free and good for health. Crystalline limestone is also to be found in Moke and Satuza. Iron, chromium, nickel, cobalt, copper, molybdenum, chromite, magnesite, asbestos, talc, marble are also some of the mineral deposits found in the district. The district is regarded as the richest areas of mineral deposits such as limestone, decorative

marble stone, coal, brine etc.

### **Forest Types**

The type of vegetation of a region depends on the topography, climate and soil of the particular region. Based on the present study and works on the vegetation cover of North East India by eminent botanists such as Hooker (1854, 1872-97), Clarke (1889), Kanjilal *et al.* (1934-40), Champion & Seth (1968), the forest types of Phek district may be classified into the following:

- a. Tropical deciduous forest
- b. Tropical semi-evergreen forest
- c. Sub-tropical evergreen forest
- d. Temperate broad leaved forest



## REVIEW OF LITERATURE

The first important contribution in the taxonomy of India came from Garcia d' Oorta (1565) and C. Acosta (1578). However, it was Handrik Van Rheede's work *Hortus Malabaricus* which is regarded to be the first authentic record of plants of Indian region, where he described 794 plants of the Malabar region. William Roxburgh who is considered as the Father of Indian Botany, published his monumental work *Flora Indica* (1820-1824) which has been of immense significance in Indian botany. Later eminent botanists J.D. Hooker and his associates published "*Flora of British India*" (1872-1897) in seven volumes, which are considered to be the standard reference work for the botanist in India to study the flora of the country.

The North-Eastern Indian region characterised by high rainfall and humidity, with the varied altitude from near sea level to 4500 m, the climate ranging from that of tropical plains to temperate and sub-alpine hills has made the region to be one of the richest botanical regions in the Indian subcontinent and has been considered a paradise for botanists (Chauhan, 1996). The rich and interesting floristic diversity has attracted several plant collectors and botanist, leading to the documentation of the floristic composition in the area. Buchanan-Hamilton (1820) initiated floristic expedition in Northeast India. Significant contributions on the floristic of this region have been made by Roxburgh (1820-1824), Wallich (1829-1832), Griffith (1847, 1848), Beddome (1865-1870), Clarke (1886), Burkill (1924-1925), Kanjilal *et al.* (1934-40), Bor (1940, 42). On reviewing through the available literatures on the botanical exploration of North-East India, a number of information has been found recorded of the Naga Hills, presently known as Nagaland.

The earliest person to remark on the botany of Naga Hills seems to be William Robinson who was an educationist of the Assam Government Seminary. Robinson (1841), in his descriptive accounts of Assam gave detailed report on the climate, geology, botany, zoology and anthropology of the area. His descriptive account also gave some information on the flora of Northeast region.

Masters (1844) has made a number of collections, while passing over the first ranges of Naga Hills, lying between the Dikho and Dansiri rivers. He remarked “the flora of this portion of the hills resembles in the great measure that of the more elevated parts of the plains”, and also made comments on the flora and the area and their method of cultivation. Masters (1848) has also published an account of the vegetable productions of the Naga Hills. C. B. Clarke who was a mathematician by training seems to be the greatest Botanical collector of the century from this area. He has surveyed areas and made a large numbers of collections, which are now deposited in Kew Herbarium (K) with a duplicate set in Calcutta Herbarium (CAL).

C. B. Clarke has listed 1050 species of Flowering Plants and Ferns in his account on *Plants of Kohima and Muneypore* collected on a march from Golaghat via Kohima and Muneypore to Cachar in October and November 1885. Dr. Watt, a contemporary of C. B. Clarke has also made some collections almost from the same route as that of Clarke’s and all collections of Watt are deposited in Kew and have not been published subsequently. Clarke (1886) has remarked that the Flora of Nagaland closely resembles to that of Sikkim, about 800km away than that of Khasi Hills flora, which is only 160 km away. Most of the collections of Clarke were also studied by Hooker (1872-1897) for his *Flora of British India*.

The botanical explorations and floristic studies in Naga Hills for the next few decades were undertaken by the forest officers of Assam. Gustav Mann who was posted as



conservator of forest in Assam during 1863-1881 made extensive collections of plants from the whole of Assam and mainly from Khasi and Jaintia Hills. His collections are now deposited in Kanjilal Herbarium, Botanical Survey of India, Eastern Circle (ASSAM). Some important persons who made floristic collection from Nagaland are Master (1843-1873) in the hills of Angami Nagas, Watt (1882-1883) along Golaghat- Kohima- Manipur- Cachar but mostly along the Burma border, Collett (1891) in Kohima, C. B. Clarke (1866-1887) along Golaghat- Kohima- Manipur area, Meebold (1906-1907) along Golaghat- Kohima- Manipur area, Prain in Nagaland (Nair *et al.*, 1996).

Publication of the *Flora of Assam* (Kanjilal *et al.*, 1934-40) forms a landmark in the history of botanical studies in this region. N. L. Bor, a British botanist during the tenure as a Forest officer in Assam, has also made substantial collection particularly of grasses from this region. Bor (1942) expressed the earlier view of Clarke (1886) about the similarity of the Naga Hills flora with Sikkim. The fifth volume of *Flora of Assam* which comprises Gramineae (Poaceae) was done by Bor (1940).

The establishment of regional circle of Botanical Survey of India and the North-Eastern Hill University has pushed forward the floristic activities of this region adding to the significant contributions and publications on the regional flora (Rao & Verma, 1972, '82; Rao, 1978, 81a, 81b, 1982; Balakrishnan, 1981-83; Rao & Haridasan, 1982; Joseph, 1982; Rao & Jamir, 1982a, 82b; Bora & Kumar, 2003). Some state floras of the region were carried out viz. Flora of Tripura (Deb, 1981-83), Forest Flora of Meghalaya (Haridasan & Rao, 1985-87), Flora of Sikkim (Hajra & Verma, 1996), Flora of Manipur (Singh *et al.*, 2000), Materials for the Flora of Arunachal Pradesh (Hajra *et al.*, 2001; Giri *et al.*, 2008; Chowdhery *et al.*, 2009), Flora of Mizoram (Singh *et al.*, 2002; Sinha *et al.*, 2012).

The above works mostly deals with other parts of N.E. India. Hynniewta (1999) on his descriptive account *Nagaland* in *Floristic Diversity and Conservation Strategies in India* Vol. 3 gave a number of information on topography, vegetation, floristic diversity, economic uses, vulnerability and major threats and conservation of the state. *The Ferns of Nagaland*, Jamir and Rao, 1988; *Lichen Flora of Nagaland*, Singh & Sinha, 1994; *Orchids of Nagaland*, Deorani & Naithani, 1995; *Orchids of Nagaland*, Hynniewta *et al.*, 2000; *Orchid Diversity of Nagaland*, Deb & Imchen, 2008; *Medicinal and Aromatic Flora of Nagaland*, Changkija *et al.*, 2010; *Bamboos of Nagaland*, Naithani, 2011; *Flora of Dziiko/Dzukou Valley*, Mao & Gogoi, 2016 are some notable contributions on the flora of the state. The *Checklist of Flora of Nagaland* by Mao *et al.* (2017) is the most recent and updated list of the flora of the state which deals with 2363 species, 38 subspecies and 39 variety.

The work on the district flora of the state has been recently taken up by few dedicated researchers for their Ph. D work. *Flora of Mokokchung District* by Gurung (1993, Ph. D. thesis, unpublished), *Flora of Zunheboto District* by Moaakum (2011, Ph. D. thesis, unpublished), *Studies on the Floristic Diversity of Dimapur District, Nagaland* by Mozhui (2014, Ph. D. thesis, unpublished), *Studies on the Floristic Diversity of Fakim Wildlife Sanctuary* by Rongsensashi (2014, Ph. D. thesis, unpublished) and *Studies on the Diversity of Flowering Plants of Tuensang District* by Dey (2018, Ph. D. thesis, unpublished).

Many notable published works on the floristic diversity of the state has been carried out by several workers in the recent years. Mentions of some prominent works are: Chaturvedi & Moaakum, 2007; 2008a; 2008b; Rongsensashi *et al.*, 2010; 2011; Benniamin *et al.*, 2012; Moaakum & Dey, 2013; Moaakum *et al.*, 2014; Deb *et al.*, 2014; Dey *et al.*, 2014; Gogoi *et al.*, 2015; Jakha *et al.*, 2015; Odyuo *et al.*, 2015; Jamir *et al.*, 2015; Odyuo *et*

*al.*, 2016; Lea *et al.*, 2016; Rongsensashi *et al.*, 2016; Moaakum *et al.*, 2017; Odyuo *et al.*, 2017; Kapfo & Puro, 2017; Kapfo & Puro, 2018; Deb *et al.*, 2021, Roy *et al.*, 2021.

## **OBJECTIVE AND PURPOSE OF THE PRESENT WORK**

The documentation of the plant diversity is essential for the conservation of biodiversity. Documenting provides information on rare and threatened species, geographic distribution of species and the relationship between species. Documentation is also essential to know the economic, medicinal and sustainable utilization of the plant resources. Taxonomy one of the pioneer subjects in the study of all biological sciences is credited for its enormous contribution in the understanding of plants importance and values to the mankind. It forms the basis of every understanding for utilisation of the natural plant wealth of the country, as well as scientific researches on every aspect concerning plant species. But due to the emergence of more complicated and trendy experimental sciences, unawareness of the importance of the subject, inadequate funding, least job opportunities for taxonomist in modern days, lack of herbaria in teaching departments etc, curtailed the growth of taxonomic research at par with the other branches of biological sciences.

The challenges and involvement of going to the deep forest in remote and interior places for field works with difficult and uncomfortable situations, life time process of learning the knowledge of the subject and to carry out demanding task to get a result makes the subject more tedious to the plant researchers which makes the subject more outdated and least interested. As a result, the biggest hurdle in our country today in achieving the primary objective in taxonomy is lack of trained taxonomist and manpower. The *Earth Summit* of June 1992 held at Rio de Janerio, discussed ways and means to make the earth a better and cleaner place to live in, and adopted the *Conservation on Biological Diversity* (CBD) and

recognised the role and importance of taxonomist. In the year 1997 capacity building in taxonomy was initiated with the objective to enhance country's capabilities for inventorising, monitoring and sustainably utilizing and conserving the biodiversity as well as establishing Indian taxonomist at regional and global level. The inventorization of biological resources is the pre-requisite for its sustainable utilization and conservation.

After the establishment of regional circle of Botanical Survey of India, in Shillong, significant contributions have been made in the botanical exploration of Northeast India and in Nagaland as well. In the recent years taxonomic work in Nagaland has gained momentum, but the botanical exploration is not actively undertaken as a result till yet the state do not have written flora like its neighbouring states which have their own state floras respectively. Nagaland being hilly state and poor road connectivity makes it difficult for the researchers to explore satisfactorily. One factor could also be the local researchers are not introduced to the subject of taxonomic studies and were ignorant of the importance of the subject. Remoteness of the region with difficult terrain, and political tensions and insurgency might have also hindered successful botanical explorations by trained taxonomists.

Floristic inventory is necessary to understand the conservation of biodiversity. It helps in assessing the plant wealth of the region. The local flora will help to enhance the knowledge of the students and other workers about the plant diversity of the region, also the information will be helpful for the revisionary work of state, regional and national flora. Therefore, keeping these facts in mind the present study was undertaken to document the angiospermic flora of Phek district, Nagaland. The main objectives are:

1. Survey, collection, identification of the plants of Phek district.
2. Compilation of the flora with the systematic keys on families, genus, species and variety level.

## **CHAPTER 2**

### **METHODS AND METHODOLOGY**

To procure the detailed information about the plants of Phek district, well planned preparation was organized. All necessary arrangements and permissions for co-operation from the local authorities, reservation for accommodation and transport, equipments required during exploration were arranged before starting the work.

The present study is the outcome of the intensive field work and collection of the flora of Phek district for six years from 2014-2019. The study is based on regular field survey at different seasons for the collection and observation of the plants.

#### **METHODOLOGY**

The following measures were undertaken in the present study:

- Field tours were conducted throughout the year so as to cover different seasons of the year at different localities, different altitudes and forest types of Phek district.
- During the collection of plant specimens, the morphological characters, habit, habitat, and information such as uses were noted in the field notebook and the specimens were given field number. Usually three to four samples of each species was collected in a polythene bag and this bag was kept in larger polythene bag so that plants remain fresh for long. Individual species were kept in small different polythene so as not to mixed different plants. Small herbs were carefully uprooted and collected in entirety. For larger species twigs with leaves and flowers/fruits were collected.



- The collected specimens were poisoned in formalin to kill the plant and to prevent the detachment of leaves, flowers, fruits and other parts from the main plant.
- The specimens were pressed in between newspapers under heavy pressure and the absorbents were changed regularly depending on the nature of the plant specimen and weather condition. The larger specimens were folded in the shape of 'V' or 'N'.
- For the preparation of herbarium, the routine herbarium techniques recommended by Jain and Rao (1977), was followed. The specimens were mounted in the standard sized herbarium sheets (28 x 42 cm) and field data from field notebooks were entered in the permanent labels of the sheets.
- Identification of the collected plant species was done following the scientific method with the help of regional and national floras and available literatures and also from herbaria of Botanical Survey of India, Eastern Regional Centre, Shillong (ASSAM) and Central National Herbarium, Howrah (CAL).
- After the completion of proper accession and filling of specimens the complete herbarium sheets are sorted family, genus and species wise. They are then filled in their respective folders accordingly and deposited in the herbarium of Department of Botany, Nagaland University.
- The bibliography of the reference cited in the text, books, journal, etc., reference during this work for confirmation of identification of plants and other relevant information on them is given at the end of the thesis.
- Digital photographs of most of the plants in flowering or fruiting condition were taken with Nikon Camera Model No. 3200. The photo plates were arranged in Microsoft word.

## **PRESENTATION OF THE FLORA**

The families are arranged according to the system of Bentham and Hooker's 'Genera Plantarum' (1862-1883), with modifications as proposed by Hutchinson (1959). The updated nomenclature and the distributional records have been followed using the standard references like POWO (Plants of the World Online) @ [www.ipni.org](http://www.ipni.org) and GBIF (Global biodiversity Information Facility) @ [www.gbif.org](http://www.gbif.org).

1. For each family a short note is given on the following: brief description of the families; indented keys for genera.
2. For each genus the following information are provided: brief description of each genus; indented keys for species.
3. For each species the following information are provided: correct name is followed by citation of important pertinent literature, each specimen citation is followed by description, flowering and fruiting period; distribution of species.
4. Measurements are made in conventional metric scale *i.e.* m: meter; cm: centimetre; mm: millimetre.

## CHAPTER 3

### KEY TO THE FAMILIES

- 1a. Leaves usually reticulately veined; flowers 4 or 5-merous;  
seeds with 2 cotyledons; vascular bundles open
- 2a. Plants insectivorous **Droseraceae**
- 2b. Plants not insectivorous
- 3a. Plants parasitic or saprophytic
- 4a. Plants with leaves
- 5a. Flowers greenish; petals absent **Santalaceae**
- 5b. Flowers brightly coloured; petals present **Loranthaceae**
- 4b. Plants without leaves
- 6a. Plants saprophytic **Monotropaceae**
- 6b. Plants parasitic
- 7a. Parasitic on aerial parts of host plant **Cuscutaceae**
- 7b. Parasitic on roots of host plant
- 8a. Flowers unisexual, in spadices **Balanophoraceae**
- 8b. Flowers bisexual, solitary or in racemes **Orobanchaceae**
- 3b. Plants neither parasitic nor saprophytic
- 9a. Fruit a legume
- 10a. Flower regular; sepals and petals valvate **Mimosaceae**
- 10b. Flower irregular; sepals and petals imbricate
- 11a. Corolla papilionaceous; stamens mono or diadelphous **Fabaceae**
- 11b. Corolla caesalpinaceous; stamens free **Caesalpiniaceae**

- 9b. Fruit not a legume
- 12a. Perianth absent, if present than uniseriate, and not differentiated into calyx and corolla
- 13a. Perianth absent
  - 14a. Inflorescence in cup-like cyathia **Euphorbiaceae**
  - 14b. Inflorescence catkin or spike
  - 15a. Flowers unisexual; fruit a drupe **Myricaceae**
  - 15b. Flowers bisexual; fruit a drupe or capsule
  - 16a. Bracts petaloid; ovules several **Saururaceae**
  - 16b. Bracts not petaloid; ovule 1 **Piperaceae**
- 13b. Perianth present
  - 17a. Ovary inferior or semi-inferior
    - 19a. Leaves alternate; flowers unisexual **Begoniaceae**
    - 19b. Leaves opposite; flowers bisexual **Nyctaginaceae**
  - 17b. Ovary superior
    - 20a. Anthers dehiscing by 2 or 4 valves **Lauraceae**
    - 20b. Anthers dehiscing otherwise
      - 21a. Bracts adnate to fruits as wing **Juglandaceae**
      - 21b. Bracts if present otherwise
        - 22a. Ovary 1-celled
        - 23a. Stipules forming ocrea **Polygonaceae**
        - 23b. Stipules if present not forming ocrea
        - 24a. Herbs
        - 25a. Flowers bisexual
        - 26a. Stamens opposite perianth segments **Amaranthaceae**

26b. Stamens alternate with the perianth segments	<b>Phytolaccaceae</b>
25b. Flowers unisexual	
27a. Leaves simple, ovule basal	<b>Urticaceae</b>
27b. Leaves palmately compound; ovule pendulous	<b>Cannabaceae</b>
24b. Shrubs or trees	
28a. Stipules absent	<b>Thymelaeaceae</b>
28b. Stipules present	
29a. Plants with milky latex; flowers unisexual	<b>Moraceae</b>
29b. Plants without milky latex; flowers bisexual	<b>Ulmaceae</b>
22b. Ovary 2 or more celled	
30a. Inflorescence a spike or catkin	
31a. Plants with milky latex	<b>Euphorbiaceae</b>
31b. Plants without milky latex	
32a. Ovules 2 in each cell; fruit wholly or partially enveloped by cupular involucre	<b>Fagaceae</b>
32b. Ovule 1 in each cell; fruit a catkin or nutlike in spikes	<b>Betulaceae</b>
30b. Inflorescence otherwise; fruit a double samara	<b>Aceraceae</b>
12b. Perianth present, 2-many series, differentiated into calyx and corolla	
31a. Corolla free	
32a. Stamens many or more than twice as many as petals	
33a. Ovary superior or half superior	
34a. Pistils more than one, free	
35a. Stamens arising from hypanthium	<b>Rosaceae</b>
35b. Stamens arising from receptacle	

36a. Perianth 3 or more seriate	
37a. Sepals and petals valvate; fruits fleshy	<b>Annonaceae</b>
37b. Sepals and petals imbricate; fruit dry	
38a. Trees or shrubs; stipules caducous	<b>Magnoliaceae</b>
38b. Woody climbing shrubs; stipules absent	<b>Schisandraceae</b>
36b. Perianth 2 seriate	
39a. Leaves basal and alternate; petals with nectariferous gland	<b>Ranunculaceae</b>
39b. Leaves alternate or opposite; petals without nectariferous gland	<b>Hydrangeaceae</b>
34b. Pistil one, united	
35a. Stamens perigynous; arising from hypanthium	
36a. Leaves alternate, stipulate	<b>Rosaceae</b>
36b. Leaves opposite, exstipulate	<b>Lythraceae</b>
35b. Stamens hypogynous	
37a. Stamens united, monadelphous or polyadelphous	
38a. Leaves opposite, pellucid-dotted with black gland dots	<b>Hypericaceae</b>
38b. Leaves alternate, not pellucid	
39a. Anthers 2-celled	<b>Sterculiaceae</b>
39b. Anthers 1-celled	
40a. Shrubs or trees; leaves simple	<b>Malvaceae</b>
40b. Trees; leaves digitately compound	<b>Bombacaceae</b>
37b. Stamens free	
41a. Ovary stipitate on a gynophore	<b>Capparaceae</b>
41b. Ovary not stipitate, sessile	
42a. Flowers unisexual	

43a. Plants with resinous juice; leaves opposite	<b>Clusiaceae</b>
43b. Plants without resinous juice; leaves alternate	<b>Theaceae</b>
42b. Flowers bisexual	
44a. Fruits long beaked	<b>Geraniaceae</b>
44b. Fruits not long beaked	
45a. Leaves opposite	
46a. Herbs; leaves gland dotted; flowers pentamerous	<b>Hypericaceae</b>
46b. Trees; leaves not gland dotted; flowers tetramerous	<b>Clusiaceae</b>
45b. Leaves alternate	
47a. Leaves palmately veined	<b>Tiliaceae</b>
47b. Leaves pinnately veined	
48a. Leaves with oil glands	<b>Rutaceae</b>
48b. Leaves without oil glands	
49a. Plant usually spinous	<b>Berberidaceae</b>
49b. Plant not spiny	
50a. Anthers opening by lateral slits; fruit a capsule or drupe	<b>Elaeocarpaceae</b>
50b. Anthers opening by longitudinal slits; fruit a berry	
51a. Trees or shrubs or woody vines; sepals and petals 5	<b>Actinidiaceae</b>
51b. Shrubs or small trees; sepals and petals 4	<b>Stachyuraceae</b>
32b. Stamens fewer or at the most twice as many as petals	
52a. Leaves simple	
53a. Ovary 1-celled	
54a. Scandent shrubs or climbers	
55a. Leaves stipulate; stamens borne on an androgynophore;	

ovules numerous	<b>Passifloraceae</b>
55b. Leaves exstipulate; stamens not as above; ovules 1	<b>Menispermaceae</b>
54b. Plant otherwise	
56a. Placentation free-central	
57a. Stamens alternate to petals	<b>Caryophyllaceae</b>
57b. Stamens opposite to petals	
58a. Herbs; leaves usually basal	<b>Primulaceae</b>
58b. Shrubs or trees; leaves alternate	<b>Myrsinaceae</b>
56b. Placentation not as above	
59a. Ovary stipitate on gynophore	<b>Capparaceae</b>
59b. Ovary sessile or subsessile	
60a. Anther connective with an appendage at apex	<b>Violaceae</b>
60b. Anther connective without appendages at apex	
61a. Ovules 1-2, in each cell of ovary	<b>Hernandiaceae</b>
61b. Ovules many, in each cell of ovary	<b>Flacourtiaceae</b>
53b. Ovary 1-many celled	
62a. Corolla cruciform	<b>Brassicaceae</b>
62b. Corolla not as above	
63a. Flowers zygomorphic	
64a. Flowers resupinate; sepals 3 or 5	<b>Balsaminaceae</b>
64b. Flowers not as above; sepals 5	<b>Polygalaceae</b>
63b. Flowers actinomorphic	
65a. Leaves opposite	
66a. Herbs; stamens 10; fruit long beaked capsule	<b>Geraniaceae</b>



66b. Shrubs or trees; stamens 2; fruit a berry, drupe or capsule	<b>Oleaceae</b>
65b. Leaves alternate	
67a. Plants climbing or creeping with tendrils	<b>Vitaceae</b>
67b. Plants not as above	
68a. Stamens opposite to petals	
69a. Sepals valvate; anthers versatile; ovary 3-celled	<b>Rhamnaceae</b>
69b. Sepals imbricate; anthers imbricate; ovary 3-6 celled	<b>Leeaceae</b>
68b. Stamens alternate to petals	
69a. Herbs; leaves simple or compound, exstipulate; stamens 5-10	<b>Saxifragaceae</b>
69b. Shrubs or trees; leaves simple, stipulate; stamens 4-5	<b>Celastraceae</b>
51b. Leaves compound	
70a. Twining or erect shrubs; carpels free	<b>Lardizabalaceae</b>
70b. Shrubs or trees; carpels united	
71a. Ovary 1-celled	
72a. Stamens 10, in 2 whorls	<b>Anacardiaceae</b>
72b. Stamens 3-5, in one whorl	<b>Hernandiaceae</b>
71b. Ovary 2 or more celled	
73a. Leaves aromatic gland dotted	<b>Rutaceae</b>
73b. Leaves not aromatic gland dotted	
74a. Herbs or climbers	
75a. Leaves stipulate	<b>Geraniaceae</b>
75b. Leaves exstipulate	
76a. Flowers actinomorphic; sepals 5	<b>Oxalidaceae</b>
76b. Flowers zygomorphic; sepals 2	<b>Fumariaceae</b>

74b. Trees or shrubs, sometimes scandent	
75a. Scandent shrubs with tendrils; filaments not connate into a tube	<b>Vitaceae</b>
75b. Shrubs or trees; filaments connate into a tube	<b>Meliaceae</b>
33b. Ovary inferior	
76a. Stamens numerous, usually more than twice as many as petals	
77a. Succulent herbs; leaves simple; flowers unisexual	<b>Begoniaceae</b>
77b. Herbs, shrubs or trees; leaves simple or compound; flowers bisexual	<b>Rosaceae</b>
76b. Stamens as many as petals or twice the number of petals	
78a. Inflorescence umbellate	
79a. Inflorescence borne on upper side of leaf midrib	<b>Helwingiaceae</b>
79b. Inflorescence not borne on leaf blade	
80a. Herbs; leaves exstipulate; fruit a schizocarp	<b>Araliaceae</b>
80b. Shrubs or trees; leaves stipulate; fruit a drupe or berry	<b>Apiaceae</b>
78b. Inflorescence otherwise	
81a. Leaves stipulate	
82a. Leaves alternate; stamens indefinite	<b>Rosaceae</b>
82b. Leaves opposite; stamens twice as many as petals	<b>Rhizophoraceae</b>
81b. Leaves exstipulate	
83a. Trees or shrubs; flowers surrounded by large showy bracts	<b>Cornaceae</b>
83b. Herbs or shrubs; flowers not surrounded by showy bracts	
84a. Leaves opposite decussate, parallel and palmately nerved	<b>Melastomataceae</b>

84b. Leaves opposite and spiral, pinnately nerved	<b>Onagraceae</b>
31b. Corolla united, usually forming a long or short tube	
85a. Ovary semi inferior or inferior	
86a. Plants climbing with the help of tendrils	<b>Cucurbitaceae</b>
86b. Plants of various habit	
87a. Ovary 1-celled	
88a. Flowers in involucre heads; fruit a 1-seeded achene	<b>Asteraceae</b>
88b. Flowers not in heads; fruit a drupe or berry or an achene	
89a. Leaves basal and cauline; stamens 1-4; fruit an achene	<b>Valerianaceae</b>
89b. Leaves otherwise; stamens 5; fruit a drupe or berry	<b>Caprifoliaceae</b>
87b. Ovary 2-many celled	
90a. Leaves opposite; stipules inter or intra-petiole	<b>Rubiaceae</b>
90b. Leaves otherwise; stipules absent	
91a. Herbs; stamens as many as corolla lobes	<b>Campanulaceae</b>
91b. Trees with stellate hairs; stamens twice as many as or as many as corolla lobes	<b>Styracaceae</b>
85b. Ovary superior	
92a. Plant succulent	<b>Crassulaceae</b>
92b. Plant not succulent	
93a. Stamens more than corolla lobes	
94a. Flowers unisexual; calyx gamosepalous	<b>Ebenaceae</b>
94b. Flowers bisexual; calyx polysepalous	<b>Ericaceae</b>
93b. Stamens as many as corolla lobes or fewer	
95a. Flowers zygomorphic; stamens 2 or 4	

96a. Inflorescence bracteate; bracts prominent and concealing calyx	<b>Acanthaceae</b>
96b. Inflorescence otherwise	
97a. Ovules and seeds few	
98a. Ovary 4 lobed; style gynobasic	<b>Lamiaceae</b>
98b. Ovary not lobed; style terminal	<b>Ebenaceae</b>
97b. Ovules and seeds numerous	
99a. Leaves compound; seeds winged	<b>Bignoniaceae</b>
99b. Leaves simple or dissected; seeds not winged	
100a. Placentation axile	<b>Scrophulariaceae</b>
100b. Placentation parietal	
101a. Perianth 4 or 5 merous; corolla contorted	<b>Gentianaceae</b>
101b. Perianth 5-merous; corolla imbricate or valvate	<b>Gesneriaceae</b>
95b. Flowers actinomorphic; stamens 5	
102a. Leaves alternate	
103a. Flowers in scorpioid cymes	<b>Boraginaceae</b>
103b. Flowers not in scorpioid cymes	
104a. Corolla dry, membranous	<b>Plantaginaceae</b>
104b. Corolla otherwise	
105a. Ovules many in each cell	<b>Solanaceae</b>
105b. Ovules 1-2 in each cell	
106a. Sepals free; corolla lobes contorted	<b>Convolvulaceae</b>
106b. Sepals united; corolla lobes imbricate	<b>Boraginaceae</b>
102b. Leaves opposite	

- 107a. Anthers and stigma united to form a gynostegium;  
       pollen in pollinia **Asclepiadaceae**
- 107b. Anthers and stigma not as above; pollen not in pollinia
- 108a. Plants with milky sap; fruit of two follicles **Apocynaceae**
- 108b. Plants with watery sap; fruit not follicular
- 109a. Herbs hispid; fruit of 4 nutlets **Boraginaceae**
- 109b. Plants not as above
- 110a. Ovules 1-2 in each cell
- 111a. Ovule 1 in each cell **Verbenaceae**
- 111b. Ovule 2 in each cell
- 112a. Stamens 2 **Oleaceae**
- 112b. Stamens 3-5 **Celastraceae**
- 110b. Ovules many in each cell
- 113a. Shrubs or small trees; plants covered with stellate hairs **Buddlejaceae**
- 113b. Herbs; plant glabrous **Gentianaceae**
- 1b. Leaves usually parallel veined; flowers 3-merous; seeds with 1 cotyledons; vascular bundles scattered
- 114a. Inflorescence a fleshy spadix with  
       minute flowers and a large spathe **Araceae**
- 114b. Inflorescence not as above
- 115a. Ovary inferior or semi inferior
- 116a. Ovary 1-celled **Orchidaceae**
- 116b. Ovary 2 or more-celled
- 117a. Fertile stamen 1

118a. Sepals free or at most connivent; anther 1-celled	
119a. Ovules solitary in each cell	<b>Marantaceae</b>
119b. Ovules numerous in each cell	<b>Cannaceae</b>
118b. Sepals united into spathaceous tube	
120a. Leaves spiral; sheaths closed	<b>Costaceae</b>
120b. Leaves distichous; sheaths open	<b>Zingiberaceae</b>
117b. Fertile stamens 2 or more	
121a. Flowers unisexual	
122. Plants climbers, dioecious; leaves alternate or opposite; bracts simple or absent; capsules winged	<b>Dioscoreaceae</b>
122b. Plants tree like erect; monoecious; bracts spathaceous; fruits fleshy not winged	<b>Musaceae</b>
121b. Flowers bisexual	
123a. Leaves fibrous, spine tipped	<b>Agavaceae</b>
123b. Leaves not as above	
124a. Plants scapose with tunicated bulbous rootstock	<b>Amaryllidaceae</b>
124b. Plants not scapose, with tuberous rhizome or corm	<b>Hypoxidaceae</b>
115b. Ovary superior	
125a. Perianth absent or reduced to scales	
125a. Plant arborescent; leaves plicate or pinnatisect	<b>Arecaceae</b>
126b. Plant herbaceous; leaves not as above	

127a. Flowers in dense cylindrical spikes; floral bracts absent	<b>Typhaceae</b>
127b. Flowers in spikelets and in axils of scaly bracts	
128a. Stems terete, hollow; leaf sheaths usually open; anthers dorsifixed or versatile	<b>Poaceae</b>
128b. Stems solid, triangular; leaf sheaths entire or closed; anthers basifixed	<b>Cyperaceae</b>
125b. Perianth distinct	
129a. Perianth biseriate, sepaloid	<b>Juncaceae</b>
129b. Perianth biseriate, inner whorl petaloid	
130a. Perianth segments distinguishable into two heteromorphic series with outer whorl sepaloid and inner petaloid	<b>Commelinaceae</b>
130b. Perianth segments not distinguishable, both perianth segments usually of the same colour, often petaloid or united into a tube below	
131a. Plants aquatic; inflorescence subtended by spathe like leaf sheaths	<b>Pontederiaceae</b>
131b. Plants terrestrial; inflorescence not subtended by spathe as above	
132a. Flowers mostly dioecious; anthers 1-celled	<b>Smilacaceae</b>
132b. Flowers mostly bisexual; anthers 2-celled	
133a. Flowers terminal, solitary	<b>Trilliaceae</b>
133b. Flowers few to many in terminal or axillary clusters	<b>Liliaceae</b>

## Taxonomic Enumeration

### RANUNCULACEAE

Juss., Gen. Pl. 231. 1789

Annual or perennial, herbs, erect or stoloniferous, rarely shrubs or woody climbers. Leaves simple or compound, alternate, rarely opposite, entire or palmately, ternately or pinnately dissected; exstipulate, petiole sometimes broadened into stipule like auricles at base. Inflorescence 1 flowered, cymose, racemose or paniculate. Flowers actinomorphic or zygomorphic, bisexual or unisexual. Sepals 3-8, free, often coloured. Petals 0, 3-5, free. Stamens many, rarely few, free; carpels 1-many, superior, free or shortly connate at base. Fruit follicles or achenes, rarely capsule or berry.

1a. Plant climbers, climbing by means of twining petioles,

leaves opposite

*Clematis*

1b. Plant herbaceous, erect, decumbent or prostrate ; leaves all basal or

alternate along the stem

2a. Leaves all basal

*Eriocapitella*

2b. Leaves basal or alternate on stem

3a. Calyx petaloid, corolla absent

*Thalictrum*

3b. Calyx and corolla both present

*Ranunculus*

*Eriocapitella* Nakai, J. Jap. Bot. 17: 267. 1941

Perennial rhizomatous herbs. Leaves all basal, petiolate, lobed or divided. Flowers actinomorphic, solitary or several in cymes or umbels, scape erect, bracts 2-3 forming an



involucres. Sepals 4-20, petaloid. Petals 0. Stamens numerous; carpels many, ovule 1. Fruit a head of sessile achenes; style persistent.

*Eriocapitella rivularis* (Buch.-Ham.ex DC.) Christenh. & Byng, Global Fl. 4: 75. 2018;  
*Anemone rivularis* Buch.-Ham.ex DC. Hook.f. & T. in Hook.f., Fl. Brit. Ind. 1: 9. 1872;  
Grierson & Long, Fl. Bhut. 1.2:292.1984; Rau in Sharma *et al.*, Fl. Ind. 1:35.1993.

Herbs, rootstock stout. Leaves ternate, puberulous, petiole 5-15 cm; leaflets broadly elliptic, 4-7 × 3-5 cm, deeply trilobed, margins serrate, base cuneate, apex acute. Scapes 7-35 cm, involucres leaf like, deeply incised, segments linear, margin serrate; inflorescence a simple or compound cyme. Flowers white within and blue or purplish outside. Sepals 5-8, elliptic, obovate, 4-10mm, anthers ellipsoid or ovoid, carpels many. Achenes broadly elliptic, compressed with long glabrous hooked beak.

**Fl. & Fr.:** May – August

**Distribution:** India (N.E India), E & W Himalaya, China, Myanmar, Nepal, Sri Lanka, Vietnam

**Specimen examined:** Grows in forest margins, streamsides. Pfutsero. NLNU 0201.

*Clematis* L., Sp. Pl. 1: 543. 1753

Climbers or rarely shrubs. Leaves opposite, simple or ternate, biternate or pinnate, exstipulate, petioles tendrillar. Inflorescence axillary or terminal, flowers actinomorphic, sepals 4-8, petaloid, petals absent. Stamens and carpels many. Achenes with persistent slender plumose style.

1a. Flowers in axillary fascicle at nodes

*C. napaulensis*

1b. Flowers in axillary or terminal racemes or panicles

2a. Sepals spreading from the base

*C. puberula*

2b. Sepals erect with recurved tip

*C. buchananiana*

***Clematis buchananiana*** DC., Syst. Nat. 1: 140. 1817; Hook.f. & T. in Hook.f., Fl. Brit. Ind. 1: 6. 1872; Kanjilal *et al.*, Fl. As. 1(1): 5. 1934; Rau in Sharma *et al.*, Fl. Ind. 1: 60.1993; Haridasan & Rao, For. Fl. Meghalaya 1: 48. 1985; Grierson & Long, Fl. Bhut. 1.2:289.1984.

A slender woody climber. Leaves ternate or pinnate, 3-5 foliate. Leaflets 5-10×3-8 cm, ovate, rounded to cordate at base, acute or shortly acuminate apex, margins dentate serrate, irregularly lobed, sparsely pubescent above denser beneath. Petioles sometimes thickened and broadened at base and narrowly connate. Inflorescence axillary, panicles branched, bracts foliaceous. Sepals 4, creamy yellow, softly tomentose, filaments hairy. Achenes ovate – elliptic, densely hairy.

**Fl. Fr.:** July - January

**Distribution:** India (NE India), Himalaya, Nepal, Myanmar, Bhutan, Vietnam.

**Specimen examined:** Grows in shaded forest margin. Tsupfume. NLNU 0005. **(Pl. 1)**

***Clematis napaulensis*** DC. Syst. Nat. 1: 164. 1817, Hook.f. & T. in Hook.f., Fl. Brit. Ind. 1: 2. 1872; Rau in Sharma *et al.*, Fl. Ind. 1:71,72.1993; Grierson & Long, Fl. Bhut. 1.2: 288.1984.

A glabrous woody climber. Leaves opposite, crowded at nodes, ternate, leaflets ovate-lanceolate, 3-10×1-3 cm, entire or distantly toothed, often 2-3 lobed, base cuneate or rounded, lateral leaflets oblique, apex acuminate, glabrous. Flowers in axillary clusters; pedicels with 2 connate bracts near or in the middle of flower. Sepals 4, oblong-elliptic, 1.5-2×0.5-0.7cm, suberect, greenish yellow. Filaments purplish, glabrous. Achenes obovate, compressed, pubescent, with long feathery tail.

**Fl. Fr.:** October - May

**Distribution:** India, China South-Central, Myanmar, Nepal, Tibet

**Specimen examined:** Grows in forest margins climbing on trees and rocks. Tsupfume, Sakraba. NLNU 0050.

*Clematis puberula* Hook.f. & T., Hook.f. & T. in Hook.f., Fl. Brit. Ind. 1: 4. 1872; Rau in Sharma *et al.*, Fl. Ind. 1:74.1993; Kanjilal *et al.*, Fl. As. 1: 3,4. 1934; Grierson & Long, Fl. Bhut. 1.2: 290.1984.

Slender climbers. Stem deeply grooved, pubescent. Leaves opposite, biternately pinnate; ovate-lanceolate, margin entire, acute or acuminate apex. Inflorescence axillary, few flowered in lax panicles, leafy bracts. Sepals 4, spreading, whitish, elliptic-spathulate, soft hairy outside, glabrous inside. Filaments glabrous, narrow; anthers short. Achenes silky hairy.

**Fl. Fr.:** September - January

**Distribution:** India (NE India), Himalaya, Myanmar, Nepal, Tibet, China

**Specimen examined:** Grows in forest margin in dry open places. Thetsumi. NLNU 0811.

**(Pl. 1)**

***Ranunculus* L., Sp. Pl. 1: 548. 1753**

Annual or perennial, terrestrial or aquatic herbs. Leaves basal or alternate on stems, simple, palmately divided, often ternately lobed or dissected, rarely pinnate; petiole expanded into sheath at base. Flowers bisexual, actinomorphic, solitary or few in a corymb. Sepals 3-5, caducous. Petals 5, each with a nectar-pit near base. Stamens many. Carpels many, style short, ovule 1. Fruit a head or spike of achenes.

***Ranunculus cantoniensis*** DC., Prodr. 1: 43. 1824, Rau in Sharma *et al.*, Fl. Ind. 1:117.1993; Balakr., Fl. Jowai 1:55. 1981; Singh in Singh *et al.*, Fl. Mizo. 1: 124. 2002. *Ranunculus pensylvanicus* auct. Non L.F., Hook.f. & T. in Hook.f., Fl. Brit. Ind. 1: 19. 1872; Kanjilal *et al.*, Fl. As. 1: 9. 1934.

Erect or prostrate herb, rooting at base. Radical leaves trifoliolate, densely hirsute; petioles sheathing at base, 10-20 cm long; leaflets tripartite, deeply cut into narrow segments, 4-8×5-10 cm. Cauline leaves trifoliolate, petioles 1-5 cm long and upper leaves sessile; leaflets ternisect, 3-8 x 5-10 cm, margin irregularly serrate. Flowers solitary, terminal or leaf opposed. Sepals reflexed, elliptic-oblong, 5 x 3 mm. Petals 5, oblong, 5-6 x 3-4 mm, glabrous, yellow. Achenes compressed, in globose head, broadly elliptic, surrounded by narrow marginal rim.

**Fl. Fr.:** May - December

**Distribution:** India, China, Myanmar, Nepal, Thailand, Vietnam, Pakistan, Mongolia, Korea, Japan

**Specimen examined:** Grows in moist, marshy places and often as weed in irrigated fields. Pfutsero, Chozuba. NLNU 0202.

***Thalictrum*** Tourn.ex L., Sp. Pl. 1: 545. 1753

Herbs perennial, erect. Leaves compound, pinnate or 1-4 ternate; leaflets cordate-reniform, obovate, lanceolate, sometimes lobed, margin entire or crenate; petioles sheathing at base, sometimes with stipule like auricles. Inflorescence terminal, sometimes axillary, paniced or raceme. Sepals 4-5, petaloid; petals 0. Stamens many; carpels few or many, ovule 1. Fruit a head of sessile or stalked achenes.

*Thalictrum foliolosum* DC., Hook.f. & T. in Hook.f., Fl. Brit. Ind. 1:14. 1872; Kanjilal *et al.*, Fl. As. 1:7. 1934; Grierson & Long, Fl. Bhut. 1.2:298.1984; Rau in Sharma *et al.*, Fl. Ind. 1:136.1993.

Plant robust, upto 2 m tall, glabrous. Leaf blade 3 ternate, leaflet rhombic-elliptic or ovate, 1-2.5×0.5-1.5 cm, base rounded or sub cordate, apex obtuse or rounded. Inflorescence terminal or axillary, paniculate, many flowered. Sepals 4, caducous, greenish or bluish. Stamens many, filaments filiform, anthers oblong. Carpels 4-6. Achenes sessile, style deciduous.

**Fl. Fr.:** June-October

**Distribution:** India, China, Nepal, Tibet, Myanmar.

**Specimen examined:** Grows in cool forest margins. Kapamodzu. NLNU 0301. **(Pl. 1)**

## MAGNOLIACEAE

Juss., Gen. Pl. 280. 1789

Trees or shrubs. Leaves alternate, entire; stipules large, enclosing the young buds, later deciduous, leaving scar on the branches. Flowers solitary, terminal or axillary, large, showy. Perianth arranged in one whorl of sepals and 2-4 whorls of petals in series of 3. Stamens and carpels numerous, and spirally arranged on an elongated torus. Fruit apocarpous or sometimes syncarpous, mature carpels dehiscent longitudinally or transversely.

*Magnolia* Plum.ex L., Sp. Pl. 1: 535

Trees or shrubs, evergreen or deciduous. Twigs with annular stipular scars. Leaves alternate, simple, entire; stipules envelop the young buds. Flowers solitary, terminal, axillary, bisexual, large, fragrant. Perianth parts 9-12 in 3-4 whorls. Stamens numerous,

filaments flat, deciduous. Carpels many, persistent, styles curved outward; ovules 2 per carpel, stigmas papillate. Fruit an elongated axis dehiscing along dorsal sutures.

1a. Gynophore present, fruit a lax spike *M.doltsopa*

1b. Gynophore absent, fruit compact *M.insignis*

***Magnolia doltsopa*** (Buch.-Ham. ex DC.) Figlar, Proc. Int. Symp. Magnoliac. 1: 21. 2000; *Michelia doltsopa* DC. Syst. 1: 448. 1818; *Magnolia excelsa* Wall. Tent. Fl. Nep. 5.t. 2. 1824; *Michelia excelsa* (Wall.) Bl. Fl. Jav. 1: 9. 1828; Raju in Sharma *et al.*, Fl. Ind. 1: 176. 1993; Hook.f. & T. in Hook.f. Fl. Brit. Ind. 1: 43. 1872; Kanjilal *et al.*, Fl. As. 1: 21. 1934.

Trees, upto 25 m tall. Bark dark grey, corky, lenticellate with irregular lines. Young branchlets ferruginous tomentose, buds brownish grey, densely pubescent. Leaves oblong-elliptic, oblanceolate, 15-25×4-7 cm, entire, base cuneate or obtuse, apex acute to acuminate, glabrous above, densely pubescent beneath at first. Flowers axillary, creamy white, fragrant, 10-13 cm across, perianth 9-12, oblanceolate. Stamens 50-80, yellowish. Carpels about 40, gynophore 6-8 mm, styles recurved. Fruiting receptacles 7-12 cm; ripe carpels obliquely ovoid, beaked, compressed.

**Fl. & Fr.:** March - October

**Distribution:** India (NE India), E Himalaya, China South-Central, Myanmar, Nepal

**Specimen examined:** Grows in temperate forest. Pfitsero. NLNU 0210. (**Pl. 1**)

***Magnolia insignis*** Wall., Tent. Fl. Nepal. 1:5, t. 1. 1824; Raju in Sharma *et al.*, Fl. Ind. 1: 170. 1993; *Manglietia insignis* (Wall.) Bl. Fl. Jav. 1: 23. 1828; Hook.f. & T. in Hook.f. Fl. Brit. Ind. 1: 42. 1872; Kanjilal *et al.*, Fl. As. 1: 21. 1934; Brandis, Ind. Trees 6. 1906; Haridasan & Rao, For. Fl. Megh. 1: 57. 1985.

Trees, to 30 cm tall. Bark grayish white to brown, with faint vertical fissures. Leaves elliptic lanceolate, oblanceolate, base cuneate, acute or acuminate apex, 15-25×3-6 cm, entire margin, glabrous, coriaceous, lateral nerves 10-18 pairs. Flowers large, fragrant, pinkish white, 10-15 cm across. Outer tepals 3, pink; inner tepals 9, pinkish white, obovate, spatulate. Anthers sessile. Gynophore absent. Carpels densely crowded on receptacle, beaked. Fruit subcylindric or ovoid, purplish red when fresh.

**Fl. & Fr.:** May- September

**Distribution:** India (NE India), E Himalaya, China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Evergreen broad-leaved forest. Sakraba. NLNU 0781. (**Pl. 1**)

## SCHISANDRACEAE

Blume, Fl. Javae 32-33: 3. 1830

Small trees or shrubs. Leaves alternate, simple, entire, coriaceous, exstipulate, often clustered or whorled at branch ends. Flowers axillary or supraaxillary, usually solitary or 2-3 flowered, bisexual. Perianth parts spirally arranged, free, 7-33; outer tepals small, sometimes bractlike, inner tepals large, ligulate or suborbicular, innermost tepals often reduced. Stamens numerous, free, filaments short, anthers basifixed, dehiscing longitudinally. Carpels 8-12(-21), locules 8-12, ovary 1 loculed, style short. Fruit an aggregate of globose fleshy carpels in an elongated receptacle or spreading compressed hard follicles star shaped, dehiscing along ventral suture.

*Illicium* L., Syst. Nat. ed. 10, 2: 1050. 1759

Shrub or small trees. Leaves alternate, simple, entire, stipules absent, coriaceous, often whorled at branch ends. Flowers axillary, or subterminal, usually solitary, rarely 2-3.

Tepals 7-33, free. Outer tepals small, inner tepals becoming large and innermost tepals reduced. Stamens numerous in several series; Carpels about 20, in a single whorl, ovary unilocular. Fruit star shaped of single seeded follicles, dehiscing ventrally. Seeds elliptic to ovate, compressed.

1a. Perianth segments ca 26; stamens 20-30, carpels 12-13 *I. griffithii*

1b. Perianth segments 23-27; stamens 18, carpels 7-8 *I. simonsii*

***Illicium griffithii*** Hook.f. & Thomson, Fl. Ind. 1: 74. 1855; Raju *et al.*, in Sharma *et al.*, Fl. Ind. 1: 186. 1993; Kanjilal *et al.*, Fl. As. 1: 27. 1934; Grierson & Long, Fl. Bhut. 1.2:249.1984; Hook.f. & Th. in Hook.f. Fl. Brit. Ind. 1:40. 1872.

Shrub or small trees of 3-5 m, evergreen, glabrous. Leaves ovate, elliptic-oblong, 5-13×2-5 cm, coriaceous, entire, cuneate at base, apex acuminate, clustered at distal ends. Flowers axillary or subterminal, solitary or in clusters of 2-3, pedicel 1-2.5 cm. Perianth segments ca 26, ovate to suborbicular, outer segments papery, inner ones fleshy. Stamens biseriate, 20-30, filaments fleshy. Carpels 12-13, in a single whorl, style recurved. Fruit a follicle, compressed, narrowed at apex into an incurved beak.

**Fl. & Fr.:** April – November

**Distribution:** India (NE India), E Himalaya, Bhutan, China, Myanmar

**Specimen examined:** Grows in sub tropical forest, along forest margins. Pfutsero. NLNU 0204. (Pl. 1)

***Illicium simonsii*** Maxim., Bull. Acad. Imp. Sci. St.- Pt. 3, 32: 480. 1888; *I. manipurens* Watt ex King in Ann. Roy. Bot. Gard. Calcutta 3(2): 200. 1891; *I. fargesii* Finet &



Gagnepain in Bull. Soc. Bot. Fr. 52: 29. 1905; Raju *et al.*, in Sharma *et al.*, Fl. Ind. 1: 187. 1993.

Shrub or small trees of 5-7 m. Leaves elliptic, oblong, cuneate at base, apex shortly acuminate, entire, coriaceous, petioles 1-1.5cm. Flowers axillary, solitary, pedicels very short. Tepals 23-27, whitish yellow, outer ones oblong, inner ones ligulate. Stamens 18, biseriate, connective truncate or cuspidate. Carpels 7-8, ellipsoid, flattened, free.

**Fl. & Fr.:** February – October

**Distribution:** India (NE India), Myanmar

**Specimen examined:** Grows in subtropical higher altitude forest. Kapamodzu. NLNU 0278.

**(Pl. 2)**

## ANNONACEAE

Juss., Gen. Pl. 283. 1789

Trees, shrubs or climbers. Leaves simple, alternate, entire, coriaceous, exstipulate, glossy above, glaucous beneath. Inflorescence axillary, extraaxillary, terminal or leaf opposed, solitary or in cymes or panicles. Flowers bisexual, rarely unisexual, often scented. Sepals 3, free, usually valvate. Petals 6, in 2 whorls, valvate or imbricate, inner ones sometimes absent. Stamens numerous, free, filaments short. Carpels small, usually numerous, free, superior; style short or absent, stigma capitate or grooved. Fruit of dry or fleshy carpels, usually stalked, which elongates as fruit ripens.

1a. Climbing or scrambling shrubs, carpels of fruit long stalked, globose

or subglobose

*Fissistigma*

1b. Erect shrubs or trees, carpels of fruit subsessile, ellipsoid, pointed

at apex

*Goniothalamus*

***Fissistigma*** Griff., Notulae 4: 706. 1854

Climbing or scrambling shrubs. Leaves pubescent to tomentose, veins stout, parallel. Flowers bisexual, terminal, axillary or leaf opposed, solitary or several in cymes or branched panicles. Sepals 3, connate at base, persistent. Petals 6, in 2 whorls, leathery, outer petals larger than inner petals. Stamens many. Carpels many, free, styles clavate, stigma short. Fruit ovoid or globose, thick walled, berry stalked. Seeds many.

***Fissistigma verrucosum*** (Hook.f & Thomson) Merr., Philip. J. Sci. Bot. 15: 137. 1919; D. Mitra in Sharma *et al.*, Fl. India 1: 303. 1993; *Melodorum verrucosum* Hook.f. & Thomson, Fl. Ind. 1: 119. 1855; Balakr., Fl. Jowai 1: 66. 1981; Kanjilal *et al.*, Fl. As. 1.1: 47. 1934; Hook.f. & Thomson, Fl. Brit. Ind.1: 80. 1872; Haridasan & Rao, For. Fl. Megh. 1: 70. 1985.

Large woody climbers. Stem lenticelled, young branches brown tomentose. Leaves oblong-lanceolate, 7-11×2-3.5 cm, base cuneate or rounded, apex acute or short acuminate, entire, glabrous above, rusty tomentose beneath, lateral nerves 15-18 pairs; petiole 0.8-1.2 cm long. Flowers solitary, terminal, leaf opposed, umbel on short peduncle, pale yellow, scented. Sepals ovate, acute, spreading, tomentose. Petals velvety. Fruit ellipsoid or subglobose, verrucose; seeds in 2 rows.

**Fl. & Fr.:** March-January

**Distribution:** India (NE India), Bangladesh, Myanmar

**Specimen examined:** Grows in dense forest climbing over trees. Sakraba. NLNU 0784. (Pl. 2)

***Goniothalamus*** (Blume) Hook.f. & Thomson, Fl. Ind. 1: 105. 1855

Shrubs or small trees. Leaves coriaceous, distinctly veined. Flowers solitary, axillary. Sepals 3, valvate. Petals 6 (3+3), valvate, coriaceous, outer petals erect, inner ones shortly clawed at base with upper parts broadened and cohering in a narrow cone. Stamens many, linear-oblong. Carpels many, style linear, stigma simple or bifid. Fruit subsessile, fleshy.

***Goniothalamus sesquipetalis*** Hook. f. & Thomson, Fl. Ind., 1:108. 1855; Kanjilal *et al.*, Fl. As. 1.1: 37. 1934; Hook.f. & Thomson, Fl. Brit. Ind.1: 73. 1872; *Guatteria sesquipetalis* Colebr.ex Wall., Pl. Asiat. Rar. 3: 42. 1832; Balakr., Fl. Jowai, 1: 66. 1981; D. Mitra in Sharma *et al.*, Fl. India, 1: 237. 1993; Singh in Singh *et al.*, Fl. Mizo., 1. 144. 2002; Grierson & Long, Fl Bhut., 1.2: 243. 1984.

Erect shrubs or undershrubs, upto 3 m tall. Sparingly branched, glabrous. Leaves oblong-lanceolate, 18-30×4-8 cm, base cuneate or attenuate, apex acuminate, margin entire, recurved, glabrous, lateral nerves 15-20 pairs; petioles 1-1.3 cm long. Flowers solitary or fascicled, axillary or supra-axillary, greenish yellow, bracteate at base. Sepals 3, ovate, free, pubescent. Petals 6(3+3), outer petals ovate-lanceolate, 2×0.5 cm; inner petals shortly clawed and free in lower parts, 1.2×0.4 cm. Stamens many. Carpels few, hairy, styles slightly recurved, stigma funnel-shaped. Fruit sub-sessile, obovoid-ellipsoid, orange-red when matured.

**Fl. & Fr.:** April-August

**Distribution:** India (NE India), E Himalaya, Bangladesh, Myanmar

**Specimen examined:** Grows in primary forest in shaded places under big trees. Chizami. NLNU 0551.

## MENISPERMACEAE

Juss., Gen. Pl. 284. 1789

Shrubs, twinning or climbing. Leaves alternate, simple, entire or lobed, petiolate, sometimes peltate, stipules absent. Inflorescence axillary or on old wood, fascicles, cymose, paniculate. Flowers small, unisexual, regular, rarely asymmetrical. Sepals 6, in 2 whorls of 3 or sometimes 4-5, imbricate. Petals 3 or 6, in 1 or 2 whorls. Male flowers: stamens 3-6, opposite petals, free or united. Female flowers: staminodes present or absent; carpels 1-6, free. Fruit drupaceous.

- |   |                    |
|---|--------------------|
| 1a. Inflorescence umbellate or subcapitate        | <i>Stephania</i>   |
| 1b. Inflorescence paniculate cymose or racemiform | <i>Cissampelos</i> |

*Cissampelos* L., Sp. Pl. 1031. 1753

Twining or erect shrubs. Leaves peltate or not, palmately nerved. Male flowers in axillary corymbose cymes, solitary or fascicled on peduncle; sepals 4, petals connate into cup-shape; stamens 4-10. Female flowers in elongated thyrsoid cymes or fascicles; sepal 1; petals 2-3; staminodes absent; carpel solitary. Fruit a drupe, compressed.

*Cissampelos pareira* var. *hirsuta* (Buch.-Ham. ex DC.) Forman, Kew Bull. 22: 356. 1968; Pramik & Gangopadhyay in Sharma *et al.*, Fl. Ind. 1:317.1993; Singh in Singh *et al.*, Fl. Mizo. 1: 147. 2002; *C. hirsuta* Buch.-Ham. ex DC., Syst. Nat. 1: 535. 1817; *C. pareira* L., Sp. Pl. 1031. 1753; Hook.f. & Th. in Hook.f., Fl. Brit. Ind. 1: 103. 1872; Kanjilal *et al.*, Fl. Assam 1: 52. 1934.

Twining shrubs, young parts tomentose. Leaves broadly ovate or orbicular, peltate, 3-8 x 4-8 cm, base cordate or truncate, apex mucronate, margin entire, pubescent above,

glaucous beneath, palmately 5-7 nerved; petioles 3-8 cm, inserted at base of lamina. Male flowers greenish-yellow in axillary subcorymbose cymes, pubescent; sepals 4-6, pilose; petals 4, connate into a cup; stamens connate into a column. Female flowers greenish, crowded in the axils; sepals 1; petals 1, obovate, stigma 3-fid. Drupe compressed, obovoid-globose, ridged.

**Fl. & Fr.:** April - July

**Distribution:** India (throughout), Tropics and Subtropics

**Specimen examined:** Common in forest, bushes. Chozuba. NLNU 0305. **(Pl. 2)**

*Stephania* Lour., Fl. Cochinch. 608. 1790

Twining herbs or shrubs, or woody vines. Leaves pelate, ovate or deltoid, palmately veined. Inflorescence axillary or on old wood, umbellate or subcapitate. Male flowers: sepals 6, in 2 series; petals 3; stamens connate into column. Female flowers symmetrical or asymmetrical; sepals and petals as many as of the male but sometimes fewer; carpel 1; stylae short. Fruit a drupe, obovoid, compressed.

*Stephania japonica* (Thunb.) Miers, Ann. Mag. Nat. Hist., ser. 3. 18: 14. 1866; Pramik & Gangopadhyay in Sharma *et al.*, Fl. Ind. 1:335.1993; Singh in Singh *et al.*, Fl. Mizo. 1: 155. 2002; *S. hernandifolia* (Willd.) Walp., Repert. Bot. Syst. 1: 96. 1842; Hook.f. & Th. in Hook.f., Fl. Brit. Ind. 1: 103. 1872; Kanjilal *et al.*, Fl. Assam 1: 51. 1934.

Slender twiner, branchlets glabrous. Leaves deltoid, broadly ovate, 7-9 x 4-7 cm, base rounded, apex acuminate, margin entire, membranous, glabrous above, hirsute beneath; petioles 3-7 cm long. Flowers in axillary, capitate umbels, greenish white or yellow, peduncle about 6 cm long. Male flowers sessile, in dense capitate cluster, sepals 6-8, petals

3-4, stamens 6 or 8. Female flowers similar to male, carpel ovoid. Fruit a drupe, obovate or sub-globose, red when ripe.

**Fl. & Fr.:** June - October

**Distribution:** India (NE India), E Himalaya, Malaya, Myanmar, Nepal, New Guinea, Nicobar Is., Sumatera, Thailand, Vietnam

**Specimen examined:** Grows twining on trees or thickets in secondary forest, or open forests. Wazeho. NLNU 0751. **(Pl. 2)**

## **BERBERIDACEAE**

Juss., Gen. Pl. 286. 1789

Shrubs, often spiny. Leaves alternate, simple or 1-pinnate, exstipulate. Flowers solitary or several to many in fascicles or racemes, bisexual, actinomorphic. Sepals and petals similar, usually 6 of each in whorls of 3, free, yellow or greenish, sometimes tinged with red, petals with 2 oblong glands near base. Stamens 6, slightly adnate to base of petals, anthers opening by valves. Ovary consisting of a single carpel, superior, ovules few, basal, style short or absent, stigma rounded. Fruit a berry.

***Mahonia*** Nutt., Gen. N. Amer. Pl.1: 211. 1818

Unarmed shrubs. Leaves unevenly 1-pinnate, rachis articulated at each leaflet node. Flowers in narrow fascicled racemes. Sepals usually in 3 series of 3, yellow. Petals 6 in 2 series of 3.

***Mahonia napaulensis*** DC., Syst. Nat. 2: 21. 1821; Grierson & Long, Fl. Bhut. 1.2:327, 1894; *Berberis nepalensis* (DC.) Spreng., Hook.f. & T., in Hook.f. Fl. Brit. Ind. 1: 109. 1872; *M. nepalensis* DC., Kanjilal *et al.*, Fl. As. 1:16. 1982.

Shrub about 3m tall, stems leafy near apex. Leaves coriaceous, 30-45cm, leaflets opposite, 6-13 pairs, ovate to suborbicular, apex acute, base rounded or truncate, coarsely spinose-dentate with 3-7 teeth on each side, glabrous. Racemes 10-25 cm in fascicles of 6-10, bracts oblong ovate. Sepals ovate to obovate. Petals obovate. Berries ellipsoid, blue-black, glaucous.

**Fl. & Fr.:** October - March

**Distribution:** India (NE India), E & W Himalaya, China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in forest. Tsupfume. NLNU 0008.

### **LARDIZABALACEAE**

R. Br., Trans. Linn. Soc. London 13:212. 1821

Twining or erect shrubs. Monoecious. Leaves alternate, trifoliate, digitately compound or pinnate; stipules absent. Flowers unisexual, in racemes, actinomorphic. Sepals 6 in 2 series, petaloid. Petals 6, nectar-like, smaller than calyx or absent. Stamens 6, filaments free or connate into a tube at base; anthers free; staminodes 6, or absent in female flowers. Carpels 3, superior, free, ovules numerous; pistillodes usually present in male flowers. Fruit fleshy follicles or baccate. Seeds ovoid numerous.

***Stauntonia*** DC., Numer. List: n. 4950. 1831

Woody twining shrubs. Monoecious or dioecious. Leaves alternate, trifoliate or digitate with upto 9 leaflets. Flowers fragrant, in axillary fascicles or racemes. Sepals 6, 2-series, 3 outer valvate, ovate, slightly fleshy. Male flowers stamens 6, filaments connate into

a tube at base, pistillodes minute. Female flowers carpels 3, straight; staminodes minute. Fruits oblong to ellipsoid, fleshy, indehiscent. Seeds within the pulp.

***Stauntonia latifolia*** (Wall.) R.B.ex Wall., Numer. List: n. 4950. 1831; *Holboellia latifolia* Wall., Tent. Fl. Nepal.: 24. 1824; Hook.f. & Thoms in Hook. f. Fl. Brit. Ind. 1: 108. 1872; Kanjilal *et al.*, Fl. As. 1: 61.1934; Balakr., Fl. Jowai 1: 71.1981; Grierson & Long, Fl. Bhut. 1.2: 330. 1984.

Woody climbers. Leaves digitately 3-7-foliolate, ovate-elliptic 5-10 x 2-5 cm, base rounded or cuneate, apex acute to acuminate, margins entire, glabrous; petioles slender 4-11 cm, petiolules 1-4 cm. Flowers green to purplish green in axillary fascicles or racemes. Bracts broadly ovate or suborbicular, scaly, persistent. Male flowers: outer 3 sepals oblong, inner 3 sepals oblong-lanceolate; petals minute; stamens 6; pistillodes linear. Female flowers: sepals oblong-ovate; staminodes minute; carpels oblong. Fruit pyriform, 3-7 cm, rugose outside. Seeds numerous.

**Fl. & Fr.:** April - September

**Distribution:** India (NE India), E & W Himalaya, Bangladesh, Bhutan, China, Nepal

**Specimen examined:** Grows in primary and secondary forest in shaded moist areas. Sakraba. NLNU 0783. **(Pl. 2)**

## BRASSICACEAE

Burnett, Outlines Bot. (Burnett) 854, 1093, 1123. 1835

Annual, biennial or perennial herbs, with a pungent watery juice. Leaves alternate, exstipulate, simple or pinnate, entire or variously lobed. Flowers bisexual, actinomorphic, solitary, scapose, or in racemes or corymbs. Sepals 4, free, saccate at base. Petals 4, free,



alternating with sepals, arranged in the form of a cross. Stamens 6, in 2 whorls, the outer pair shorter than the inner 4. Ovary superior, usually divided into 2 cells by a membranous septum, sometimes 1 celled or with 2 or more superposed cells, ovules 1 to many per locule, parietal placentation. Style short or absent, stigma capitate. Fruit a dehiscent pod-like siliqua, opening by 2 valves. Seeds exalbuminous, 1-many in 1-2 rows in each cell.

***Cardamine*** L., Sp. Pl. 2: 654. 1753

Herbs, annual or perennial, glabrous or with simple hairs. Stems erect or prostrate, leafy, plant scapose. Leaves simple, ternate or pinnate; basal leaves petiolate, rosulate, entire or pinnatisect; cauline leaves alternate. Flowers in racemes, ebracteate. Sepals ovate or oblong, pouched at base. Petals obovate, rounded or emarginated, base narrowed or clawed. Stamens 6, tetradynamous, rarely 4 and equal in length, anthers ovate, oblong or obtuse at apex. Ovules 4-many per ovary. Fruit siliqua narrow, linear, dehiscent explosively and becoming coiled at maturity. Style short, stigma rounded or bilobed. Seeds few to many in a row.

***Cardamine hirsuta*** L., Sp. Pl. 655. 1753; Hook.f., Fl. Brit. Ind. 1:138. 1872; Kanjilal *et al.*, Fl. As. 1.1: 70. 1934; Balakr., Fl. Jowai 1: 73. 1981; Grierson & Long, Fl. Bhut. 1.2: 431. 1984.

Annual herbs, plants 15-30 cm. Leaves pinnate or pinnatisect; leaflets of varying shapes, orbicular, ovate or elliptic, entire or dentate lobulate. Flowers white, small, 1.5-2 cm across, in terminal racemes. Sepals minute. Petals twice as long as sepals, erect, clawed. Siliques linear, flat, 1.5-2 cm long. Seeds ellipsoid, smooth, 8-16 per cell.

**Fl. & Fr.:** April-October

**Distribution:** Cosmopolitan

**Specimen examined:** Grows in damp areas, paddy fields, wastelands. Chozuba. NLNU 0303.

## CAPPARACEAE

Juss., Gen. Pl. 242. 1789

Herbs, shrubs or trees, sometimes scandent. Leaves alternate, simple or palmately compound, stipules present or absent. Flowers in terminal or axillary racemes, or flowers solitary or fascicled; bisexual, regular or irregular. Sepals 4-8, free or basally connate. Petals 4-8 or absent, with or without a claw. Stamens 4 to numerous, exserted, filaments free, filiform. Ovary sessile or stalked, 1 celled, style short or absent, ovules few to numerous. Fruit a capsule or berry. Seeds 1 to many seeded.

1a. Sepals and petals 4; fruit a berry *Caparis*

1b. Sepals 5-6, petals absent; fruit a drupe *Stixis*

### *Capparis* Tourn.ex L., Sp. Pl. 503. 1753

Small trees or shrubs, erect or straggling. Leaves simple, alternate, stipules 2 or absent, sometimes as curved or straight spines. Flowers axillary or terminal, racemes, corymbs or umbels, sometimes 2-10 flowered in vertical rows at or above leaf axils. Sepals 4, in 2 series. Petals 4, in 2 pairs, upper pair erect and united at base, lower pair longer and oblique. Stamens numerous. Ovary borne on a gynophore, stigma sessile. Fruit a berry, ellipsoid or globose, seeds many.

1a. Inflorescence of superaxillary rows of 2-10 flowers

2a. Flowers in rows of 7-10, on leafless shoots *C.multiflora*

2b. Flowers 2-4, at or above leaf axils *C.acutifolia*

1b. Inflorescence terminal, subumbellate corymbs forming panicles *C.sikkimensis*

***Capparis acutifolia*** Sweet, Hort. Brit. ed. 2: 585. 1830; *C.sabiaefolia* Hook.f. & Th. in Hook.f., Fl. Brit. Ind. 1: 179. 1872; Kanjilal *et al.*, Fl. As. 1: 78. 1934; Balakr., Fl. Jowai 1: 74. 1981; Grierson & Long, Fl. Bhut. 1.2: 414. 1984; Haridasan & Rao, For. Fl. Megh. 1: 85. 1985.

Shrubs, erect or scandent, glabrous; stipular thorns straight, small. Leaves elliptic lanceolate, 5-11×2-4 cm, apex caudate acuminate, base cuneate or rounded, margin entire wavy; petiole 0.5-0.7 cm, grooved above. Flowers axillary, or solitary in 2-4 rows. Sepals elliptic, obtuse. Petals white, obovate. Stamens numerous, filaments filiform. Ovary ovoid, glabrous. Fruit globose.

**Fl. & Fr.:** April-October

**Distribution:** India (NE India), Bhutan, China, Myanmar, Thailand, Vietnam

**Specimen examined:** Grows in secondary forest as undergrowths, in slopes. Chozuba. NLNU 0304. (Pl. 2)

***Capparis multiflora*** Hook. f. & Thom. in Hook. f., Fl. Brit Ind. 1: 178. 1872; Kanjilal *et al.*, Fl. As. 1: 76. 1934; Grierson & Long, Fl. Bhut. 1.2: 414. 1984; Singh in Singh *et al.*, Fl. Mizo. 1: 169. 2002.

Shrubs or small trees. Shoots whitish pubescent, terete, glabrescent, stipular spines short, straight. Leaves elliptic lanceolate, 8-20 x 3-6 cm, apex acuminate, base cuneate, margin entire, glabrous; petiole 0.5-1 cm. Flowers white, arranged in vertical rows of 7-10 on leafless shoots, 10-20 cm long, between old and new leaves. Sepals 4, ovate, glabrous. Petals 4, oblong, glabrous. Stamens 12, filaments filiform. Gynophore 0.6-1.2 cm, minutely pubescent or glabrous. Fruit globose, glabrous, 1cm across.

**Fl. & Fr.:** April-October

**Distribution:** India (NE India), E Himalaya, Bhutan, China, Myanmar, Nepal, Tibet

**Specimen examined:** Grows in secondary forest as undergrowths, in slopes. Chepoketa.

NLNU 1051. **(Pl. 3)**

*Capparis sikkimensis* Kurz, J. Asiat. Soc. Bengal, Pt.2, Nat. Hist. 43: 181. 1874; Grierson & Long, Fl. Bhut. 1.2: 415. 1984.

Scandent shrubs, or vines armed with hooked spines. Leaves elliptic, or elliptic-lanceolate 7-12 x 3-5 cm, apex acute, base cuneate, glabrous, coriaceous; petioles 1-2 cm. Flowers in terminal or axillary subumbels on flowering twigs forming a terminal panicles, 3-8 flowered; peduncle 2-5 cm, with brown tomentum. Sepals orbicular, outer whorl leathery with brown tomentum, inner whorl thin. Petals white, obovate, tomentose inside. Stamens numerous, filament filiform. Gynophore glabrous, ovary ovoid. Fruit globose or ellipsoid, smooth.

**Fl. & Fr.:** May-November

**Distribution:** India (NE India), E Himalaya, Bhutan, China, Myanmar, Tibet

**Specimen examined:** Grows in secondary forest. Sakraba. NLNU 0651 **(Pl. 3)**

*Stixis* Lour., Fl. Cochinch. 295. 1790

Shrubs or woody climbers, twigs lenticellate. Leaves simple, alternate, leathery; petiole thickened apically. Flowers in axillary racemes or panicles, many flowered; bracts deciduous. Sepals 5-6, usually connate into a short tube. Petals absent. Stamens numerous. Gynophore as long as filaments, ovary ellipsoid or globose, 1-celled. Fruit a drupe, pulpy, 1 seeded.

*Stixis suaveolens* (Roxb.) Baill., Bull. Bot. Soc. Linn. Paris 1: 654. 1887; Raghvan in Sharma *et al.*, Fl. Ind. 2: 333. 1993; *Roydsia suaveolens* Roxb., Pl. Corom. 3: 87.t. 289. 1819; Hook.f. & Thomson in Hook.f., Fl. Brit. Ind. 1: 180. 1872; Kanjilal *et al.*, Fl. As. 1: 79. 1934; Grierson & Long, Fl. Bhut. 1.2: 411. 1984; Singh in Singh *et al.*, Fl. Mizo. 1: 175. 2002.

Unarmed woody climbers, branchlets white dotted. Leaves oblong, lanceolate, 10-24×4-9 cm, apex abruptly acuminate, base cuneate, entire, glabrous, shining above; petioles 1-1.5 cm long. Flowers axillary, in racemes or terminal panicles, 10-20 cm long, fragrant, bracts caducous. Sepals ovate elliptic, 0.4-0.6×0.2 cm, reddish yellow. Petals absent. Stamens numerous, yellow, white, filaments stout. Gynophore enlarging in fruit, ovary ellipsoid. Drupe ellipsoid or obovoid, pulpy, 1 seeded, brown orange, surface covered with flat whitish warts.

**Fl. & Fr.:** May-November

**Distribution:** India (NE India), E Himalaya, Bangladesh, Bhutan, Cambodia, China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in secondary forest. Sakraba. NLNU 0653.

## VIOLACEAE

Batsch, Tab. Affin. Regni Veg. 57. 1802

Herbs, shrubs or small trees. Leaves alternate, simple, stipules present. Flowers solitary or fasciculate, regular or irregular, bisexual. Sepals 5, free, usually persistent. Petals 5, free, equal or unequal. Stamens 5, filaments short, broad; anthers free or connate. Ovary superior, 1-celled; style simple. Fruit a capsule.

- 1a. Plant glabrous or sparsely pubescent; petioles glabrous; stipules entire *V.hamiltoniana*
- 1b. Plant pubescent or glabrous; petioles pubescent; stipules fimbriate
  - 2a. Leaves pilose, acute or acuminate *V.pilosa*
  - 2b. Leaves canescent, obtuse *V.canescens*

***Viola* L., Sp. Pl. 933. 1753**

Herbs, rarely shrubs, stoloniferous. Stem absent or short. Leaves simple, alternate, stipules leaf like, persistent, free or adnate to petiole. Flowers bisexual, irregular, axillary, solitary, sometimes cleistogamous. Sepals 5, persistent. Petals 5, unequal, lower largest, spurred at base. Filaments free; anthers free or mostly connivent around ovary, connectives of 2 lower often spurred at base. Ovary 3-carpelled, ovules many; stigma simple or lobed. Fruit a capsule.

***Viola canescens*** Wall., Roxb., Fl. Ind. 2: 450. 1824; Banerjee & Pramanik in Sharma *et al.*, Fl. Ind. 2: 359. 1993; Singh in Singh *et al.*, Fl. Mizo. 1: 177. 2002; *V. serpens* Wall. var. *canescens* (Wall.) Hook.f. & Thomson in Hook. f., Fl. Brit. Ind. 1: 184. 1872.

Herbs, prostrate, pubescent or glabrous. Stems with runners. Leaves ovate-cordate to subreniform, 1-4 x 1.5-3 cm, apex obtuse to acute, margin crenate-serrate; petioles 4-8 cm, pubescent, stipules lanceolate, fimbriate. Flowers on peduncles of 6-10 cm long, pale violet, bracteoles 2. Sepals pubescent, trinerved. Petals obovate-oblong, lowermost petal with dark colour streaks, spurred. Ovary villous, stigma truncate. Capsules pubescent, sub-globose, many seeded.

**Fl. & Fr.:** March - October

**Distribution:** India (throughout), E & W Himalaya, Myanmar, Nepal, East Asia

**Specimen examined:** Grows in open cultivated, moist common places, open forest floors.

Tsupfume. NLNU 0010. (Pl. 3)

*Viola hamiltoniana* D. Don, Prodr. Fl. Nepal. 206. 1825; Banerjee & Pramanik in Sharma *et al.*, Fl. Ind. 2: 363. 1993; Singh in Singh *et al.*, Fl. Mizo. 1: 178. 2002; *V. arcuata* Blume, Bijdr. Fl. Ned. Ind. 58. 1826; Kanjilal *et al.*, Fl. As. 1.2:81. 1934; *V. distans* Wall., Trans. Med. Soc. Calcutta 7: 227. 1835; Hook.f. & Thomson in Hook. f., Fl. Brit. Ind. 1: 183. 1872.

Perennial herbs. Stem slender, ascending or trailing, upto 20 cm long. Leaves ovate to reniform or deltoid, 1-3.5 x 1.5-3.5 cm, base deeply cordate, glabrous or sparsely puberulous, margin crenate-serrate; petioles glabrous, upto 4 cm long, stipules sub-entire. Flowers solitary on long peduncles, glabrous, pale purple to white, bi-bracteolate, near the middle. Sepals lanceolate acute. Petals obovate, spur saccate. Capsule ellipsoid-oblong, glabrous, many seeded.

**Fl. & Fr.:** March - June

**Distribution:** India (NE India), E & W Himalaya, Bhutan, China, Malaysia, Myanmar, Nepal, Philippines

**Specimen examined:** Grows in open common places, open forest floors. Tsupfume. NLNU 0012. (Pl. 3)

*Viola pilosa* Blume, Catalogus: 57. 1823; Singh in Singh *et al.*, Fl. Mizo. 1: 178. 2002; Grierson & Long, Fl. Bhut. 2. 1: 228. 1991; *V. serpens* Wall. ex Ging., DC. Prodr. 1: 296. 1824; Hook.f. & Thomson in Hook. f., Fl. Brit. Ind. 1: 184. 1872; Kanjilal *et al.*, Fl. As. 1.2:81. 1934.

Stoloniferous herbs. Stem slender, ascending or trailing. Leaves ovate to deltoid, 2-5 x 1.5-3 cm, base deeply cordate, apex acute or acuminate, margin crenate-serrate, sparsely

pubescent; petioles about 7 cm long, stipules lanceolate, fimbriate. Flowers white to bluish, peduncles 3-7 cm, pilose. Sepals linear-lanceolate. Petals obovate, spur saccate. Style trumpet shaped, stigma crooked. Capsule ellipsoid-globose, seeds few.

**Fl. & Fr.:** February - May

**Distribution:** India (throughout), E & W Himalaya, Bhutan, China, Myanmar, Nepal, Thailand, Tibet, Vietnam.

**Specimen examined:** Grows in open cultivated, moist common places. Pfutsero. NLNU 0102. (Pl. 3)

## FLACOURTIACEAE

DC., Prodr. 1: 255. 1824

Trees or shrubs. Bisexual, monoecious, dioecious, or polygamous. Leaves simple, alternate, sometimes crowded toward apex of branches; stipules usually small and caducous, sometimes leaflike and persistent; margin entire or toothed; petioles often thickened at the base and apex. Flowers axillary, terminal or occasionally borne on trunk, solitary or of various forms. Bracts and bracteoles minute. Sepals 3-6 or more, usually free or connate at base, seldom accrescent. Petals absent or present, usually equaling the number of sepals. Stamens 4-many, filaments free, rarely united into a column. Ovary superior or partly inferior, 1-celled, 2-8 parietal placentas, ovules numerous; styles as many as the placentas, often united. Fruit a capsule or berry.

***Gynocardia*** R. Br., W. Roxburgh. Pl. Coromandel 3: 95. 1820.

Trees. Leaves alternate, entire. Dioecious. Flowers in fascicles; female borne on trunk, and males axillary. Sepals 5, united. Petals 5, united at base. Male flowers with



numerous stamens. Female flowers with 10-15 staminodes. Ovary superior, 1-celled; style 5, stigma cordate. Fruit a large subglobose berry with thick rind, woody.

***Gynocardia odorata*** R. Br., W. Roxburgh, Pl. Coromandel 3: 95. 1820; Hook.f. & Th. in Hook.f., Fl. Brit. Ind. 1: 195. 1872; Kanjilal *et al.*, Fl. As. 1: 87. 1934; Balakr. Fl. Jowai 1: 78. 1981; Mitra in Sharma *et al.*, Fl. Ind. 2: 407. 1993; Singh in Singh *et al.*, Fl. Mizo. 1: 182. 2002.

Large spreading trees, 10-30 m tall with drooping branchlets. Bark grey or grayish brown. Leaves bifarious, oblong or oblong-lanceolate, 13-20 x 5-7.5 cm, base rounded or truncate, apex short acuminate, margin slightly uneven; glabrous; lateral nerves 5-9 pairs; petioles 1-2 cm long. Male flowers: 2.5-3.5 cm across, in few-flowered axillary fascicles or corymbose clusters on stem and old branches; yellow, fragrant; calyx lobes 5, united into a cupular calyx; petals 5, oblong; stamens numerous, silky. Female flowers: few on tubercles on stem and older branches; sepals and petals larger in size than males. Berry 8-12 cm diameter, globose, rugose, grayish. Seeds numerous, obovoid or oblong, 2-2.5 cm, immersed in pulp.

**Fl. & Fr.:** March-December

**Distibution:** India, Bangladesh, Bhutan, Myanmar, Nepal

**Specimen examined:** Grows in primary and secondary forests. Sakraba. NLNU 0656. (Pl. 3)

## POLYGALACEAE

Hoffmanns. & Link, Fl. Portug. 1: 62. 1809

Herbs, shrubs or small trees, annual or perennial. Leaves alternate, rarely opposite, simple, entire, stipules absent or scale-like. Flowers bisexual, irregular; bracts and bracteoles

present or absent. Sepals 5. Petals 3, free or variously united. Stamens 4-8. Ovary superior, 2-celled. Fruit a capsule or berry.

1a. Shrubs, plant more than 1 m

*P. arillata*

1b. Herbs, plant less than 0.5m

2a. Capsule suborbicular, broadly winged

*P. sibirica*

2b. Capsule oblong-obovate, narrowly winged

*P. persicariifolia*

***Polygala*** Tourn. ex L., Sp. Pl. 701. 1753

Herbs or shrubs. Leaves alternate, simple. Bracts and bracteoles present. Sepals persistent or deciduous; inner 2 wing-like, larger than outer 3. Petals united and adnate to staminal sheath; keel petal with laciniate crest. Stamens 8; filaments united upto middle. Capsule flattened, usually winged, dehiscent.

***Polygala arillata*** Buch.-Ham. ex D. Don, Prodr. Fl. Nepal. 199. 1825; Bennett in Hook.f., Fl. Brit Ind. 1: 200. 1872; Kanjilal *et al.*, Fl. As. 1: 97. 1934; Balakr., Fl. Jowai 1: 81. 1981; Banerjee in Sharma *et al.*, Fl. Ind. 2:457. 1993; Singh in Singh *et al.*, Fl. Mizo. 1: 189. 2002.

Shrubs, upto 3 m tall. Leaves elliptic or oblong-lanceolate, 6-14 x 3-5 cm, base attenuate, apex acuminate, puberulous on nerves beneath; petioles 0.5-1 cm long. Flowers in axillary, terminal or supra-terminal, pendent racemes, yellow to orange. Sepals unequal, hairy outside. Petals 3, hairy inside. Capsule broadly reniform, compressed, notched at apex.

**Fl. & Fr.:** July - October

**Distribution:** India (throughout), Bangladesh, Cambodia, China, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, Tibet, Vietnam

**Specimen examined:** Grows in shaded places in forest slopes, roadsides. Pfutsero. NLNU 0108. (Pl. 4)

*Polygala persicariifolia* DC., Prodr. 1: 326. 1824; Bennett in Hook. f., Fl. Brit Ind. 1: 202. 1872 (as “*persicariaefolia*”); Balakr., Fl. Jowai 1: 83. 1981(as “*persicariaefolia*”); Grierson & Long, Fl. Bhut. 2. 1: 48. 1991; Banerjee in Sharma *et al.*, Fl. Ind. 2:480. 1993.

Herbaceous erect plants, pubescent. Leaves alternate, subsessile, elliptic to linear-lanceolate, 2.5-5 x 0.1-0.5 cm, base cuneate, apex acuminate or acute-mucronate, slightly pubescent on nerves beneath. Flowers in terminal and axillary racemes, light purple with pink streaks. Sepals persistent, outer ones small, lateral ones winged, petaloid. Petals hairy inside. Capsule elliptic, oblong, notched at apex, winged.

**Fl. & Fr.:** July - October

**Distribution:** Native of Tropical Africa, Tropical & Subtropical Asia to N. Australia

**Specimen examined:** Grows in shaded places in forest edges, roadsides. Zhavame. NLNU 0255. (Pl. 4)

*Polygala sibirica* L., Sp. Pl. 702. 1753; Bennett in Hook.f., Fl. Brit Ind. 1: 205. 1872; Kanjilal *et al.*, Fl. As. 1: 98. 1934; Balakr., Fl. Jowai 1: 83. 1981; Grierson & Long, Fl. Bhut. 2. 1: 47. 1991.

Perennial herb, 15-30 cm, pubescent. Leaves elliptic to linear-lanceolate, base cuneate, apex acuminate, subsessile, pubescent on nerves beneath. Flowers in axillary or supra-axillary racemes, bluish-purple. Outer sepals ovate, boat-shaped, ciliate; wing sepals elliptic-spathulate, persistent. Keel petal crest laciniate. Capsule winged, suborbicular, notched at apex.

**Fl. & Fr.:** April - August

**Distribution:** India, Bhutan, China, Japan, Korea, Mongolia, Myanmar, Nepal, Russia; SW Asia, Australia, Europe

**Specimen examined:** Grows in shaded places in forest edges, roadsides. Sakraba. NLNU 0657. (Pl. 4)

## CARYOPHYLLACEAE

Juss., Gen. Pl. 299. 1789

Annual or perennial herbs, subshrubs or rarely shrubs. Stems and branches swollen at nodes. Leaves opposite, rarely verticillate, simple, entire, serrulate, usually connate at base; stipules scarious or often absent. Flowers actinomorphic, bisexual, solitary or in cymes. Sepals 4-5, free or united, leaflike or scarious. Petals 4-5, free, small or rarely absent. Stamens upto 10, free, often in 1 or 2 series. Ovary superior or incomplete. Fruit usually a capsule opening by apical tooth- like valve, rarely fleshy, irregular dehiscing or an achene.

1a. Climbing herbs; petals entire

*Brachystemma*

1b. Erect or prostrate herbs; petals bifid or notched

2a. Stipules absent; plant mat-forming

*Stellaria*

2b. Stipules present; plant suberect or spreading

*Drymaria*

***Brachystemma*** D.Don, Prodr. Fl. Nepal. 216. 1825

Herbs, annual climbing. Stems subscandent. Leaves opposite, petiolate, lanceolate; stipules absent. Flowers in axillary or terminal panicles, numerous, 5-merous. Stamens 5, sometimes with staminodes. Ovary 1-celled; styles 2. Fruit a capsule, 4-valved, seed globose.

***Brachystemma calycinum*** D. Don, Prodr. Fl. Nepal. 216. 1825; Edgeworth & Hook. f. in Fl. Brit. Ind. 1:235. 1874; Majumdar in Sharma *et al.*, Fl. Ind. 2: 519. 1993; Singh in Singh *et al.*, Fl. Mizo. 1: 196. 2002.

Climbing herbs. Stem 4-angular. Leaves opposite, ovate-lanceolate, 2.5-8 x 0.6-2.5cm, base cuneate or rounded, apex acuminate, mucronate, sparsely pubescent on upper surface; petioles 1-2cm, recurved, hardened. Flowers in axillary or terminal panicles; panicle branches, pubescent, bracts linear, recurved. Sepals 5, lanceolate or elliptic, 0.5-0.7 cm. Petals 5, white, lanceolate. Stamens 5. Ovary globose. Capsule globose, 4-valved.

**Fl. & Fr.:** December - April

**Distribution:** India (NE India), E Himalaya, Bhutan, Cambodia, China, Laos, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in open areas, forest edges, on bushes and small trees. Tsupfume. NLNU 0013. **(Pl. 4)**

***Drymaria*** Willd. ex Schult. Roemer & Schultes, Syst. Veg. 5: 31. 1819

Annual or perennial, suberect branching herbs. Leaves opposite, petiolate, orbicular, stipules small, scarious. Flowers a cyme, axillary or terminal, 4 or 5 merous. Sepals 5, free. Petals white, 5, bifid. Stamens 2-3-(-5), filaments joined at base. Ovary 1-celled, styles 2-3, united at base. Fruit a capsule, 2 or 3 valved, seeds ovate, 1 to many seeds.

***Drymaria cordata*** (L.) Willd. ex Schult., Roemer & Schultes, Syst. Veg. 5: 406. 1819; Edgeworth & Hook. f. in Fl. Brit. Ind. 1:244. 1874; Balakr., Fl. Jowai 1: 84. 1981; *Holoseetum cordatum* L., Sp. Pl. 88. 1753.

Diffused annual herbs, rooting at nodes. Leaves orbicular to reniform, or broadly ovate, 0.5-2.5 x 0.4-2 cm, base obtuse or rounded, apex acute, mucronate, glabrous; petioles

0.2-1 cm. Flowers terminal or axillary in dichasial cymes; pedicels slender, hairy. Sepals elliptic ovate, hairy. Petals white, deeply bifid. Capsule ovoid, dehiscent, 3-valved.

**Fl. & Fr.:** May - October

**Distribution:** Native Central and South America, cosmopolitan

**Specimen examined:** Grows in shaded damp areas, disturb areas. Chizami. NLNU 0536.

*Stellaria* L., Sp. Pl. 421. 1753

Annual , biennial, or perennial herbs, mat forming. Leaves variously shaped, stipules absent. Flowers in cymes, terminal, rarely solitary. Sepals 4 or 5, ovate lanceolate, scarious. Petals white, 4 or 5, bifid, cleft nearly to base, sometimes absent. Stamens 10 or 8. Ovary 1-celled, ovules numerous; styles 3-5. Capsule ovate; seeds numerous.

*Stellaria media* (L.) Vill., Hist. Pl. Dauphine 3: 615. 1789; Edgeworth & Hook. f. in Fl. Brit. Ind. 1:230. 1874; Grierson & Long, Fl. Bhut. 1. 2: 207 .1984.

Decumbent herbs, stem 10-30 cm tall, quadrangular, rooting at nodes. Leaves ovate, 1-2.5 x 0.5-1.5 cm, base rounded or cordate, apex acute, basal leaves long petiolate, distal leaves sessile or shortly petiolate. Flowers in terminal leafy cymes , few to numerous. Sepals ovate, sparsely glandular. Petals deeply bifid, shorter than sepals. Stamens 3-8. Capsule ovoid; seeds numerous.

**Fl. & Fr.:** February - November

**Distribution:** India (throughout), Afghanistan, Bhutan, Japan, Korea, Pakistan, Russia; Europe

**Specimen examined:** Grows in shaded damp areas, in cultivated fields. Thetsumi. NLNU 0737. (Pl. 4)

## HYPERICACEAE

Juss., Gen. Pl. 254.1789

Herbs or shrubs. Leaves opposite, simple, often with pellucid-dotted; stipules absent. Flowers bisexual, regular, axillary or terminal, solitary or in cymes. Bracts leafy, bracteolate. Sepals 4-5, free, often glandular. Petals 4-5, free. Stamens numerous in 5 bundles, united at base. Ovary superior, 1-5-celled, ovules 2-many per cell. Fruit a capsule, 3-5 valved; seeds numerous.

### *Hypericum* Tourn.ex L., Sp. Pl.: 785. 1753

Herbs, shrubs or subshrubs, rarely trees. Leaves opposite, sessile or subsessile. Inflorescence cymose. Flowers yellow, terminal or axillary. Sepals 5, persistent. Petals 5 early deciduous, usually oblique. Fruit a capsule; seeds numerous.

1a. Annual herbs, stems quadrangular, bracts and sepals

margin not glandular-ciliate

*H.japonicum*

1b. Perennial herbs, bracts and sepals with glandular-ciliated margin

2a. Branchlets terete; stamens fascicled in group of 3

*H.elodeoides*

2b. Branchlets compressed, 4-winged; stamens fascicled in group  
of 5

*H.uralum*

*Hypericum elodeoides* Choisy, Candolle, Prodr. 1: 551. 1824; Dyer in Hook. f., Fl. Brit. Ind. 1: 255. 1874; Kanjilal *et al.*, Fl. As. 1: 100. 1934; Balakr., Fl. Jowai 1: 86. 1981; Biswas in Sharma *et al.*, Fl. Ind. 3: 56. 1993.

Erect herbs, usually unbranched, upto 50 cm tall. Stem terete, glabrous. Leaves opposite, sessile, oblong-lanceolate, 1.5-3 x 0.5-1.5 cm, apex acute to obtuse, base cordate,

amplexicaul, glandular-ciliate, glabrous, glaucous beneath, pellucid-punctate with small black marginal glands. Flowers yellow in terminal corymbose cymes. Bracts ciliate, glandular, lanceolate. Sepals with glandular ciliate margins, elliptic-lanceolate. Petals oblanceolate, with few black glands. Stamens many, in fascicled groups of 3. Ovary 3-celled. Capsule ovoid, longitudinally ribbed.

**Fl. & Fr.:** May - August

**Distribution:** India (NE India), E Himalaya, Bhutan, China, Myanmar, Nepal

**Specimen examined:** Grows in open clear forest, forest edges, bushes. Kapamodzu. NLNU 0257. (Pl. 4)

*Hypericum uralum* Buch.-Ham. ex D. Don, Bot. Mag. 50: t. 2375. 1823; Biswas in Sharma *et al.*, Fl. Ind. 3: 77. 1993; *H. patulum* Thunb., Fl. Jap. 295. 1784; Dyer in Hook.f., Fl. Brit. Ind. 1: 254. 1874; Kanjilal *et al.*, Fl. As. 1: 101. 1934; Balakr., Fl. Jowai 1: 86. 1981.

Small shrubs, with spreading branches. Stem glabrous, reddish brown, branchlets compressed, 4-winged or ribbed. Leaves opposite, sessile, ovate-lanceolate, 1.4-2.5 x 0.5-1.5 cm, apex acute or obtuse or minutely apiculate, base cuneate, glabrous above, glaucous beneath with black gland dots. Flowers yellow, in few flowered terminal cymes. Sepals 5, free, elliptic-oblong, gland dotted. Petals 5, suborbicular to obovate, often oblique. Stamens numerous, fascicled in 5 bundles at the base. Style 5, connate at base. Capsule ovoid.

**Fl. & Fr.:** July - September

**Distribution:** India (NE India), E & W Himalaya, Bhutan, China, Myanmar, Nepal, Pakistan, Thailand

**Specimen examined:** Grows in open clear forest, forest edges, bushes. Kapamodzu. NLNU 0258. (Pl. 5)



***Hypericum japonicum*** Thunb., Murray, Syst. Veg. ed. 14: 702. 1784; Dyer in Hook. f. Fl. Brit. Ind. 1: 256. 1874; Kanjilal *et al.*, Fl. As. 1; 102. 1934; Biswas in Sharma *et al.*, Fl. India 3: 69.1993; Singh in Singh *et al.*, Fl. Mizo. 1: 205. 2002.

Annual herbs, suberect or diffuse, sometimes prostrate herb, upto 25 cm tall. Stem quadrangular, glabrous. Leaves opposite, sessile, elliptic-oblong or ovate, 0.5-1 x 0.2-0.6 cm, apex obtuse, base rounded, pellucid dotted along margins, with black glands beneath. Flowers yellow, in terminal dichotomous cymes. Sepals 5, elliptic-obovate, with pellucid black glands along margins. Petals 5, oblique, elliptic to obovate, shorter than sepals. Stamens many, connate at base. Ovary 1-celled. Capsule ovoid.

**Fl. & Fr.:** March - October

**Distribution:** India (NE India), E & W Himalaya, Bhutan, China, Myanmar, Nepal, Pakistan, Thailand

**Specimen examined:** Grows in open areas, wastelands, grasslands, roadsides. Chozuba.

NLNU 0307. (Pl. 5)

## THEACEAE

Mirb. ex Ker Gawl., Bot. Reg. 2: ad t. 112. 1816

Trees or shrubs. Leaves alternate, simple, entire or serrate, often evergreen, exstipulate. Flowers in axillary or extra-axillary, solitary or fascicles, regular, bisexual, rarely unisexual. Sepals 4-7, free or partially united, persistent. Petals 4-7, free or united at base. Stamens numerous, adnate to petals, free or united at base. Ovary 3-5-celled, superior. Fruit a berry or capsule with persistent calyx.

1a. Flowers bisexual; fruits dehiscent

*Schima*

1b. Flowers unisexual; fruit indehiscent

*Eurya*

*Eurya* Thunb., Nov. Gen. Pl. 67. 1783

Shrubs or small trees. Dioecious. Leaves alternate, simple, entire or serrulate. Flowers in axillary clusters of 2-4, usually from axils of fallen leaves, sometimes solitary; bracteoles 2, small. Sepals 5. Petals 5, slightly connate at base. Stamens 5-15, adnate to base of petals. Ovary 3-celled; styles 3, free or united. Fruit a berry, subglobose, indehiscent.

*Eurya acuminata* DC., Prodr. 1: 525. 1824; Dyer in Hook.f., Fl. Brit. Ind. 1:285. 1874; Kanjilal *et al.*, Fl. As. 1: 125. 1934; Grierson & Long, Fl. Bhut. 1. 2: 363 .1984; Chauhan & Paul in Sharma *et al.*, Fl. Ind. 3: 178. 1993; Singh in Singh *et al.*, Fl. Mizo. 1: 219. 2002.

Large shrubs or small trees, upto 12 m tall. Young branches pubescent with spreading hairs. Leave selliptic-lanceolate, 4-9 x 1-2.5 cm, base cuneate, apex acute or acuminate, margins finely serrate, pubescent beneath; petioles 0.2-0.3 cm. flowers axillary or in axils of fallen leaves, 1-5 together. Sepals 5, ovate, glabrous. Petals obovate, united at base. Male flowers: stamens many, anther cells not chambered. Female flowers: ovary 3-5-celled; styles 3. Berry globose, with persistent sepals.

**Fl. & Fr.:** July - December

**Distribution:** India (NE India), Bangladesh, Bhutan, China, Myanmar, Nepal, Philippines, Sri Lanka, Taiwan, Thailand, Vietnam

**Specimen examined:** Grows in secondary forest. Thetsumi. NLNU 0740.

*Schima* Reinw. ex Blume, Catalogus: 80. 1823

Trees. Flowers bisexual, solitary or few in axils of uppermost leaves, pedicels bearing 2 deciduous bracteoles. Sepals 5, unequal. Petals 5, connate at base. Stamens

numerous, adnate to base of petals. Ovary 5-celled; style simple, stigma capitate. Capsule woody, 5-valved.

***Schima wallichii*** (DC.) Korth., Verh. Nat. Gesch. Ned. Bezitt., Bot. 143. 1842; Dyer in Hook.f., Fl. Brit. Ind. 1: 289. 1874; Kanjilal *et al.*, Fl. As. 1: 125. 1934; Balakr., Fl. Jowai., 1: 91. 1981; Grierson & Long, Fl. Bhut. 1. 2: 365. 1984; Chauhan & Paul in Sharma *et al.*, Fl. Ind. 3: 168. 1993; Singh in Singh *et al.*, Fl. Mizo. 1: 221. 2002.

Trees. Leaves elliptic-oblong or ovate-lanceolate, or oblanceolate, 5-25 x 2.5-10 cm, apex acuminate, base cuneate, glabrous or sparsely hairy on midrib above, sparsely appressed hairy beneath, margin entire. Flowers solitary or paired, in short terminal racemes, white, fragrant. Petals obovate. Stamens many, adnate to base of corolla. Capsule subglobose to globose, with persistent calyx.

**Fl. & Fr.:** April - February

**Distribution:** India (NE India), Bangladesh, Bhutan, China, Myanmar, Nepal, Philippines, Thailand, Vietnam

**Specimen examined:** Grows in primary and secondary forest. Sakraba. NLNU 0660. (Pl. 5)

## ACTINIDIACEAE

Engl. & Gilg, Syllabus (ed. 9 & 10) 279. 1924

Trees, shrubs, or sometimes climbers. Leaves alternate, simple, stipules absent. Flowers bisexual or unisexual, actinomorphic, cymose or paniculate, often drooping. Sepals 5, rarely 3-8, free, imbricate. Petals 5, rarely 3-8, free or shortly connate, imbricate. Stamens many, free or adnate to base of petals; dehiscent by apical pores or longitudinal slits. Ovary superior. Fruit a berry.

1a. Scrambling shrub, styles numerous

*Actinidia*

1b. Shrubs or trees, styles 5

*Saurauia*

*Actinidia* Lindl., Intr. Nat. Syst. Bot., ed. 2: 439. 1836

Climbing shrubs, glabrous or pubescent; pith solid or chambered. Leaves ovate-elliptic, long petioled, stipules small or absent; leaf blade leathery, membranous, margin serrate or dentate, rarely entire. Inflorescence axillary, cymose. Flowers few or many flowered, or solitary; bracts small. Sepals 5, free or connate at base, imbricate. Petals 5, imbricate. Male flowers with well developed stamens and under-developed ovaries. Female flowers with well developed ovary. Berry oblong, glabrous or hairy, spotted with lenticels.

*Actinidia callosa* Lindl., Intr. Nat. Syst. Bot., ed. 2: 439. 1836; Dyer in Hook.f., Fl. Brit. Ind. 1: 286. 1874; Kanjilal *et al.*, Fl. As. 1.1: 130. 1934; Balakr., Fl. Jowai 1: 95. 1981; Grierson & Long, Fl. Bhut. 1.2: 358. 1984; Brandis, Ind. Trees 62. 1906.

Large straggling climber. Bark lenticelled. Leaves ovate-oblong, ovate-elliptic, 5-13×2.5-6.5 cm, base rounded to subcuneate, apex acuminate, margin finely serrated; petiole 2-5 cm long, reddish-pink. Flowers white, axillary, umbellate cymes. Sepals ovate, ciliate. Petals broad ovate or obovate, 0.8-1.2×0.6-0.8 cm. Stamens numerous, free. Style club-shaped. Fruit oblong, cylindrical, with brown hairs.

**Fl. & Fr.:** May-August

**Distribution:** India (NE India), E Himalaya, China, Myanmar, Nepal, Vietnam

**Specimen examined:** Grows in forest thickets, margins, slopes. Tsupfume. NLNU 0098.

(Pl. 5)

***Saurauia*** Willd., Ges. Naturf. Freunde Berlin Neue Schriften 3: 407. 1801

Shrubs or small trees. Branches usually scaly or strigose. Leaves clustered towards the ends of branches, simple, glabrous, serrate, numerous lateral parallel veins. Inflorescence axillary, often in axils of fallen leaves, panicles or cymes. Flowers bisexual, bracteate. Sepals 5, imbricate. Petals 5, imbricate, connate at base. Stamens numerous, adnate to base of petals. Ovary 3-5 celled, styles 3-5, free or united. Fruit a berry, globose.

1a. Flowers in long panicles, more than 15 cm long *S. napaulensis*

1b. Flowers in cymes, less than 10 cm long

2a. Leaves glabrous beneath, lateral nerves 15-25 pairs,

flowers 0.5-0.8 cm across *S. roxburghii*

2b. Leaves rusty tomentose beneath, lateral nerves 20-30 pairs,

flowers 1.5 cm across *S. punduana*

***Saurauia napaulensis*** DC., Mem. Soc. Phys. Genev. 1:421. 1822; Dyer in Hook.f., Fl. Brit. Ind. 1: 286. 1874; *S. panicuata* Wall.ex G. Don, Gen. Hist. 1: 567. 1831; Balakr., Fl. Jowai 1: 94. 1981; Brandis, Ind. Trees 62. 1906; Grierson & Long, Fl. Bhut. 1.2: 359. 1984; Singh in Singh *et al.*, Fl. Mizo. 1: 223. 2002; Kanjilal *et al.*, Fl. As. 1.1: 127. 1934.

Small trees, upto 10 m tall; bark reddish brown; young parts covered with scruffy tomentum , and with appressed ovate, acuminate scales. Leaves elliptic-oblong, or oblong lanceolate, 15-30×5-9 cm, base oblique cuneate to rounded, apex acute, margin sharply serrate, glabrous above, brownish tomentose beneath, lateral nerves 25-40 pairs; petioles 2-4.5 cm long. Flowers axillary in lax pedunculate panicles, pink. Sepals ovate, glabrous. Petals obovate, tips fimbriate, recurved. Berry globose. 0.8 cm across.

**Fl. & Fr.:** June-December

**Distribution:** India (NE India), E Himalaya, China, Myanmar, Nepal, Vietnam, Thailand

**Specimen examined:** Grows in primary or secondary forest. Tsupfume. NLNU 0078. (Pl. 5)

*Saurauia punduana* Wall., Pl. asiat. Rar. 2:49. 1831; Balakr., Fl. Jowai 1: 95. 1981; Singh in Singh *et al.*, Fl. Mizo. 1: 224. 2002; Kanjilal *et al.*, Fl. As. 1.1: 129. 1934; Dyer in Hook.f., Fl. Brit. Ind. 1: 287. 1874; Brandis, Ind. Trees 63. 1906; Haridasan & Rao, For. Fl. Megh. 1: 125. 1985.

Shrubs or small trees, upto 7 m tall. Branchlets brown tomentose and apressed with minute toothed scales. Leaves elliptic-ovate to oblong-lanceolate, 10-25×4-12 cm, base rounded, apex acute to short acuminate, margin serrate, lateral nerves 20-30 pairs; petioles 3-5 cm long, brown tomentose with scales. Flowers in axillary cymes of 4-8 cm long, fascicled or solitary often in axils of fallen leaves, flowers white to pink; bracts ovate, acute. Sepals broad-ovate, glabrous, persistent. Petals obovate, rounded. Berry globose, 0.8 cm across, many seeded.

**Fl. & Fr.:** May-December

**Distribution:** India (NE India), E Himalaya, China, Myanmar, Bangladesh, Bhutan

**Specimen examined:** Grows in primary or secondary forest. Sakraba. NLNU 0678. (Pl. 5)

*Saurauia roxburghii* Wall, Pl. Asiat. Rar. 2: 40. 1831; Kanjilal *et al.*, Fl. As. 1.1: 128. 1934; Dyer in Hook.f., Fl. Brit. Ind. 1: 287. 1874; Haridasan & Rao, For. Fl. Megh. 1: 125. 1985; Balakr., Fl. Jowai 1: 95. 1981; Brandis, Ind. Trees 63. 1906.

Shrubs or trees, upto 10m tall. Young parts covered with scurfy tomentose and subulate scales. Leaves elliptic-oblong, oblong lanceolate, 10-25 x 3-9 cm, base cuneate to rounded, apex acute or short acuminate, margin serrate, young leaves rusty tomentose, mature leaves glabrous, coriaceous, lateral nerves 15-25 pairs; petioles 2-5 cm long. Flowers

pink, axillary cymes, often in axils of fallen leaves, peduncle upto 3 cm long, bracts small. Sepals ovate, glabrous. Petals broad ovate, fimbriate at apex and margin. Berry globose, 0.5 cm across.

**Fl. & Fr.:** April-August

**Distribution:** India (NE India), E Himalaya, China, Myanmar, Bangladesh, Bhutan, Thailand, Malaya

**Specimen examined:** Grows in open primary or secondary forest. Kikruma. NLNU 0451.

## STACHYURACEAE

J. Agardh, Theoria Syst. Pl. 152. 1858

Shrubs or small trees. Leaves alternate, simple; stipules caducous. Flowers small in axillary, spike racemes, nodding; bisexual or plant dioecious; bracts 2. Sepals 4, imbricate. Petals 4, free. Stamens 8. Ovary 4-celled, superior; style simple, stigma capitate, peltate; ovules many. Fruit a berry.

*Stachyurus* Siebold & Zucc., Fl. Jap. 1: 42, t. 18. 1836

Small trees or shrubs. Leaves simple, alternate, serrulate. Flowers small in axillary, pendulous racemes or spikes; bracts 2, connate at base. Sepals and petals 4 each, imbricate. Berries many-seeded. Seeds small, arillate.

*Stachyurus himalaicus* Hook. f. & Thomson ex Benth.; J. Proc. Linn. Soc., Bot. 5: 55. 1860; Dyer in Hook.f., Fl. Brit. Ind., 1: 288. 1874; Grierson & Long, Fl. Bhut. 2. 1: 228. 1991.

Shrubs with straggling branches. Leaves ovate-elliptic or oblong-lanceolate, 7-13 x 3-5.5 cm, apex acute to acuminate, base obtuse or rounded, margins finely serrate. Flowers yellowish green, spikes nodding; bracts ovate. Sepals ovate. Petals obovate. Berry subglobose.

**Fl. & Fr.:** April - July

**Distribution:** India (NE India), E Himalaya, Bhutan, China, Myanmar, Nepal

**Specimen examined:** Grows in primary and secondary forest. Tsupfume. NLNU 0056.

## MALVACEAE

Juss., Gen. Pl. 271. 1789

Herbs, shrubs or trees. Branches usually with stellate hairs, stems often fibrous. Leaves alternate, simple, lobed or digitately compound, palmately nerved, stipulate. Bracteoles 3 or more, rarely absent, often form epicalyx. Flowers regular, generally bisexual, axillary or terminal, solitary, fascicled or cymosely panicled. Sepals 5, connate at base. Petals 5, free, fused to the base of staminal column. Stamens many; filaments united into a tube surrounding the style and ovary. Ovary superior, carpels 2 or more, styles as many as carpel. Fruit a schizocarp, or a loculicidal capsule.

1a. Styles and stigmas twice as many as carpels

*Urena*

1b. Styles and stigmas as many as carpels

2a. Filament tube with anthers inserted along length; fruit a loculicidal capsule

3a. Calyx splitting along one side, deciduous with the corolla; capsule

long and sharp angled

*Abelmoschus*

3b. Calyx not splitting along one side and not deciduous with corolla;



capsule cylindrical or globose

*Hibiscus*

2b. Filament tube with anthers inserted along length or only at apex; fruit a schizocarp

4a. Trees, flowers in panicles; epicalyx present

*Kydia*

4b. Shrubs or herbs, flowers solitary or in clusters; epicalyx absent

*Sida*

***Abelmoschus* Medik., Malvenfam. 45. 1787**

Herbs, annual or perennial. Stem hispid, tomentose. Leaves entire or palmately lobed. Flowers bisexual, solitary, axillary or in terminal racemes or panicles. Epicalyx segments 5-15, linear or lanceolate, persistent. Calyx 5-toothed at apex, splitting along one side at anthesis, deciduous with corolla. Corolla 5-lobed, funnelform, with dark red centre. Staminal column shorter than corolla. Ovary 5-celled, style 5-branched above, stigma capitate. Capsule elongate, loculicidal, hispid or pubescent. Seeds globose, smooth.

***Abelmoschus manihot* var. *pungens* (Roxb.) Hochr., Candollea 2: 87. 1924; *Hibiscus pungens* Roxb., Fl. Ind. ed. 3: 213. 1832; Masters in Hook.f., Fl. Brit. Ind.1: 341. 1874; Kanjilal *et al.*, Fl. As. 1: 144. 1934; Grierson & Long, Fl. Bhut. 2.1: 184. 1991.**

Erect herbs or undershrubs, 1-2 m tall. Stem hispid, pubescent. Leaves palmately 5-9-lobed, lobes oblong-lanceolate, 8-20 x 2-7 cm, base cordate, margin dentate, hispid on both surfaces; stipules linear-lanceolate; petioles 5-15 cm long. Flowers solitary, in axillary and terminal long racemes. Epicalyx 4-6 segments, ovate-lanceolate, hispid; calyx spathaceous, puberulous, 5-lobed, caducous. Corolla yellow with dark purple centre, 5-lobed, obovate, glabrous. Anthers nearly sessile; stigma dark purple. Capsule ovoid-oblong, acuminate, densely hairy.

**Fl. & Fr.:** August - November

**Distribution:** India (throughout), Bangladesh, China, Myanmar, Nepal, Vietnam

**Specimen examined:** Grows in open places in forests, wastelands, along roadsides.  
Tsupfume. NLNU 0058. **(Pl-6)**

*Hibiscus* L., Sp. Pl. 693. 1753

Herbs, shrubs or trees. Leaves simple, entire or palmately lobed, stipulate. Flowers bisexual, solitary, in axillary or terminal racemes or panicles, pedicels jointed. Epicalyx 5-15 segments, linear to ovate, free or connate below. Calyx 5-lobed, campanulate, or tubular. Corolla large, showy. Staminal column pollen bearing throughout or on upper half of tube. Ovary 5-celled; style 5 branched, stigma capitate. Fruit a capsule, 5-valved, loculicidally dehiscent.

*Hibiscus syriacus* L., Sp. Pl. 695. 1753; Grierson & Long, Fl. Bhut. 2. 1: 184. 1991.

Shrubs. Leaves ovate-rhomboid, entire or 3-lobed, 3-9 x 2-4 cm, base cuneate, apex acute or obtuse, margin irregularly serrate, glabrous above, puberulent beneath; petiole 0.5-2.5 cm. Flowers solitary, axillary on upper branches. Epicalyx 6-8 lobed, linear, connate at base. Calyx campanulate, 5-lobed. Corolla purple-blue, with darker centre; petals obovate. Staminal column included, pollen bearing throughout.

**Fl. & Fr.:** July - October

**Distribution:** Cosmopolitan

**Specimen examined:** Grows as hedge in fields, along roadsides, also cultivated. Chozuba.  
NLNU 0321. **(Pl. 6)**

*Kydia* Roxb., Pl. Coromandel 3: 11. 1811

Trees, with stellate hairs throughout. Leaves obscurely 3-5 lobed, midrib beneath with a linear gland, stipule deciduous. Flowers small, unisexual, in axillary and terminal

panicles. Epicalyx 4-6, connate at base. Sepals 5, connate to middle. Petals 5, clawed, suborbicular. Male flowers with staminal column divided above into 5 branches each bearing 3-4 anthers. Female flowers with 3-celled ovary, style 3-branched; stigma peltate. Fruit a capsule, 3-valved.

***Kydia calycina*** Roxb., Pl. Coromandel 3: 11. 1811; Masters in Hook. f., Fl. Brit. Ind. 1: 348. 1874; Kanjilal *et al.*, Fl. As. 1: 146. 1934; Balakr. Fl. Jowai 1: 98. 1981; Paul in Sharma *et al.*, Fl. Ind. 3: 344. 1993; Singh in Singh *et al.*, Fl. Mizo. 1: 235. 2002.

Deciduous trees, densely pubescent, 10-15 m tall. Leaves broadly ovate to suborbicular, 5-14 x 6-14 cm, base subcordate or rounded, apex acute to acuminate, margin entire or irregularly dentate or shallowly 3-lobed, basal nerve 5-7, stellate-hispid above, stellate-pubescent beneath; petioles 2-5 cm long. Flowers purplish to pinkish white in axillary or terminal close panicles. Epicalyx segments 4-6, pubescent. Calyx connate up to the middle, 5-lobed, pubescent. Petals 5, oblong, densely pubescent, adnate with staminal tube at the base. Stamens 15. Capsule subglobose, yellow, pubescent.

**Fl. & Fr.:** September - February

**Distribution:** Cosmopolitan

**Specimen examined:** Grows in primary or secondary forest. Sakraba. NLNU 0729. **(Pl. 6)**

***Sida*** L., Sp. Pl. 683. 1753

Herbs or shrubs, annual or perennial. Leaves simple, pinnately or palmately nerved, stipules persistent. Flowers solitary or paired, in axillary fascicles or at the end of branches. Epicalyx absent. Sepals 5, connate to middle. Petals 5, free, basally connate. Staminal

column divided at apex into numerous filaments. Ovary 5-12 celled; stigmas capitate. Fruit a schizocarp, subglobose, with 1 or 2 apical awns.

***Sida rhombifolia*** L., Sp. Pl. 684. 175; Masters in Hook. f., Fl. Brit. Ind. 1: 323. 1874; Kanjilal *et al.*, Fl. As. 1: 140. 1934; Balakr., Fl. Jowai 1: 97. 1981.

Herbs or undershrubs, upto 1 m tall, stem stellate pubescent or tomentose. Leaves oblong lanceolate, ovate, or rhombic, 2-8 x 1-3.5 cm, base cuneate, apex acute or obtuse, margin serrate, glabrescent above, tomentose beneath; petiole 0.3-0.5 cm, stipules filiform. Flowers axillary or in clusters of 2-5. Calyx campanulate. Petals yellow, obliquely triangular. Staminal column shorter than petal. Mericarp flattened, 2-awned at apex.

**Fl. & Fr.:** April - November

**Distribution:** India (throughout), Bangladesh, Bhutan, China, Laos, Malaya, Myanmar, Nepal, Thailand, Vietnam; Pantropical

**Specimen examined:** Grows along roadsides, wastelands, open areas. Khuza. NLNU 0803.

**(Pl. 6)**

***Urena*** Dill. ex L., Sp. Pl. 692. 1753

Herbs or shrubs, stellate hairy throughout. Leaves alternate, palmately lobed or sinuate. Flowers bisexual, solitary or in few fascicles, axillary, sometimes clustered at the end of branches. Epicalyx 5, narrowly lanceolate, campanulate. Sepals 5, fused upto middle. Petals 5. Staminal column with subsessile anthers throughout upper half. Ovary 5-celled; style 10 branched; stigmas capitate. Fruit a schizocarp, subglobose; mericarps 5, ovoid, usually with hooked spines.

***Urena lobota*** L., Sp. Pl. 692. 1753; Masters in Hook.f., Fl. Brit. Ind. 1: 329. 1874; Kanjilal *et al.*, Fl. Assam 1: 141. 1934; Balakr., Fl. Jowai 1: 96. 1981; Haridasan & Rao, For. Fl. Megh. 1: 137. 1985; Paul in Sharma *et al.*, Fl. Ind. 3: 380. 1993; Singh in Singh *et al.*, Fl. Mizo. 1: 244. 2002.

Erect undershrubs, upto 1.5 m tall. Stems and young parts tomentose. Leaves variously lobed, ovate to orbicular, unlobed or shallowly lobed, 3-10 x 1.5-9 cm, base rounded or cordate, apex acute or obtuse, margin crenate to serrate, softly pubescent beneath, sparsely or roughly pubescent above, 3-9-nerved at base; petioles 1-10 cm long; stipules lanceolate. Flowers pink with purple centre, axillary, solitary or in clusters of 2-3. Epicalyx adnate to the calyx at base. Calyx tubular to campanulate. Petals obovate, tomentose outside. Schizocarps globular, tomentose, covered with barbed bristles.

**Fl. & Fr.:** July - February

**Distribution:** India (throughout), Tropic & Subtropic region

**Specimen examined:** Grows in open forests, roadsides, wastelands. Tsupfume. NLNU 0069.

## **BOMBACACEAE**

Kunth, H.B. & K. Nov. Gen. 5: 294. 1822

Trees. Stems and branchlets aculeate, glabrous or lepidote with stellate or simple hairs. Leaves alternate, simple or digitately compound, stipules present. Flowers solitary on axillary peduncles, large and showy, regular, bisexual, appearing before leaves. Sepals 3-5, connate and cup-shaped, leathery. Petals 5, free. Stamens many, free or united into a tube. Ovary superior, 5-celled; ovules many in each cell; stigma capitate or lobed. Fruit a capsule, 5-valved.

***Bombax* L., Sp. Pl. 511. 1753**

Deciduous trees. Leaves digitately compound, 5-9-foliolate, leaflets sessile or petiolulate. Flowers bisexual, solitary or fascicled, axillary or sub terminal; flowers appearing before the leaves. Sepals fused into a cup-shaped, lobes 3-5, leathery. Petals 5, free. Stamens many, free or united into a tube. Ovary superior, 5-celled; ovules many in each cell; style 1, stigmas 5. Capsule oblong-ellipsoid, loculicidally 5-valved, with silky wool inside.

***Bombax ceiba* L., Sp. Pl. 511. 1753; Nayar & Biswas in Sharma *et al.*, Fl. India 3: 398. 1993; Singh in Singh *et al.*, Fl. Mizo. 1: 246. 2002; *B. malabaricum* DC., Prodr. 1: 479. 1824; Masters in Hook.f., Fl. Brit. Ind. 1: 349. 1874; Kanjilal *et al.*, Fl. As. 1: 147. 1934; *Salmaalina malabarica* (DC.) Schott & Endl., Melet. Bot. 35. 1832; Haridasan & Rao, Forest Fl. Megh. 1: 137. 1985.**

Large deciduous trees. Trunk buttressed at base, with conical woody prickles; branches spreading horizontally. Leaves digitately 5-7-foliolate, petioles 10- 20 cm long; leaflets elliptic-lanceolate, 8-16 x 3-6 cm, base cuneate, apex acuminate, margin entire, glabrous; petiolules 1-2.5 cm long. Flowers large, scarlet, solitary in leaf axils or clustered towards branch ends, appearing before leaves. Calyx campanulate, 2-5-lobed, lobes unequal. Petals 5, fleshy, obovate, pubescent. Stamens many, in 5-6 bundles. Styles 5, longer than stamens. Capsule oblong-ovoid, 10-17 cm long, 5-valved, silky fibres inside.

**Fl. & Fr.:** February - May

**Distribution:** India, Tropical & Subtropical Asia to N Australia

**Specimen examined:** Grows in open places in forests. Thetsumi. NLNU 0739. **(Pl-6)**

## STERCULIACEAE

Bartling, Ord. Nat. Pl. 255. 1830

Trees, shrubs or climbers. Branchlets with stellate hairs. Leaves alternate, simple, lobed, often palmately veined at base, stipules present. Inflorescence in axillary or terminal cymes or panicles, rarely solitary. Flowers bisexual or unisexual, regular. Sepals 5, lobes free or united at base. Petals 5 or absent, free or connate at base. Stamens many, connate into a tube or column, or rarely few. Ovary superior, 2-5-celled, rarely of 1 carpel; styles as many as the cells of the ovary or consolidated. Fruit a capsule or cluster of free or twisted follicles.

1a. Flowers unisexual; petals absent

2a. Calyx campanulate; follicles woody or leathery

*Sterculia*

2b. Calyx tubular; follicles membranous

*Firmiana*

1b. Flowers bisexual; petals present

3a. Flowers in leaf-opposed cymes; fruit a membranous

winged capsule

*Abroma*

3b. Flowers solitary, axillary or in few flowered cymes

or many flowered corymbs

4a. Flowers solitary or in few flowered cymes; staminodes

present

*Pterospermum*

4b. Flowers numerous in corymbs; staminodes absent

*Reevesia*

*Abroma* Jacq., Hort. Bot. Vindob. 3: 3, t. 1. 1776

Shrubs or small trees. Leaves simple, or palmately lobed, 5-7 nerved at base. Flowers bisexual, in few flowered cymes, leaf-opposed or terminal. Calyx 5-lobed, divided to near

base. Petals 5, claw concave, glandular at base. Stamens 15, filaments connate into tube enclosing pistil; anthers in 5 groups of 3 on outer part of filament tube alternating with staminodes; staminodes 5. Ovary sessile, 5-celled, styles 5-lobed. Fruit a 5-winged capsule, membranous, apex truncate.

***Abroma augustum*** (L.) L.f., Suppl. Pl. 341. 1782; Masters in Hook.f., Fl. Brit. Ind.1: 375. 1874; Kanjilal *et al.*, Fl. As. 1: 156. 1934; Balakr., Fl. Jowai 1: 102. 1981; Grierson & Long, Fl. Bhut. 2.1: 206. 1991; *Theobroma augustum* L., Syst. Nat. ed. 12.2: 233. 1767.

Erect shrubs, 2-4 m tall. Branches horizontal, softly stellate tomentose. Leaves simple, alternate, ovate-lanceolate to suborbicular, 12-28 x 6-20 cm, base cordate or subcordate, apex acuminate, margin entire or undulate, glabrescent above, softly pubescent or glabrescent beneath, basal nerves 5-7; petioles 1-2.5 cm, stipules narrow lanceolate, caducous. Flowers purplish maroon, leaf-opposed few-flowered cymes. Sepals 5, lanceolate, fused at base, puberulous. Petals concave-clawed at base, upper part elliptic spatulate, margin ciliate. Staminal tube short, staminodes 5. Ovary sessile, 5-lobed, styles 5. Capsule obconical, 5-winged, apex truncate. Seeds many.

**Fl. & Fr.:** July - September

**Distribution:** India (NE India), Bangladesh, Bhutan, China, Myanmar, Nepal, Phillipines, Thailand, Vietnam

**Specimen examined:** Grows in open places in forests, along roadsides. Chozuba. NLNU 0311. (Pl. 6)



***Firmiana*** Marsili, Saggi Sci. Lett. Accad. Padova 1: 106. 1786

Deciduous trees or shrubs. Leaves simple, entire or palmately lobed. Flowers in axillary panicles borne in the axils of previous year's leaves, unisexual, stellately tomentose. Calyx tubular, 5-lobed. Corolla absent. Stamens and ovary exerted from calyx on slender column. Male flowers: stamens 10. Female flowers with ovary surrounded by ring of sterile anthers; carpels 5, free; style short. Fruit a membranous follicle, with 1-2 seeds attached to the margin of the follicle.

***Firmiana colorata*** (Roxb.) R. Br., Pterocymbium: 235. 1844; Haridasan & Rao, For. Fl. Megh. 1: 142. 1985; Singh in Singh *et al.*, Fl. Mizo. 1: 251. 2002; K.C. Malick in Sharma *et al.*, Fl. India 3: 420. 1993. *Sterculia colorata* Roxb., Pl. Coromandel 1: 26. 1795; Masters in Hook. f., Fl. Brit. Ind. 1: 359. 1874; Kanjilal *et al.*, Fl. As. 1: 151. 1934.

Deciduous trees, upto 25 m tall. Leaves shallowly to deeply 3-5-lobed, broadly ovate to suborbicular, 8-20 x 8-17 cm, lobes acuminate, base cordate, margins entire, glabrous above, sparsely stellate beneath; petiole 5-15 cm; stipules lanceolate. Flowers bright orange-red, appearing before leaves, in the axils of fallen leaves, paniculate. Calyx funnel shaped, 1.5-2 cm, stellate tomentose, lobes triangular. Follicles lanceolate, 5-7 cm.

**Fl. & Fr.:** March - July

**Distribution:** India (throughout), Bangladesh, Bhutan, China, Myanmar, Vietnam

**Specimen examined:** Grows in open forest. Kikruma. NLNU 0468. **(Pl. 7)**

***Pterospermum*** Schreber, Gen. Pl. 2: 461. 1791

Trees or shrubs, young parts stellate tomentose. Leaves simple, unlobed or lobed, palmately veined at base, margin entire or serrate. Flowers bisexual, solitary, or 2-3 on

axillary peduncles; bracteate. Sepals 5, free, linear, deciduous. Petals 5, deciduous. Stamens 15 in 5 groups of 3, alternating with staminodes, staminodes 5. Ovary 5-celled; style elongate, clavate. Fruit a 5-valved capsule, woody; seeds winged.

***Pterospermum acerifolium*** (L.) Willd., Sp. Pl. 3: 729. 1800; Masters in Hook. f., Fl. Brit. Ind. 1: 368. 1874; Kanjilal *et al.*, Fl. As. 1: 157. 1934; S.K. Chandra in Sharma *et al.*, Fl. Ind. 3: 448. 1993; Singh in Singh *et al.*, Fl. Mizo. 1: 255. 2002 .

Trees, 15-30m tall. Young parts finely stellate tomentose. Leaves variable in shape and size, broadly ovate to rounded, suborbicular or oblong, 15-40 x 9-30 cm, base cordate or peltate, apex acute or truncate, margin entire or remotely toothed or lobed, 7-9 nerved at base, glabrous above, brown tomentose beneath; petioles 6-20 cm long. Flowers fragrant, white, solitary or 2-3-flowered cymes. Calyx lobes linear, fleshy, 8-12 x 0.7-1cm, brown, villous. Petals white, twisted, slightly shorter than sepals. Stamens linear, 4-5 cm long. Ovary oblong, obscurely 5-angled. Capsule oblong, 9-15 cm, woody, covered with brown tomentum.

**Fl. & Fr.:** April - June

**Distribution:** India (throughout), Bangladesh, Bhutan, China, Laos, Malaya, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in primary or secondary forest. Khuza. NLNU 0823.

***Reevesia*** Lindl., Quart. J. Sci. Lit. Arts, ser. 2.2: 112. 1827

Trees or shrubs. Leaves simple, 3-nerved at base. Flowers many, in terminal branched paniculate cymes. Calyx campanulate or funnel shaped, irregularly 5-lobed. Petals 5, clawed at base. Stamens 15 in 5 groups of 3; stamens and ovary united into long slender

column bearing a globose head. Ovary 5-lobed, 5-celled; ovules 2 in each cell; stigma sessile, 5-lobed. Fruit a woody 5-valved capsule, seeds winged.

***Reevesia walichii*** R. Br., J.J.Bennett, Pl. Jav. Rar.: 231. 1844; Masters in Hook.f., Fl. Brit. Ind. 1: 364. 1874; Kanjilal *et al.*, Fl. As. 1: 159. 1938; Malick in Sharma *et al.*, Fl. India 3: 456. 1993; Singh in Singh *et al.*, Fl. Mizo. 1: 258. 2002.

Trees, upto 18 m tall; bark grey, exfoliating in round flakes. Branchlets sparsely stellate pubescent. Leaves simple, ovate or ovate-oblong, 8-15 x 3-7 cm, base shallowly cordate or rounded, apex acute or acuminate, margin entire, coriaceous, glabrous above and sparsely pubescent beneath. Flowers white, scented, in dense corymbs panicle cymes, panicles terminal or from axils of fallen leaves. Calyx lobes 5, triangular, about 0.4 cm long. Petals white, spatulate, clawed. Staminal column slender, far exceeding the petals with a globose head of anthers. Capsule obovoid, pendulous, 5-loculed, valves woody. Seeds winged.

**Fl. & Fr.:** April - October

**Distribution:** India (NE India), E Himalaya, China, Bhutan

**Specimen examined:** Grows in primary and secondary forest. Tsupfume. NLNU 0094. (Pl. 7)

***Sterculia*** L., Sp. Pl. 1007. 1753

Trees or large shrubs. Leaves unlobed or palmately lobed. Flowers unisexual, both sexes on one plant, in axillary panicles or racemes. Calyx campanulate, 5-lobed. Petals absent. Male flowers with staminal column bearing globose head with 10-15 sessile anthers. Female flowers with globose stellate hairy stalk ovary, surrounded at base by ring of sterile anthers. Carpels 5. Fruit a group of spreading follicles.

*Sterculia lanceolata* var. *coccinea* (Jack) Phengklai, Thai Forest Bull. Bot. 23: 99. 1995; *S. hamiltonii* (Kuntze) Adelb., Backer, Bekn. Fl. Java 4b. Fam. 107: 23. 1944; Balakr., Fl. Jowai 1: 100. 1981; K.C. Malick in Sharma *et al.*, Fl. Ind. 3: 464. 1993; Singh in Singh *et al.*, Fl. Mizo. 1: 260. 2002; *Sterculia coccinea* Roxb., Fl. Ind. 3: 151. 1832 (*non*. Jack, 1820); Masters in Hook. f., Fl. Brit. Ind. 1: 357. 1874; Kanjilal *et al.*, Fl. Assam 1: 153. 1934.

Shrubs or small trees, 5-10 m tall. Leaves simple, elliptic-lanceolate, oblanceolate, or narrowly oblong, 9-25 x 2.5-8 cm, base cuneate, apex acuminate, glabrous above, simple appressed hairs beneath, margin entire; stipules lanceolate; petioles 1.5-4 cm. Flowers pinkish red, unisexual, in axillary or supra-axillary on long peduncled drooping panicles, puberulous. Calyx tube short, 0.9-1.4 cm, white hairy outside, pinkish-red inside, united at tip and later becoming free. Staminal column short. Stigma 5-lobed. Follicles laterally compressed, orange to crimson-red, spreading, finely tomentose.

**Fl. & Fr.:** June - March

**Distribution:** India (NE India), Bangladesh, Bhutan, Malaya, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in open forests. Phukhungri. NLNU 0876. (Pl. 7)

## TILIACEAE

A. L. de Juss., Gen. Pl. 289. 1789

Trees, shrubs, or herbs, with stellate or simple hairs. Leaves alternate, simple or lobed, palmately nerved at base, stipules present. Flowers in axillary and terminal or leaf opposed cymes or panicles, regular, bisexual. Sepals 4-5, free or united at base. Petals 4-5,

free, rarely absent. Stamens 10-many, free or united at base into bundles. Ovary 2-10-celled; style simple, stigma capitate or 2-10-lobed. Fruit a capsule or drupe.

1a. Fruits winged *Colona*

1b. Fruits not winged

2a. Flowers leaf opposed or extra-axillary; fruits covered with

hook prickles *Triumfetta*

2b. Flowers axillary or terminal; fruits not prickly *Grewia*

***Colona*** Cav., Icon. 4: 47. 1798

Trees or shrubs. Branchlets stellate hairy. Leaves simple, usually oblique, long petiolate, basal nerves 3-7, stipules present. Flowers bisexual, small, terminal, cymose paniculate. Sepals and petals 5, free. Stamens many, free or in bundles. Ovary 3-5-loculed, ovules 2-4 per locule. Fruit a capsule, 3-5 winged, septicidally dehiscent.

***Colona floribunda*** (Kurz) Craib, Fl. Siam. 1.1: 189.1925; Daniel & Chandrabose in Sharma *et al.*, Fl. Ind. 3: 482. 1993; *Columbia floribunda* Kurz, J. As. Soc. Bengal 42. 2: 63. 1873; Masters in Hook.f., Fl. Brit. Ind. 1: 393. 1874; Kanjilal *et al.*, Fl. As. 1: 169. 1934.

Medium sized trees, up to 15 m tall. Branchlets scabrid with short stellate hairs. Leaves rotundate-ovate –oblong or suborbicular, often shortly lobed, 8-15 x 5-13 cm, base rounded or cordate, apex acute or short acuminate, 3-7-nerved at base, margin irregularly serrate, subcoriaceous, rugulose and scabrous on both surfaces; petioles 2.5-5 cm long, swollen at apex. Flowers small, in few flowered clusters, clusters arranged in lax terminal grayish pubescent panicles. Sepals 5, about 0.2 cm long, red inside, hoary outside. Petals 5, spatulate, yellow with scarlet dots and minute glandular cavity at base. Stamens many. Ovary 3-5-celled. Capsules ellipsoid, 1-2.5 cm across, stellate-pubescent, winged, 1-seeded.

**Fl. & Fr.:** July - October

**Distribution:** India, Tropical & Subtropical Asia to N Australia

**Specimen examined:** Grows in primary and secondary open forest. Wazeho. NLNU 0558.

(Pl. 7)

*Grewia* L., Sp. Pl. 964. 1753

Trees or shrubs. Leaves simple, unlobed or shallowly lobed, 3-7 nerved from base. Flowers bisexual, in axillary or leaf opposed, pedunculate, umbellate cymes. Sepals 5, free. Petals 5, glandular at base. Stamens numerous, inserted on glandular receptacle. Ovary 2-4-celled; style subulate; stigma 2-4-lobed. Fruit a drupe, 2-4-lobed.

1a. Leaves ovate to oblong-lanceolate; margin regularly serrate *G. serrulata*

1b. Leaves broadly ovate or elliptic-ovate; margin irregularly serrate *G. abutilifolia*

*Grewia abutilifolia* Vent. ex Juss., Ann. Mus. Natl. Hist. Nat. 4: 92. 1804; Masters in Hook.f., Fl. Brit. Ind. 1: 390. 1874; Kanjilal *et al.*, Fl. As. 1: 166. 1934; Haridasan & Rao, For. Fl. Megh. 1: 153. 1985; Daniel & Chandrabose in Sharma *et al.*, Fl. Ind. 3: 493. 1993; Singh in Singh *et al.*, Fl. Mizo. 1: 267. 2002.

Shrubs or small trees, upto 3 m. Branchlets stellate tomentose. Leaves broadly ovate or elliptic-ovate, 7.5-17 x 5-9 cm, base rounded or subcordate, apex acuminate, margin irregularly serrate, stellate tomentose beneath, 3-5 nerved at base; petioles 1-2 cm long.; stipules subulate. Flowers in axillary, 3-4 flowered umbellate cymes. Sepals 5, narrowly oblong or lanceolate, woolly outside, white turning yellow inside. Petals 5, white, oblong, shorter than sepals, ciliate at base. Stamens many. Ovary 2-celled. Drupe subglobose, tomentose, wrinkled.

**Fl. & Fr.:** April - July

**Distribution:** India (throughout), Bangladesh, Cambodia, China, Myanmar, Taiwan, Thailand, Vietnam

**Specimen examined:** Grows in open forest. Chozuba. NLNU 0345. (Pl. 7)

*Grewia serrulata* DC., Prodr. 1: 510. 1824; Daniel & Chandrabose in Sharma *et al.*, Fl. Ind. 3: 509. 1993; Singh in Singh *et al.*, Fl. Mizo. 1: 271. 2002; *G. disperma* Rottler ex Spreng., Syst. Veg. 2: 579. 1825; Kanjilal *et al.*, Fl. As. 1: 164. 1934; Balakr. Fl. Jowai 1: 104. 1981; *G. laevigata* (non Vahl, 1790) Masters in Hook.f., Fl. Brit. Ind. 1: 389. 1874.

Shrubs or small trees. Leaves ovate to oblong-lanceolate, 6-15 x 2-4.5 cm, base acute or rounded, apex acute or acuminate, margin serrate, glabrous on both surface, 3-nerved at base; petioles 1 cm long; stipules linear lanceolate. Flowers greenish-white, in axillary umbellate cymes. Sepals 5, lanceolate, stellately tomentose. Petals 5, ovate-obovate. Stamens many. Ovary hairy. Drupe globose, 2-lobed, wrinkled.

**Fl. & Fr.:** July - October

**Distribution:** India (throughout), Bangladesh, Bhutan, China, Myanmar, Nepal, Pakistan, Vietnam

**Specimen examined:** Grows in open forest. Wazeho. NLNU 0562. (Pl. 7)

*Triumfetta* Plum. ex L., Sp. Pl. 444. 1753

Herbs or shrubs, stellate pubescent. Leaves simple, alternate, unlobed or 3-7 lobed. Flowers bisexual, axillary, solitary or in cymes or fascicles. Sepals 5, free. Petals 5, glandular or pitted at base. Stamens many, inserted above glandular receptacle. Ovary 2-5-celled, ovules 2 per cell, style slender. Fruit a capsule, with straight or hooded spines.

***Triumfetta pilosa*** Roth, Nov. Pl. Sp. 223. 1821; Masters in Hook.f., Fl. Brit. Ind. 1: 394. 1874; Kanjilal *et al.*, Fl. Assam 1: 167. 1934; Haridasan & Rao, For. Fl. Megh. 1: 158. 1985; Daniel & Chandrabose in Sharma *et al.*, Fl. Ind. 3: 519. 1993; Singh in Singh *et al.*, Fl. Mizo. 1: 272. 2002.

Erect undershrubs, woody at base. Stems and leaves covered with dense hairs. Leaves ovate-lanceolate or elliptic-lanceolate, 4-10 x 1-4 cm, base cordate or rounded, apex acuminate, 3-4-nerved, margin serrate; stipules linear lanceolate; petioles 1-3 cm long. Flowers yellow, in axillary or leaf opposed lateral cymes. Sepals 5, linear, stellate hairy. Petals 5, oblong or obovate, shorter than sepals. Stamens 10. Carpels 4. Capsule globose, covered with hooked pilose spines.

**Fl. & Fr.:** August - November

**Distribution:** India (throughout), Tropical & Subtropical Asia; Africa

**Specimen examined:** Grows in open forests, roadsides, wastelands. Thetsumi. NLNU 0765.

**(Pl. 8)**

## **ELAEOCARPACEAE**

Juss., Essai Propr. Med. Pl. ed. 2: 87. 1816

Trees or shrubs. Leaves alternate, simple, stipules present. Flowers in axillary racemes, fascicles or solitary, actinomorphic, bisexual. Calyx 4-6, free or connate at base. Petals 4-5, rarely united at base, toothed or fimbriate at apex. Disc flat or rounded, lobed. Stamens numerous, free, inserted on a fleshy disk. Ovary superior, 2-5 celled, style 1. Fruit a drupe with a bony stone or a capsule.



*Elaeocarpus* L., Sp. Pl. 1: 515. 1753

Trees. Leaves alternate or spirally arranged, serrate or entire, turning red when old, petioles often swollen at both ends. Inflorescence axillary, racemose. Flowers bisexual, 4-5 merous. Sepals 4 or 5, free. Petals 4 or 5, free, margin fimbriate. Disk glandular, 5 or 10 lobed. Stamens many, filaments short, anthers with awn at tip. Ovary superior, 2-5 celled, 2-5 ovules per cell. Fruit a drupe, stone smooth or rugose.

1a. Anthers awned at apex; leaves oblanceolate *E. aristatus*

1b. Anthers not awned at apex; leaves ovate, ovate-elliptic *E. floribundus*

*Elaeocarpus aristatus* Roxb., Fl. Ind. 2: 599. 1832; Masters in Hook.f., Fl. Brit. Ind. 1: 405. 1874; Brandis, Ind. Trees 104. 1906; Kanjilal *et al.*, Fl. As. 1: 177. 1934; Haridasan & Rao, For. Fl. Megh. 1: 165. 1985; Singh in Singh *et al.*, Fl. Mizo. 1: 276. 2002.

Large trees, 20-40 m tall, with conical crown; stem buttressed at base, branchlets thick, rough. Leaves crowded near the ends of branchlets, oblanceolate or obovate, 14-30 x 4-10 cm, base cuneate, apex acute or subacute, margins minutely serrate or subentire, glabrous, coriaceous, lateral nerves 12-22 pairs; petioles 2-4.5 cm, swollen at both ends. Inflorescence on axils of fallen leaves, 10-16 cm long. Flowers white, drooping, 2cm across, faintly fragrant. Sepals lanceolate, tomentose outside, thick. Petals wedge shaped, 1.2-1.6 cm long, silky hairy outside, deeply laciniate. Stamens many, filaments short, anthers linear, with awn. Ovary 2-celled, ovoid, densely appressed pubescent, style subulate. Drupe ellipsoid, 3-4 cm long.

**Fl. & Fr.:** April-October

**Distribution:** India (Himalaya, NE India), Bangladesh, Myanmar

**Specimen examined:** Grows in primary forest. Thetsumi. NLNU 0768. (Pl. 8)

***Elaeocarpus floribundus*** Blume, Bijdr. 120. 1825; Masters in Hook.f., Fl. Brit. Ind. 1: 401. 1874; Brandis, Ind. Trees 102. 1906; Kanjilal *et al.*, Fl. As. 1: 173. 1934; Balakr., Fl. Jowai 1: 106. 1981; Haridasan & Rao, For. Fl. Megh. 1: 167. 1985

Tall trees upto 30 m. Leaves ovate, ovate-elliptic, 5-20 x 2-8 cm, apex acute to acuminate, base cuneate or rounded, margin coarsely serrate, glabrous, subcoriaceous, glandular punctate beneath, postulate when dried; petioles 3-5 cm long, swollen with a pair of small glands at apex. Inflorescence axillary, racemose, 9-15 cm long, 20-30 flowered, flowers white. Sepals lanceolate, 0.5-0.6 cm, pubescent. Petals obtriangular, irregularly laciniate, ciliate along margins. Stamens 25-30, with or without short bristles at apex. Ovary 3-celled. Drupes oblong, pyriform, 2.5-4 cm long, rounded at both ends, stone smooth or rugulose.

**Fl. & Fr.:** March- October

**Distribution:** India (NE India), E & W Himalaya, Bhutan, Myanmar

**Specimen examined:** Grows in open primary and secondary forest. Chizami. NLNU 0589.

**(Pl. 8)**

## **GERANIACEAE**

Juss., Gen. Pl. 268. 1789

Herbs, annual or perennial. Leaves opposite or alternate, simple or compound, stipules present. Flowers solitary or in few flowered cymes or umbel like cluster, bisexual, actinomorphic, rarely zygomorphic. Calyx 5, free. Petals 5, free. Stamens 10, rarely 5 without anthers, filaments free or united at base, anthers versatile. Ovary superior, 5-lobed; styles 5 fused into a basal elongating beak. Fruit a 5-lobed capsule, breaking up when ripe into 1 seeded mericarp which separate elastically from a central beak. Seeds few to many.

***Geranium*** Tourn.ex L., Sp. Pl.: 676. 1753

Annual or perennial herbs. Leaves opposite, palmately lobed or cleft. Basal leaves usually forming a rosette. Flowers bisexual, solitary or in few flowered cymes, rarely umbellate, regular. Sepals and petals 5. Stamens 10, in 2 whorls. Ovary 5-celled; styles 5. Fruit a capsule.

***Geranium nepalense*** Sweet, Geraniaceae 1:t. 122. 1820; Edgew. & Hook.f., Fl. Brit. Ind. 1: 430. 1875; Kanjilal *et al.*, Fl. As. 3: 322. 1939; Malhotra in Hajra *et al.*, Fl. India. 4: 75. 1997; Singh in Singh *et al.*, Fl. Mizo. 1: 285. 2002.

Decumbent perennial herbs, hairy or villous. Leaves orbicular, 1.5-5 cm, palmately divided into 3-5 ovate to rhombic lobes, dark green beneath, petioles 2-7 cm long; stipules linear-lanceolate. Flowers pale purple with maroon stripes, 1-1.2 cm across, solitary or paired, on long axillary peduncles. Sepals 0.4-0.5 cm long. Petals 0.6-0.9 cm long. Capsule ellipsoid to subglobose.

**Fl. & Fr.:** April - October

**Distribution:** India (NE India), E & W Himalaya, Bhutan, China, Myanmar, Nepal, Pakistan, Thailand, Vietnam

**Specimen examined:** Grows in forest margins, weedy areas, roadsides. Tsupfume. NLNU 0015.

**OXALIDACEAE**

R. Br., Narr. Exped. Zaire 433. 1818

Herbs annual or perennial, shrubs or trees. Leaves alternate or whorled, compound; leaflets often folded at night. Flowers in umbels on axillary or basal peduncles. Sepals 5.

Petals 5. Stamens 10, in 2 whorls of 5. Ovary superior, carpels 5. Fruit a loculicidal capsule or berry.

***Oxalis* L., Sp. Pl. 1: 433. 1753**

Herbs, stem erect or creeping with bulbs or tubers. Leaves 3-foliolate, stipulate or exstipulate. Flowers in solitary, cymose or umbels. Sepals and petals 5. Ovary with 1-several ovules. Fruit a capsule.

1a. Plant creeping; flowers yellow *O. corniculata*

1b. Plant not creeping; flowers pink *O. corymbosa*

***Oxalis corniculata* L., Sp. Pl. 435. 1753; Edgew. & Hook.f., Fl. Brit. Ind. 1: 436. 1874; C.E.C. Fischer in Rec. Bot. Surv. India 12.2: 85. 1938; Manna in Hajra *et al.*, Fl. Ind. 4: 242. 1997; Singh in Singh *et al.*, Fl. Mizo. 1: 287. 2002.**

Herbs, stems prostrate, upto 30 cm long, rooting at nodes. Leaves palmately 3-foliolate, leaflets obcordate, 0.3-1.2 x 0.7-1.2 cm, base cuneate or acute, lobes rounded, glabrous to sericeous above; petioles 2-6 cm long, pubescent; stipules adnate to petiole. Flowers yellow, subumbellate, 1-4 flowered. Sepals and petals 5. Stamens 10, united at base. Ovary 5-celled. Capsules oblong or subcylindric.

**Fl. & Fr.:** March - August.

**Distibution:** India (throughout), cosmopolitan

**Specimen examined:** Grows in roadsides, wastelands and gardens. Tsupfume. NLNU 0071.

***Oxalis corymbosa* DC., Prodr. J; 696. 1824; Manna in Hajra *et al.*, Fl. Ind. 4: 246. 1997; Singh in Singh *et al.*, Fl. Mizo. 1: 287. 2002.**

Herbs with bulbous rootstocks. Leaves 3-foliolate, leaflet obcordate, 1-3 x 2-3.5 cm, base cuneate, appressed hairy on both surfaces. Flowers in corymbose cymes, 8-15 flowered. Sepals lanceolate. Petals purplish pink, hairy outside. Stamens 10. Capsule rarely formed.

**Fl. & Fr.:** March – December

**Distribution:** India (throughout), naturalized in warm temperate areas in the world.

**Specimen examined:** Grows in roadsides, wastelands and gardens. Chozuba. NLNU 0313.

## BALSAMINACEAE

A. Rich., Dict. Class. Hist. Nat. 2: 173. 1823

Annual or perennial herbs. Stems erect or procumbent, usually fleshy, often rooting at lower nodes. Leaves simple, opposite or alternate, spirally arranged in some, margin toothed, exstipulate or with stipular glands at base of the petiole. Flowers bisexual, zygomorphic, resupinate, axillary or terminal, solitary or fascicled in racemes or umbels. Sepals 3 or 5, lateral sepals free or connate, small; lower sepal large, petaloid, pouch shaped with a spur. Petals 5, upper petal(standard) flat or hooded; lower petals(wings) free or connate into 2 lateral pairs. Stamens 5, united, enclosing the ovary and stigma. Ovary superior, carpels 5. Fruit a loculicidal capsule.

1a. Flowers in axillary racemes

2a. Flowers yellow with red spots, spur curved upwards

*I. stenantha*

2b. Flowers pink, spur slightly S shaped

*I. graciliflora*

1b. Flowers in axillary solitary or fascicles

3a. Lateral sepals 4 (in 2 pairs)

4a. Herbs; flowers violet

*I. arguta*

- 4b. Undershrubs; flowers yellow with purple streaks *I. laevigata*
- 3b. Lateral sepals 2 (in 1 pair)
- 5a. Spur less than 1 cm long *I. tripetala*
- 5b. Spur more than 1 cm long
- 6a. Spur 1.5-2.5 cm long, incurved or spiral at tip *I. pulchra*
- 6b. Spur 3-4.5 cm long, curved, filiform *I. latiflora*

***Impatiens* L., Sp. Pl. 2: 937. 1753**

Description are the same as of family, but lateral petals connate into pairs. Fruit a fleshy, explosive dehiscing lodculicidal capsule.

***Impatiens arguta*** Hook.f. & Thomson, J. Proc. Linn. Soc., Bot. 4: 137. 1859; Hook.f., Fl. Brit. Ind. 1: 470. 1875; Vivekananthan *et al.*, in Hajra *et al.*, Fl. Ind. 4: 120. 1997; Grierson & Long, Fl. Bhut. 2.1: 92. 1991.

Perennial herbs upto 60 cm tall. Stem slender, erect, branched, more or less glabrous. Leaves alternate, ovate or elliptic-lanceolate, 4-10 x 2-4.5cm, apex acuminate, base cuneate, margin sharply serrate, petiole upto 4 cm long, with a pair of glands towards the top. Inflorescence axillary, 1-2 flowered, pedicellate. Bracts setaceous, twisted. Flowers violet, large. Lateral sepals 4, in 2 pairs; outer 2 subovate, apex cuspidate, inner 2 narrowly lanceolate. Lower sepal saccate, narrowed into a short spur. Upper petal orbicular, apex mucronate; lateral united petals 2 lobed, basal lobes oval, distal lobes long, emarginated. Capsule clavate, 2-3 cm long.

**Fl. & Fr.:** April-September

**Distribution:** India (E. Himalaya, NE India), Bhutan, China, Myanmar, Nepal, Tibet

**Specimen examined:** Grows in moist shady places. Zhavame. NLNU 0256. (Pl. 8)

***Impatiens graciliflora*** Hook.f., Rec. Bot. Surv. Ind. 4: 15: 1905; Grierson & Long, Fl. Bhut. 2.1: 96. 1991; Vivekananthan *et al.*, in Hajra *et al.*, Fl. Ind. 4: 153. 1997.

Annual herbs, upto 60 cm tall. Leaves elliptic-lanceolate, 6-12 x 1.7-4 cm, apex acuminate, base cuneate or attenuate, margin crenate. Inflorescence axillary, in long peduncled raceme. Flowers pink, pedicels whorled on peduncle. Lateral sepals small, narrow. Lower sepal long, shallowly navicular, spur slightly curved or S shaped, 2.8-3.5 cm long. Standard cucullate. Upper lateral petal auricle like, lower lateral petal asymmetrically bilobed. Capsule linear, 1.5-2 cm long.

**Fl. & Fr.:** June-October

**Distribution:** India (NE India), E Himalaya, Bhutan, Myanmar, Nepal

**Specimen examined:** Grows in moist shady places. Pfitsero. NLNU 0114. **(Pl. 8)**

***Impatiens laevigata*** Wall. ex Hook. f. & Thomson, J. Proc. Linn. Soc., Bot. 4: 146. 1859; Hook.f., Fl. Brit. Ind. 1: 473. 1875; Vivekananthan *et al.*, in Hajra *et al.*, Fl. Ind. 4: 167. 1997; Balakr., Fl. Jowai 1: 113. 1981.

Erect undershrubs, upto 1 m tall. Stems branched, glabrous, woody below. Leaves alternate, crowded at top of stem, elliptic-lanceolate to narrowly oblanceolate, 6-15 x 2.5-6 cm, apex acuminate, base cuneate or attenuate, margin distantly serrate; petioles 1-5 cm long, glandular. Inflorescence axillary, racemes dense, peduncles 1-2 cm long. Bracts large, ovate. Flowers yellow, with brownish purple streaks. Lateral sepals large, ovate, yellow green with brownish nerves. Lip funnel shaped, narrowed into a hooked spur. Standard semicucullate, yellow; lateral united petals 2 lobed, basal lobes short, obtuse; distal lobes twice longer than basal lobes. Capsule linear, upto 2 cm long.

**Fl. & Fr.:** July-December

**Distribution:** India (NE India), E Himalaya, Myanmar, Nepal

**Specimen examined:** Grows in moist shady places. Phukhungri. NLNU 0861. (Pl. 8)

*Impatiens latiflora* Hook. F. & Thomson, J. Proc. Linn. Soc., Bot. 4: 139. 1859; Hook.f., Fl. Brit. Ind. 1: 459. 1875; Vivekananthan *et al.*, in Hajra *et al.*, Fl. Ind. 4: 168. 1997; Grierson & Long, Fl. Bhut. 2.1: 88. 1991.

Perennial herbs, upto 40 cm tall. Stems branched, glabrous or pubescent. Leaves elliptic-lanceolate, 5-12 x 1.5-3 cm, apex acuminate, base cuneate, margins crenate, pubescent. Inflorescence 1-2 flowered raceme. Bracts ovate acuminate. Flower pink-purple. Lateral sepals ovate, acute; lip navicular, abruptly constricted into a spur. Standard obcordate; lateral united petals bilobed, basal lobes oblique oval, distal lobes obovate, emarginate. Capsule ellipsoid, 1.5-2 cm long.

**Fl. & Fr.:** July-December

**Distribution:** India (NE India), E Himalaya, Bhutan

**Specimen examined:** Grows in moist shady places. Chozuba. NLNU 0319.

*Impatiens pulchra* Hook.f. & Thomson, J. Proc. Linn. Soc., Bot. 4: 139. 1859; Hook.f., Fl. Brit. Ind. 1: 459. 1875; Vivekananthan *et al.*, in Hajra *et al.*, Fl. Ind. 4: 199. 1997; Grierson & Long, Fl. Bhut. 2.1: 90. 1991.

Perennial herbs, upto 40 cm tall. Stem sparsely branched. Leaves alternate, elliptic-lanceolate, 5-10 x 1.5-3 cm, apex acuminate, base cuneate, margin crenate; petiole upto 1.5 cm long. Inflorescence axillary, raceme 1-2 flowered. Flower orange with red marks on lip and throat. Lateral sepals 2, ovate, green; lower sepal funnel shaped, spur abruptly constricted, coiled at tip. Standard orbicular, cucullate. Lateral petals united bilobed; basal lobe obovate, distal lobe dolabriform, apex acute or obtuse. Capsule ellipsoid, glabrous.



**Fl. & Fr.:** May-October

**Distribution:** India (NE India), E Himalaya, Bhutan, Myanmar, Nepal

**Specimen examined:** Grows in moist shady places. Chozuba. NLNU 0322. **(Pl. 9)**

*Impatiens stenantha* Hook.f., Fl. Brit. Ind. 1: 478. 1875; Vivekananthan *et al.*, in Hajra *et al.*, Fl. Ind. 4: 212. 1997

Tall erect herbs, upto 60 cm high. Stems much branched, glabrous. Leaves lanceolate, ovate lanceolate, 5-14 x 3-5 cm, apex acuminate, base cuneate, margin crenate; petiole to 1.5 cm long, with 2 stipular glands. Inflorescence axillary and terminal, in long peduncled raceme. Bracts caducous. Flowers yellow with red spots. Lateral sepals small, narrow. Lower sepal long, funnel shaped, narrowed into a curved, slender spur, reddish, mouth oblique. Standard orbicular, yellow. Lateral united petals bilobed. Basal lobes triangular; distal lobes long, narrow, acute or obtuse, twisted. Capsule clavate, 1-1.5 cm long, glabrous.

**Fl. & Fr.:** July-November

**Distribution:** India (NE India), E Himalaya, Myanmar, Nepal, Tibet

**Specimen examined:** Grows in moist shady places. Pfitsero. NLNU 0112. **(Pl. 9)**

*Impatiens tripetala* Roxb. & DC., Prodr. 1: 687. 1824; Hook.f., Fl. Brit. Ind. 1: 470. 1875; Vivekananthan *et al.*, in Hajra *et al.*, Fl. Ind. 4: 219. 1997; Grierson & Long, Fl. Bhut. 2.1: 91. 1991.

Annual herbs, upto 50 cm tall. Stem erect, nodes swollen. Leaves opposite or alternate, ovate or elliptic-lanceolate, 4-12 x 1.5-5 cm, apex acuminate, base cuneate, margin crenate, sparsely pubescent; petiole 1.5-6 cm long. Inflorescence axillary, solitary or fascicled. Flowers pale pink or partially purple. Bracts lanceolate or subulate, green,

persistent. Lateral sepals 2, subulate, hairy. Lower sepal trumpet shaped, constricted into an incurved spur. Standard orbicular, cuculate, spurred at the back, apex emarginate. Lateral united petals bilobed; basal lobes triangular, distal lobes dolabriform, purple. Capsule ellipsoid, turgid in middle, 1.5-2 cm long, glabrous.

**Fl. & Fr.:** August-November

**Distribution:** India (E. Himalaya, NE India), Bangladesh, Bhutan, Myanmar, Nepal

**Specimen examined:** Grows in moist shady places. Lozaphuhu. NLNU 0381.

## RUTACEAE

Juss., Gen. Pl. 296. 1789

Trees, shrubs or rarely herbs, sometimes scandent, sometimes armed; leaves, flowers and fruits usually bearing numerous oil glands. Leaves alternate or opposite, simple or variously compound, exstipulate. Flowers regular, bisexual or unisexual, in axillary or terminal racemes, corymbs or panicles, sometimes solitary. Calyx 4-5 lobed, often connate at base. Petals 4-5 lobed, free, valvate or imbricate. Stamens as many or twice as many as petals or sometimes more; filaments free or connate; in female flowers stamens reduced to staminodes. Ovary superior; styles 1-5, free or united; in male flowers ovary reduced to pistillode. Fruit a capsule, cluster of follicles, berry or drupe. Seeds solitary or few in each cell.

### 1a. Plants armed

2a. Leaves 3-foliolate; fruits drupaceous

*Toddalia*

2b. Leaves pinnate; fruits capsular

*Zanthoxylum*

### 1b. Plants unarmed

3a. Herbs with bi or tri-pinnate leaves

*Boenninghausenia*

3b. Shrubs or trees with pinnate leaves

4a. Leaves opposite

*Melicope*

4b. Leaves alternate

5a. Leaflets large, 6-15cm; petals valvate, styles and ovary

pubescent, 5-celled

*Micromelum*

5b. Leaflets small, 3-6 cm; petals imbricate, styles and ovary

glabrous

*Murraya*

***Boenninghausenia*** Rchb. ex Meisn., Pl. Vasc. Gen. 1: 60. 1837

Perennial herbs. Leaves alternate, 2 or 3-ternate, leaflets entire. Flowers bisexual, regular, in axillary and terminal paniced cymes. Calyx 4-5 lobed, cup-shaped, united at base, persistent. Corolla 4-5 lobed, oblanceolate, imbricate in bud. Stamens 6-8, inserted on a short disc, disc annular to cup-shaped. Gynoecium 4-carpelled, ovaries united at base, borne on a slender gynophore, each lobe bearing a short ventral style. Fruit a capsule, seeds 6-8 in each cell.

***Boenninghausenia albiflora*** (Hook.) Rchb. ex Meisn, Pl. Vasc. Gen. 2: 44. 1837; *Ruta albiflora* Hook., Exot. Fl. 1: 79. 1823; Hook.f., Fl. Brit. Ind. 1: 486. 1875; Nair & Nayar in Hajra *et al.*, Fl. Ind. 4: 357. 1997; Singh in Singh *et al.*, Fl. Mizo 1: 302. 2002.

A slender erect, branching herbs, upto 60 cm tall; plant glabrous to pubescent. Leaves alternate, 2 or 3 ternate, imparipinnate, 5-12 cm long; leaflets subsessile, obovate or obcordate; terminal ones largest, lateral ones smaller, base cuneate or rounded, apex obtuse, emarginate, glabrous, glaucous beneath, margin entire. Inflorescence in terminal compound leafy cymes. Flowers white, drooping, 0.5-1 cm across, pedicels slender. Sepals 4, united at

base, urceolate. Petals 4, obovate, obtuse at apex. Stamens longer than petals. Ovary 4-carpellate, stipitate, 3-5 lobed. Capsule membranous, ventrally dehiscent.

**Fl. & Fr.:** September-November

**Distribution:** India (Himalaya, NE India), Bhutan, Indonesia, Japan, Laos, Myanmar, Nepal, Pakistan, Philippines, Thailand, Vietnam

**Specimen examined:** Grows in open slopes, roadsides. Tsupfume. NLNU 0009. **(Pl. 9)**

*Melicope* J. R. Forst. & G. Forst., Char. Gen. Pl. 55. 1776

Shrubs or trees, evergreen. Leaves opposite or whorled, trifoliolate. Inflorescence axillary or rarely terminal, cymose or thyriform or paniculate. Sepals 4, united at base or nearly their full length, valvate or imbricate. Petals 4, valvate or imbricate. Stamens 8 or rarely 4, in female flowers reduced to staminodes. Gynoecium 4-carpelled, ovaries united at base, ovules 1 or 2 per locule; stigma capitate. Fruit 1-4, basally connate follicles.

*Melicope lunu-ankenda* (Gaertn.) T. G. Hartley, Sandakania 4: 61. 1994; *Fagara lunu-ankenda* Gaertner, Fruct. Sem. Pl. 1: 334. 1788; *Euodia roxburghiana* (Cham.) Benth., Fl. Hongk. 59. 1861; Hook.f., Fl. Brit. Ind. 1: 486. 1875; Nair & Nayar in Hajra *et al.*, Fl. Ind. 4: 369. 1997.

Trees, upto 15 m tall. Bark grey, smooth or slightly reticulately fissured, lenticellate. Leaflets ovate, oblong-elliptic or lanceolate, cuneate or rounded at base, apex acute, margin entire, glabrous, coriaceous. Inflorescence in dense paniculate corymbs. Flowers bisexual, 4-merous. Sepals connate at base, pubescent outside glabrous inside, persistent in fruit. Petals white, ovate, glabrous. Stamens 4, longer than petals. Ovary and style densely pubescent. Fruit of 2-4 follicles, globose.

**Fl. & Fr.:** August-December

**Distribution:** India (throughout), Bhutan, Cambodia, Indonesia, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, Vietnam

**Specimen examined:** Grows in open secondary forest. Meluri. NLNU 0591.

*Micromelum* Blume, Bijdr. Fl. Ned. Ind. 3: 137. 1825

Shrubs or trees, unarmed. Leaves alternate, odd-pinnate; leaflets alternate. Flowers in corymbose panicles, terminal or terminal and axillary, bisexual. Calyx cupshaped, shortly 5-lobed. Petals 5, free, valvate in buds. Stamens 10, alternately unequal in length. Gynoecium 3-5 loculed, ovules 2 per locule; style as long as ovary. Fruit a berry, 1-2 seeded.

*Micromelum integerrimum* (Roxb.ex DC.) Wight & Arn.ex M. Roem., Fam. Nat. Syn. Monogr. 1: 47. 1846; *Bergera integerrima* Roxb., Fl. Ind. 2: 376. 1832 ; *M. pubescens* (non Bl.) Hook.f., Fl. Brit. Ind. 1: 501. 1875; Kanjilal *et al.*, Fl. As. 1: 208. 1936; Nair & Nayar in Hajra *et al.*, Fl. Ind. 4: 349. 1997; Singh in Singh *et al.*, Fl. Mizo 1: 313. 2002.

Trees, upto 10 m tall. Branchlets appressed pubescent. Leaflets 7-15, alternate to subopposite, obliquely ovate-lanceolate, base obliquely cuneate, apex acuminate, margins wavy or entire, glabrous above, tomentose or pubescent beneath along the nerves, gland dotted; petiolules 0.3-0.4 cm. Flowers in terminal spreading corymbose panicles or axils of uppermost leaves, pubescent, dull white, fragrant. Calyx 5-toothed, pubescent. Petals 5, oblong, rounded at tip, pubescent. Stamens 10, alternately long and short. Ovary 5-celled, subglobose or ellipsoid; stigma capitate. Berry ellipsoid or ovoid; orange or yellowish-red when ripened.

**Fl. & Fr.:** November-June

**Distribution:** India (NE India), E & W Himalaya, Bangladesh, Bhutan, China, Myanmar, Nepal

**Specimen examined:** Grows in primary and secondary forest. Chepoketa. NLNU 0931.

*Murraya* J. Koenig ex L., Mant. Pl. 2: 554. 1771

Shrubs or trees, unarmed. Leaves alternate, imparipinnate; leaflets alternate, entire, petioluled. Flowers in lateral or terminal corymbs or cymes, bisexual. Calyx 5-lobed, connate at base or to half their length. Petals 5, free, imbricate. Stamens 10, filaments subulate, alternately unequal in length. Gynoecium 2-5 loculed, narrowed into style, stigma capitate. Fruit a berry, oblong, 1-2 seeded.

*Murraya paniculata* (L.) Jack, Malay. Misc. 1: 31.1820; *Chalcas paniculata* L., Mant. Pl. 1: 68. 1767; *M.exotica* L. Man. Pl. 2: 563. 1771; Hook.f., Fl. Brit. Ind. 1: 502. 1875; Kanjilal *et al.*, Fl. As. 1: 207. 1936; Nair & Nayar in Hajra *et al.*, Fl. Ind. 4: 352. 1997; Singh in Singh *et al.*, Fl. Mizo 1: 314. 2002.

Shrubs or trees, upto 6 m tall. Leaves upto 15 cm long; leaflets 3-9, ovate, elliptic, 3-6 x 2-3 cm, base cuneate, apex obtusely acuminate, emarginated, margin entire, glabrous, petiolules 0.3-0.4 cm. Inflorescence terminal or axillary cymes. Flowers white, fragrant. Calyx 5, ovate, 0.1 cm. Petals 5, oblong-elliptic, 1.4-2 cm. Stamens 10. Ovary glabrous; stigma capitate. Berry ovoid, rugose, red when ripened.

**Fl. & Fr.:** March-July

**Distribution:** India (throughout), Bangladesh, Bhutan, China, Myanmar, Nepal, Philippines, Thailand, Sri Lanka, Australia, SW Pacific Islands

**Specimen examined:** Grows in secondary forest, forest edges. Lozaphuhu. NLNU 0491.

**(Pl. 9)**

***Toddalia* Juss., Gen. Pl. 371. 1789**

Scrambling shrubs or woody climbers; stems armed with curved spines. Leaves alternate, palmately 3-foliolate; leaflets obovate, oblanceolate or lanceolate, crenulate or subentire. Inflorescence axillary and/or terminal in paniculate cymes, racemose. Flowers unisexual. Sepals 5, connate at base. Petals 5, valvate or imbricate in buds. Stamens 5, rudimentary in female flowers. Disc fleshy, grooved, glabrous. Gynoecium 4-7 loculed, syncarpous. Rudimentary in male. Fruit a globose, fleshy, berry.

***Toddalia asiatica* (L.) Lamk., Tabl. Encycl. 2: 116. 1797; *Paullinia asiatica* L., Sp. Pl. 365. 1753; *T. aculeata* Pers., Syn. 1: 249. 1805; Hook.f., Fl. Brit. Ind. 1: 497. 1875; Kanjilal *et al.*, Fl. As. 1: 203. 1936; Balakr., Fl. Jowai, 1: 117. 1981; Nair & Nayar in Hajra *et al.*, Fl. Ind. 4: 403. 1997; Singh in Singh *et al.*, Fl. Mizo 1: 317. 2002.**

Large scandent shrubs, with recurved prickles. Young shoots rusty tomentose. Leaves alternate, digitately 3-foliolate, petioles 3-5 cm long; leaflets oblong to oblanceolate, apex acute to acuminate, base cuneate, margin crenate or serrate, sessile. Flowers in axillary or terminal paniculate cymes, creamy white. Calyx 5-lobed, small, glandular, pubescent outside. Petals 5, oblong or lanceolate, gland dotted. Stamens 5, longer than the petals. Ovary ovoid, style short, stigma 5-lobed. Berry globose, obscurely 4-5 lobed, orange when riped; rind smooth with translucent glands.

**Fl. & Fr.:** November-June

**Distribution:** India (throughout), Bangladesh, Bhutan, China, Indonesia, Japan, Myanmar, Nepal, Philippines, Thailand, Sri Lanka, Vietnam, Africa

**Specimen examined:** Grows in primary and secondary forest, scrambling on trees. Tsupfume. NLNU 0021. **(Pl. 9)**

***Zanthoxylum*** L., Sp. Pl. 1: 270. 1753

Shrubs, trees or woody climbers, often armed. Leaves alternate, trifoliate or imparipinnate; rachis often winged in between leaflets and sometimes bearing spines; leaflets opposite or alternate, entire, crenate or serrate, aromatic. Inflorescence terminal or axillary in peduncled panicle cymes. Flowers unisexual, small. Perianth either uniseriate with 4-8 undifferentiated segments or biseriate with 4-5 sepals and 4-5 petals. Stamens 4-8, rudimentary or lacking in female flowers. Female flowers with 1-4 distinct carpels surrounded by minute staminodes. Fruit follicles 1-5, globose, 1 seeded carpels.

- |   |                         |
|---|-------------------------|
| 1a. Petioles and rachis not winged; petals present    | <i>Z. rhetsa</i>        |
| 1b. Petioles and rachis broad winged; petals absent   |                         |
| 2a. Branchlets pubescent; flowers in axillary cluster | <i>Z. acanthopodium</i> |
| 2b. Branchlets glabrous; flowers in lax panicle cymes | <i>Z. armatum</i>       |

***Zanthoxylum acanthopodium*** DC., Prodr. 1: 727.1824; Hook.f., Fl. Brit. Ind. 1: 493. 1875; Kanjilal *et al.*, Fl. As. 1: 200. 1936; Balakr., Fl. Jowai, 1: 117. 1981; Nair & Nayar in Hajra *et al.*, Fl. Ind. 4: 378. 1997; Singh in Singh *et al.*, Fl. Mizo 1: 319. 2002.

Shrubs or small trees, armed with prickles. Branchlets brown tomentose, rarely glabrous. Leaves alternate, upto 30 cm long; leaflets opposite, 3-9 foliolate, elliptic, oblong-lanceolate, 3-7 x 1.5-3 cm, apex acuminate, base oblique rounded, sessile, margin serrate; wings upto 1 cm broad between leaflets. Inflorescence axillary in short dense clusters, pubescent. Perianth in 2 irregular series or 1 series. Stamens 6-8 in male flowers, anthers reddish purple before anthesis; disc pulvinate. Female flowers with 2-5 ovoid carpels, pubescent to glabrous. Fruit forming dense subsessile clusters, follicles 2-5, purplish red. Seeds black, glossy.



**Fl. & Fr.:** March-October

**Distribution:** India (NE India), E & W Himalayas, Bangladesh, Bhutan, China, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in open forest and thickets. Tsupfume. NLNU 0097. **(Pl. 9)**

*Zanthoxylum armatum* DC., Prodr. 1: 727. 1824; *Z. alatum* Roxb. Fl. Ind. 3: 768. 1832; Hook.f., Fl. Brit. Ind. 1: 493. 1875; Kanjilal *et al.*, Fl. As. 1: 199. 1936; Balakr., Fl. Jowai, 1: 117. 1981; Nair & Nayar in Hajra *et al.*, Fl. Ind. 4: 379. 1997; Singh in Singh *et al.*, Fl. Mizo 1: 321. 2002.

Shrubs or small trees, upto 6 m tall. Shoots glabrous, prickles straight or incurved from broad base. Leaves alternate, upto 20 cm long, imparipinnate; leaflets 5-11, elliptic to oblong-lanceolate, 3-7 x 1-3 cm, cuneate or rounded at base, apex acute to acuminate, subsessile, glabrous, margin entire or serrulate; rachis broadly winged. Inflorescence in terminal panicle cymes on short lateral shoots, 4-11 cm long. Perianth in 2 irregular series or 1 series. Male flowers stamens 6-8, anthers yellow prior to anthesis, carpels absent. Female flowers carpels 1-3, ovary ovoid, unilocular with 2 ovules. Fruit follicles globose, ovoid, red when ripened. Seeds black, glossy.

**Fl. & Fr.:** March-October

**Distribution:** India (Himalayas, NE India), Bangladesh, Bhutan, China, Nepal, Pakistan, Philippines, Thailand, Vietnam

**Specimen examined:** Grows in open forest and thickets. Tsupfume. NLNU 0096. **(Pl. 10)**

*Zanthoxylum rhetsa* (Roxb.)DC., Prodr. 1: 728. 1824; *Fagaria rhetsa* Roxb., Fl. Ind. 1: 438. 1820; *Z. budrunga* (Roxb.) DC. Prodr. 1: 728. 1824 Hook.f., Fl. Brit. Ind. 1: 495. 1875;

Kanjilal *et al.*, Fl. As. 1: 197. 1936; Nair & Nayar in Hajra *et al.*, Fl. Ind. 4: 387. 1997; Singh in Singh *et al.*, Fl. Mizo 1: 322. 2002.

Large trees upto 30 m tall. Main stem armed with conical corky spines with broad base, branches bearing straight or curved spines. Leaves crowded at branch ends, imparipinnate, 20-60 cm long; leaflets 3-15, opposite, ovate, oblong to elliptic-lanceolate, 6-12 x 3-5 cm, base obliquely rounded, pex acuminate, entire to remotely crenate with glands at the base of teeth, glabrous, sub coriaceous; petiolules 0.2-0.6 cm. Flowers small, in terminal and sub terminal paniculate cymes. Male flowers greenish yellow; sepals 4, minute, ovate; petals 4, oblong; stamens 4. Female flowers ovary 1 carpellate. Follicles globose, 1 seeded. Seeds glossy, blue black.

**Fl. & Fr.:** March-October

**Distribution:** India (Himalayas, NE India), Bangladesh, Bhutan, China, Nepal, Philippines, Sri Lanka, Thailand, Vietnam

**Specimen examined:** Grows in secondary forest and near fields. Tsupfume. NLNU 0095.

## MELIACEAE

Juss., Gen. Pl. 263. 1789

Trees or shrubs. Leaves, alternate, usually pinnate; leaflets entire or serrate, generally oblique at base, stipules absent. Monoecious or dioecious. Flowers in axillary or terminal panicles. Sepals 3-6 lobed, free or connate. Petals 3-6, free or connate at base. Stamens as many as or twice as many as petals; filaments generally connate into a tube. Fruit a capsule, drupe or berry.

1a. Undershrubs or shrubs; petals connate for more than half

*Munronia*

1b. Trees; petals connate less than half way, sometimes connate only at base

2a. Leaves 2-3 pinnate *Melia*

2b. Leaves pinnate or 3-foliolate

3a. Ovary 2-3-celled; ovules 1-2 in each cell; seeds unwinged *Heynea*

3b. Ovary 5-celled; ovules many in each cell; seeds winged *Toona*

***Heynea*** Roxb., Bot. Mag. 42:t. 1738. 1815

Trees or shrubs. Leaves imparipinnate; leaflets entire, opposite. Flowers unisexual, in axillary panicles. Calyx 4-5-lobed. Petals 4-5, free. Stamens 10, filaments united at base, free above. Disk fleshy, annular. Ovary 2-3-celled, each with 1-2 ovules; stigma clavate. Fruit a capsule.

***Heynea trijuga*** Sims., Bot. Mag. 42:t. 1738. 1815; Hiern in Hook.f., Fl. Brit. Ind. 1: 565. 1875; Brandis, Ind. Trees 134. 1906; Kanjilal *et al.*, Fl. As. 1: 229. 1936; *Trichilia connaroides* (Wight & Arn) Benth., Acta Bot. Neerl. 11: 13. 1962; Balakr., Fl. Jowai 1: 123. 1981; Singh in Singh *et al.*, Fl. Mizo. 1: 343. 2002.

Small trees or shrubs. Leaves alternate, crowded at ends of Branchlets; leaflets opposite, ovate-oblong, 6-12 x 2-4 cm, apex acuminate, base unequally subacute, margin entire, glabrous above, glaucous beneath; petiolules 1-1.5 cm. Flowers in axillary panicles, white. Calyx 5-lobed, hairy outside, ovate. Petals 5, hairy outside. Stamens 10. Ovary 2-3-celled. Capsule ellipsoid.

**Fl. & Fr.:** May - August

**Distribution:** India (throughout), E Himalaya, Bhutan, China, Myanmar, Nepal, Philippines, Sumatera, Thailand, Vietnam

**Specimen examined:** Grows in secondary forests. Sakraba. NLNU 0652 (Pl. 10)

***Melia*** L. Sp. Pl. 384. 1753

Trees, indumentums of simple hairs when young. Leaves 2-3-pinnate; leaflets petiolules, entire or serrate. Flowers in axillary thyrse. Calyx 5-lobed. Petals 5, free. Staminal tube cylindrical, anthers 10. Ovary 5-7-celled; stigma capitate, 5-lobed. Fruit a drupe, pulpy, stone bony.

***Melia azedarach*** L., Sp. Pl. 384. 1753; Hiern in Hook.f., Fl. Brit. Ind. 1: 544. 1875; Brandis, Ind. Trees 140. 1906; Kanjilal *et al.*, Fl. As. 1: 228. 1936; Haridasan & Rao, Forest Fl. Megh. 1: 210. 1985; Singh in Singh *et al.*, Fl. Mizo. 1: 339. 2002.

Trees, 10-16 m tall. Leaves 2-3-pinnate; leaflets ovate or elliptic, 3-5 x 1-2 cm, paex acuminate, base obliquely cuneate, margin serrate, tomentose when young. Flowers pale lilac, in axillary panicles. Calyx lobes small, minutely tomentose. Petals linear oblong, pubescent outside. Staminal tube 0.9 cm, purple, glabrous. Drupe ovoid-ellipsoid, yellow when ripe; 1 seeded.

**Fl. & Fr.:** March - July

**Distribution:** India (throughout), Tropical Asia, Australia, Tropical Africa

**Specimen examined:** Grows in secondary forests. Chizami. NLNU 0532.

***Munronia*** Wight, Ill. Ind. Bot. 1: 147. 1839

Shrubs, usually unbranched. Leaves imparipinnate; leaflets opposite, entire or sparsely crenate. Flowers bisexual, in axillary panicles. Calyx deeply 5-lobed, connate at base. Petals 5, connate below with staminal tube. Staminal tube cylindrical; anthers 10, oblong. Disk tubular. Ovary 5-celled; style slender, elongated; stigma capitate. Fruit a capsule, 5-valved.

*Munronia pinnata*(Wall.) W. Theob., Burmah, ed. 3.2: 581. 1883; Jain & Bennet in Hajra *et al.*, Fl. India 4: 497. 1997; *Turraea pinnata* Wall., Pl. Asiat. Rar. 2: 21. 1831; *Munronia wallichii* Wight, Ill. Ind. Bot. 1: 117. 1838; Hiern in Hook.f., Fl. Brit. Ind. 1: 543. 1875; Kanjilal *et al.*, Fl. As. 1: 235. 1936; Singh in Singh *et al.*, Fl. Mizo. 1: 340. 2002.

Undershrubs, 25-100 cm tall. Leaves crowded at end of shoots, alternate; petioles 5-10 cm; leaflets opposite, ovate-oblong or lanceolate, 3-11 x 2-5 cm, base obliquely acute or rounded, apex acuminate, margin entire or undulate, pubescent on nerves beneath. Flowers whitish pink, in axillary panicles towards shoot apex. Calyx 5, deeply lobed, pubescent outside. Petals spathulate, clawed. Disc tubular; ovary 5-celled. Capsule globose, 5-valved.

**Fl. & Fr.:** March - July

**Distribution:** India (throughout), E Himalaya, Bangladesh, Bhutan, China, Malaya, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam

**Specimen examined:** Grows in secondary forests. Chozuba. NLNU 00323. **(Pl. 10)**

*Toona* M. Roem., Fam. Nat. Syn. Monogr. 1: 139. 1846

Trees, bark grayish brown, fissured, sometimes flaking irregularly. Leaves pinnate leaflets entire. Flowers unisexual, in axillary much branched pendent thyrses. Calyx imbricate, cup-shaped, 5-lobed. Petals 5, imbricate. Stamens 5, distinct. Fruit a capsule, ellipsoid, pendulous, woody, 5-valved; seeds winged.

*Toona hexandra* (Wall.) M. Roem., Fam. Nat. Syn. Monogr. 1: 139. 1846; *T. ciliata* Roem., Fam. Nat. Syn. Monogr. 1: 139. 1846; Jain & Bennet in Hajra *et al.*, Fl. India 4: 504. 1997; Singh in Singh *et al.*, Fl. Mizo. 1: 341. 2002; *Cedrela toona* Roxb. ex Rottler & Willd., Neue Schriften Ges. Naturf. Freunde Berlin 2: 198. 1803; Hiern in Hook.f., Fl. Brit. Ind. 1: 568. 1875; Brandis, Ind. Trees 145. 1906; Kanjilal *et al.*, Fl. As. 1: 242. 1936.

Large trees. Bark grey, fissured and flaking. Leaves upto 70 cm long; leaflets 8-20 opposite or alternate, ovate-lanceolate, oblong-lanceolate, 8-12 x 5.5-4 cm, base cuneate, apex acuminate, margin entire, wavy, glabrous. Flowers white, fragrant, in long panicles, shorter than leaves. Sepals free, ovate, pubescent. Petals white, oblong, margin ciliate. Stamens 5. Stigma capitate. Capsule oblong; seeds winged at both ends.

**Fl. & Fr.:** March - July

**Distribution:** India (throughout), Bhutan, China, Tropical Asia

**Specimen examined:** Grows in secondary forests. Khezhakheno. NLNU 0204. **(Pl. 10)**

## CELASTRACEAE

R. Br. in Flinders Voy. Terra Austr. 2: 554. 1814

Trees, shrubs or climbers. Leaves simple, opposite or alternate, stipules minute or absent. Flowers in axillary or terminal cymes or panicles, bisexual, regular. Calyx 4-5 lobed, imbricate lobes. Corolla 4-5, sometimes absent, free. Disc often conspicuous, lobed. Stamens as many as petals, free or filaments connate at base, borne on disk. Ovary 2-5 celled, free or immersed in the disk, style short, stigma simple or lobed. Fruit a capsule. Seeds sometimes arillate, rarely winged.

***Euonymus*** L., Sp. Pl. 197. 1753

Small trees or shrubs, often scandent. Leaves opposite, serrate or crenate, stipules deciduous. Flowers axillary, in lax cymes, bisexual, 4 merous. Calyx lobes entire or dentate. Corolla lobes spreading. Disc flat, 4-5 lobed. Stamens 4-5, borne on disc. Ovary partly immersed in disc, 4-5 celled, style short, ovules 2 in each cell. Capsule globose, 4-5 lobed, sometimes angled or winged.

1a. Shrubs, trailing or climbing with adventitious roots

*E. echinatus*

1b. Trees or shrubs, without adventitious roots

*E. hamiltonianus*

***Euonymus echinatus*** Wall., Roxb., Fl. Ind. 2: 410. 1824; M. A. Lawson in Hook.f., Fl. Brit. Ind. 1: 611. 1875; Kanjilal *et al.*, Fl. As. 1.2: 265. 1936; Balakr., Fl. Jowai 1:131. 1981; Grierson & Long, Fl. Bhut. 2.1: 118. 1991; Ramamurthy in Singh *et al.*, Fl. Ind. 5: 98. 2000.

Evergreen shrubs, climbing on trees and rocks by numerous adventitious roots, branchlets 4 ribbed, smooth. Leaves oblong to ovate-lanceolate, 2.5-6 x 1.5-3 cm, apex acute to acuminate, base cuneate, serrate margins, glabrous, nerves conspicuous; petioles 0.5-1cm. Flowers greenish white in axillary cymes, 4-merous, peduncles 1.5-4 cm. Calyx lobes small, rounded. Corolla orbicular, crenulate. Capsule globose, covered with conical tubercles, aril scarlet.

**Fl. & Fr.:** May-January

**Distribution:** India (NE India), Himalaya, Bhutan, Nepal

**Specimen examined:** Grows in primary forest on rocks and trees. Pfutsero. NLNU 0130.

**(Pl. 10)**

***Euonymus hamiltonianus*** Wall., Roxb., Fl. Ind. 2: 403. 1824; M. A. Lawson in Hook.f., Fl. Brit. Ind. 1: 612. 1875; Kanjilal *et al.*, Fl. As. 1.2: 263. 1936; Haridasan & Rao, For. Fl. Megh. 1: 230. 1985; Grierson & Long, Fl. Bhut. 2.1: 116. 1991; Ramamurthy in Singh *et al.*, Fl. Ind. 5: 102. 2000.

Small trees; bark grey, rough, branchlets terete, glabrous, smooth. Leaves elliptic-lanceolate, oblong-lanceolate, 8-15 x 3-5 cm, apex caudate acuminate, base cuneate or narrowly rounded, margin finely serrate. Flowers in axillary or extra-axillary 2,3-chotomous lax cymes, 4-merous. Calyx lobes suborbicular, outer pair smaller, inner pair subpetaloid, reflexed. Corolla white, with reddish tinge at base, oblong, margins reflexed. Stamens half

the length of petals. Style equal the length of filaments. Capsule deeply 3-4 lobed. Seeds enclosed in scarlet aril.

**Fl. & Fr.:** April-November

**Distribution:** India, Temperate Himalaya, Afghanistan, Pakistan, Bhutan, China, Japan

**Specimen examined:** Grows in primary forest, along streamsides. Khezhakheno, Mesulumi.

NLNU 0388. (Pl. 10)

## RHAMNACEAE

Juss., Gen. Pl. 376. 1789

Trees or shrubs, sometimes climbing, armed or unarmed. Leaves simple, alternate, or opposite, pinnately nerved or 3-5-nerved at base, stipules present. Flowers regular, bisexual, rarely unisexual, in axillary fascicles or cymes. Calyx 4-5-lobed, lobes ribbed. Petals 4-5, free, rarely absent, clawed and hooded. Stamens 4-5, filaments filiform, adnate to base of petals. Disk fleshy or thin. Ovary free or immersed in disk; 2-4-celled; styles short. Fruit a capsule or a fleshy or dry drupe.

- |  |                 |
|--|-----------------|
| 1a. Branchlets with tendrils; fruits 3-winged      | <i>Gouania</i>  |
| 1b. Branchlets without tendrils; fruits not winged |                 |
| 2a. Leaves pinnately nerved                        | <i>Rhamnus</i>  |
| 2b. Leaves palmately 3-5 nerved at base            | <i>Ziziphus</i> |

***Gouania*** Jacq., Select. Strip. Amer. Hist. 263. 1763

Climbing shrubs, unarmed, tendrillar. Leaves alternate, simple, 3-nerved from base. Flowers bisexual, in slender axillary racemes, aggregated into terminal panicles. Calyx tube short, 5-lobed. Petals 5, spatulate. Stamens 5, enclosed by petals. Disk thick, 5-lobed. Ovary



inferior, immersed in disk; 3-celled. Fruit a capsule, subglobose, crowned by persistent calyx, 3-winged.

***Gouania napalensis*** Wall., Fl. Ind. 2: 417. 1824; Lawson in Hook.f., Fl. Brit. Ind. 1: 644. 1875; Grierson & Long, Fl. Bhut. 2. 1: 146. 1991

Scandent shrubs, with circinate tendrils. Branchlets pubescent. Leaves ovate to oblong-ovate, 6-14 x 3-9 cm, base subcordate or cordate, apex acuminate, margin serrate, glabrous above, sparsely pubescent on nerves beneath; petioles 2-4 cm long. Flowers greenish white in axillary and terminal long racemes, pubescent. Calyx lobes densely appressed pubescent outside. Capsule 3-celled, splitting into 3, 1-seeded indehiscent cocci.

**Fl. & Fr.:** July - December

**Distribution:** India (NE India), E Himalaya, Bangladesh, Bhutan, China, Nepal

**Specimen examined:** Grows in shaded places in forest. Kikruma. NLNU 0455. **(Pl. 11)**

***Hovenia*** Thunb., Nov. Gen. Pl. 7. 1781

Trees, unarmed. Leaves simple, alternate, 3-nerved at base. Flowers bisexual, in axillary and terminal dichotomous cymes. Sepals and petals 5. Stamens 5, enfolded by petals. Ovary immersed in disk; 3-celled; style 3-cleft. Fruit indehiscent, 3-seeded, borne on thickened fleshy peduncles.

***Hovenia dulcis*** Thunb. Nov. Gen. Pl. 8. 1781; Lawson in Hook.f., Fl. Brit. Ind. 1: 640. 1875; Kanjilal *et al.*, Fl. As. 1: 282. 1936; Singh in Singh *et al.*, Fl. Mizo. 1: 362. 2002.

Medium sized trees. Young shoots tomentose. Leaves simple, alternate, elliptic to suborbicular-ovate, 8-14 x 5-8 cm, base rounded or subcordate or broadly cuneate, apex acuminate, margin sharply serrate, base 3-nerved, glabrescent; petioles 2-3.5 cm long.

Flowers white in axillary and terminal cymes, dichotomously branched. Sepals 5, tube funnelshaped. Petals 5, clawed. Drupes globose borne on fleshy branched peduncles.

**Fl. & Fr.:** May - October

**Distribution:** India (throughout), E&W Himalaya, Bangladesh, Bhutan, China, Japan, Korea, Thailand, Vietnam

**Specimen examined:** Grows in primary and secondary forest. Khezhakheno, Chepoketa.

NLNU 0222.

*Ziziphus* Mill., Gard. Dict. Abr. ed. 4. 1754

Trees or shrubs, sometimes climbing. Stems usually armed with stipular prickles. Leaves alternate, palmately 3-5 nerved from base, coriaceous. Flowers bisexual, small, axillary, in fascicles or in sessile or peduncled, or paniced cymes. Sepals 5, lobes spreading. Petals 5, hooded, rarely absent. Stamens 5. Disk 5-10-lobed. Ovary immersed in disk; 2-celled; style 2-lobed. Fruit a fleshy or dry drupe.

*Ziziphus incurva* Roxb., Fl. Ind. 2: 364. 1824; Lawson in Hook.f., Fl. Brit. Ind. 1: 635. 1875; Kanjilal *et al.*, Fl. As. 1: 280. 1936; Grierson & Long, Fl. Bhut. 2. 1: 140. 1991; Singh in Singh *et al.*, Fl. Mizo. 1: 365. 2002.

Small trees, young parts appressed pubescent, usually unarmed. Leaves ovate-oblong, base oblique, apex acuminate, strongly 3-nerved, margin serrate, coriaceous, glabrous above, pilose on the nerves beneath. Flowers greenish, in short axillary cymes. Calyx lobes hairy outside. Petals spatulate, spreading. Disk 10-lobed. Drupes subglobose.

**Fl. & Fr.:** May - October

**Distribution:** India (NE India), E Himalaya, Bangladesh, Bhutan, China, Myanmar, Nepal, Thailand, Tibet, Vietnam

**Specimen examined:** Grows in secondary forest. Khezhakhen. NLNU 0230. (Pl. 11)

## VITACEAE

Juss., Gen. Pl. 267. 1789

Climbing shrubs with tendrils; tendrils simple or dichotomously branched, or rarely erect shrubs without tendrils. Leaves alternate, simple or compound; simple leaves palmately veined and lobed, compound leaves trifoliate, or digitately or pedately foliate; stipules small. Flowers regular, bisexual or unisexual, small, in leaf opposed umbel, cymose or panicle. Calyx cup shaped, 4-5 lobes. Corolla 4-5, free or connate. Stamens 4-5, opposite petals. Ovary 2-6 celled, superior, styles short; stigma discoid. Fruit a berry.

1a. Leaves simple

*Cissus*

1b. Leaves compound

2a. Flowers unisexual; stigma 4-lobed

*Tetrastigma*

2b. Flowers bisexual; stigma not lobed

*Causonis*

*Causonis* Raf., Med. Fl. 2: 122. 1830

Climbing shrubs; tendrils 2 or 3 furcate. Leaves pedately 5-foliolate or 3-foliolate. Flowers 4-merous, in pseudo-axillary cymes. Calyx small. Corolla 4, free. Stamens 4. Disc 4-lobed. Style short, stigma discoid. Berry globose, 1-4 seeded.

*Causonis japonica* (Thunb.) Raf., Sylva Tellur.: 87. 1838; *Cayratia japonica* (Thunb.) Gagnep., Not. Syst. 1: 349. 1911; *Vitis japonica* Thunb., Fl. Jap. 104. 1748; Balakr., Fl. Jowai 1: 139. 1981; Grierson & Long, Fl. Bhut. 2.1: 161. 1991; Kanjilal *et al.*, Fl. As. 1.2: 301. 1936; Singh in Singh *et al.*, Fl. Mizo. 1: 371. 2002.

Slender climbers, tendrils simple or forked, leaf opposed. Leaves pedately 5-foliolate, petioles 3-6 cm long, pubescent. Leaflets elliptic-ovate or obovate, base cuneate, apex acute, margin serrate; pubescent or glabrous above, softly pubescent beneath; lateral petiolules 0.4-0.8 cm, terminal petiolule 1-2 cm. Inflorescence axillary, corymbose, peduncle upto 10 cm long, pubescent. Flowers greenish-white. Sepals and petals 4-merous, pubescent, 0.2-0.3 cm across. Berry turbinate-globose, 2-4 seeded.

**Fl. & Fr.:** April-September

**Distribution:** India(throughout), China, Myanmar, Malaya, Nepal, Thailand, Vietnam, Sri Lanka

**Specimen examined:** Grows in primary forest, along slopes of roadsides. Sakraba. NLNU 0683. (Pl. 11)

*Cissus* L., Sp. Pl. 1: 117. 1753

Climbers or erect shrubs, tendrils bifid or absent. Leaves simple or palmately 5-foliolate, stipules conspicuous. Flowers leaf opposed, 4-merous, bisexual or functionally unisexual. Calyx cup-shaped, lobed. Petals 4, free or connate. Stamens 4. Ovary 2-celled, stigma discoid. Berry 1 or 2 seeded.

*Cissus repens* Lam., Encycl. 1: 31. 1783; Grierson & Long, Fl. Bhut. 2.1:159. 1991; Balakr., Fl. Jowai 1: 136. 1981; Singh in Singh *et al.*, Fl. Mizo. 1: 377. 2002; *Vitis repens* (Lam.) W. & A. Prodr. 124. 1834; Lawson in Hook.f., Fl. Brit. Ind. 1: 646. 1875; Kanjilal *et al.*, Fl. As. 1.2: 290. 1936.

Slender climbing shrubs, glabrous; tendrils bifid, leaf opposed; young shoots glaucous. Leaves simple, ovate-triangular, 4-10 x 3-7 cm, base deeply cordate, apex acute or acuminate, margin crenate dentate; petioles 4-8 cm long. Inflorescence axillary, leaf

opposed, compound umbel; peduncles 3-6 cm long. Flowers greenish-red, small. Calyx undulate; petals ovate, glabrous. Style conical. Berry globose, ellipsoid, red, turning black when ripe.

**Fl. & Fr.:** July-October

**Distribution:** India (throughout), China, Myanmar, Malaya, Nepal, Thailand, Vietnam, Philippines

**Specimen examined:** Grows in secondary forest, forest margins. Wazeho. NLNU 0593. (**Pl. 11**)

**Tetrastigma** (Miq.) Planch., Monogr. Phan. (A. DC. & C. DC.) 5: 423. 1887

Climbers, woody, rarely herbaceous. Tendrils simple, bifid, or palmately branched. Leaves 3-foliolate, or pedately or palmately 5-7 foliolate. Inflorescence an umbel or a compound cymes. Flowers 4-merous, unisexual or bisexual. Calyx small, cup-shaped. Petals free, spreading. Stamens 4, short. Disc adnate to base of ovary; ovary 2-celled, stigma 4-lobed. Berry 1-4 seeded.

1a. Leaves digitately 5-foliolate; leaflets pubescent

*T. obovatum*

1b. Leaves pedately 5-foliolate; leaflets glabrous

2a. Slender climbers; flower glabrous

*T. serrulatum*

2b. Large climbers, lianas; flower pubescent

*T. leucostaphylum*

***Tetrastigma leucostaphylum*** (Dennst.) Alston, Taxon 26: 539. 1977; Balakr., Fl. Jowai 1: 138. 1981; *Tetrastigma lanceolarium* Planch. in DC. Monogr. Phan. 5: 433. 1887; *Cissus lanceolaria* Roxb., Fl. Ind. 1:412. 1820; *Vitis lanceolaria* Roxb., Lawson in Hook.f. Fl. Brit.

Ind. 1: 660. 1875; Kanjilal *et al.*, Fl. As. 1.2: 300. 1936; Singh in Singh *et al.*, Fl. Mizo. 1: 381. 2002; Grierson & Long, Fl. Bhut. 2.1: 154. 1991.

Large climbers, with flattened woody stem, tendrils simple; bark rough and covered with warts. Leaves pedately 5-foliolate, coriaceous, glabrous, petioles 5-13 cm long. Leaflets ovate-lanceolate, 6-14 x 2.5-7 cm, base cuneate, oblique, apex acute, margin serrate-dentate; petiolules 0.5-1.5 cm long. Inflorescence axillary cyme, subcorymbose. Flowers creamy or yellowish-green, unisexual; peduncle 2-5 cm long. Calyx small, pubescent. Petals pubescent, oblong-ovate. Style absent. Berry globose, 1-2cm across.

**Fl. & Fr.:** April-September

**Distribution:** India (NE India), E Himalaya, Bangladesh, Malaya, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in evergreen forest in shaded areas, rocky slopes. Tsupfume. NLNU 0018. (Pl. 11)

*Tetrastigma obovatum* Gagnep. in Not. Syst. 1: 266. 1910; *Vitis obovata* Laws. in Hook.f., Fl. Brit. Ind. 1: 658. 1875; Kanjilal *et al.*, Fl. As. 1.2: 298. 1936; Balakr., Fl. Jowai 1: 137. 1981; Singh in Singh *et al.*, Fl. Mizo. 1: 382. 2002; Haridasan & Rao, For. Fl. Megh. 1: 245. 1985.

Large climbers, with flattened stem; tendrils simple. Leaves digitately 3-5 foliolate, covered with brown hairs; petioles 5-15 cm long. Leaflets obovate-elliptic, 8-15 x 3-8 cm, cuneate at base, apex acuminate, margin crenate-serrate, glabrous above and pilose on veins beneath; petiolules 0.8-2 cm long, hairy. Inflorescence corymbose, umbellate, trichotomously branched. Flowers 0.3-0.5 cm across, greenish-yellow. Calyx pubescent, 4 toothed, cup-shaped. Petals pubescent, hooded. Berries globose, 1-1.5 cm long.

**Fl. & Fr.:** May-October

**Distribution:** India (NE India), Bangladesh, China, Myanmar, Thailand, Vietnam

**Specimen examined:** Grows in primary and secondary forests. Tsupfume. NLNU 0023. (**Pl. 11**)

*Tetrastigma serrulatum* (Roxb.) Planch. in DC. Monogr. Phan. 5: 432. 1887; *Cissus serrulata* Roxb., Fl. Ind. 1: 414. 1820; *Vitis capreolata* D. Don, Prodr. Fl. Nep. 188. 1825; Lawson in Hook.f., Fl. Brit. Ind. 1: 659. 1875; Balakr., Fl. Jowai 1: 137. 1981; Singh in Singh *et al.*, Fl. Mizo. 1: 383. 2002; Grierson & Long, Fl. Bhut. 2.1: 155. 1991.

Slender climbing shrubs, glabrous. Tendrils simple or bifid. Leaves pedately 5-foliolate; petioles 2-5.5 cm long. Leaflets elliptic-obovate, lanceolate, 1.5-8.5 x 0.5-3 cm; lateral leaflets smaller than the terminal leaflet; base cuneate, oblique, apex acuminate, margin undulate, with 5-10 sharp teeth on each sides. Inflorescence axillary, umbelliform; peduncle 1.5-5 cm long. Flowers tetramerous, 0.4-0.5 cm across, greenish-white. Calyx small, ciliate at margin. Petals ovate-oblong, reflexed. Filaments filiform. Style absent, stigma flat. Berry obovoid,

**Fl. & Fr.:** July-December

**Distribution:** India (NE India), E & W Himalaya, Bangladesh, China, Myanmar, Nepal, Thailand, Philippines

**Specimen examined:** Grows in primary and secondary forests. Tsupfume. NLNU 0030. (**Pl. 12**)

## LEEACEAE

Dumort., Anal. Fam. 21, 27. 1829

Large herbs, shrubs or small trees. Leaves alternate, 1-3 foliolate or 1-3-pinnate or simple; petiole sheathing at base; stipules large, persistent or caducous. Flowers bisexual, actinomorphic, 5-merous, in leaf-opposed corymbose cymes. Calyx campanulate, lobed. Petals free, connate at base. Stamens 5, adnate to corolla. Ovary superior, sunken in disc, 4-6 celled, ovules 1 per cell. Fruit a depressed globose berry.

*Leea* D. Royen, Mant. Pl. 1: 17, 124. 1767

Erect herbs, shrubs or small trees. Leaves alternate, simple, or pinnate, bipinnate, tripinnate; stipules large, persistent or caduceous; petiole sheathing at base. Inflorescence leaf-opposed, corymbose cymes. Flowers bisexual, 5-merous, actinomorphic. Calyx cup-shaped, with short 5-lobes. Petals adnate to the staminal tube at base, free, reflexed. Stamens 5, united at base into a staminodal tube. Ovary superior. Fruit a depressed-globose berry, 4-6 seeded.

*Leea asiatica* (L.) Ridsdale in Manilal, Bot. Hist. Hort. Malab.:189. 1980; *L.crispa* L., Mant. Pl.: 124. 1767; *L.edgeworthii* Santapau, Rec. Bot. Surv. Ind. 16.1: 54. 1953; Balakr., Fl. Jowai 1: 140. 1981; Kanjilal *et al.*, Fl. As. 1.2: 305. 1936; Lawson in Hook.f., Fl. Brit. Ind. 1: 665. 1875; Singh in Singh *et al.*, Fl. Mizo. 1: 388. 2002; Grierson & Long, Fl. Bhut. 2.1: 163. 1991.

Undershrubs or shrubs. Stems and branches ribbed. Leaves pinnate or bipinnate, upto 40 cm long; petioles crispate, 1-2 cm long; leaflets elliptic, ovate-oblong, 6-12 x 2.5-5 cm, base rounded or shallowly cordate, apex caudate-acuminate, margin crenate-serrate.



Inflorescence axillary, solitary or paired corymbs. Flowers greenish-white, 0.3-0.5 cm across. Sepals and petals glabrous. Berry depressed globose, 5-6 seeded.

**Fl. & Fr.:** May-October

**Distribution:** India (throughout), Bangladesh, Myanmar, Nepal, Thailand, Vietnam, Cambodia

**Specimen examined:** Grows in forest margins, along roadsides. Chozuba. NLNU 0331. **(Pl. 12)**

### ACERACEAE

Juss. Gen. Pl. 250. 1789

Trees, shrubs, or climbers herbs. Leaves alternate, opposite, simple, pinnate, 1-3-foliolate, exstipulate. Inflorescence terminal or axillary racemes, panicles or cymes. Flowers regular or irregular, usually polygamous. Calyx 4-5, united or free. Corolla 4-5, or absent, free, usually with scales at base within. Disc present. Stamens 4-12, free or connate at base. Ovary superior, 2-4-celled, 1-2 ovules per cell; style simple. Fruit capsular, indehiscent or consisting of 2 or 3 samaras.

*Acer* L., Sp. Pl. 1054. 1753

Trees or shrubs. Leaves opposite, simple or palmately lobed, exstipulate. Flowers regular, polygamous, in axillary or terminal pendulous racemes or panicles. Calyx 5; petals 5 or absent. Stamens 4-12, inserted around disc. Ovary 2-lobed, styles 2, connate at base. Fruit a 2-winged samara.

1a. Leave base 3-nerved; inflorescence paniculate

*A. oblongum*

1b. Leave base 5-nerved; inflorescence pendent

*A. sikkimense*

*Acer oblongum* Wall.ex DC., Prodr. 1: 593. 1824; Hiern. in Hook.f., Fl. Brit. Ind. 1. 693. 1875; Brandis, Ind. Trees 181. 1906; Kanjilal *et al.*, Fl. As. 1.2: 311. 1936; Balakr., Fl. Jowai 1: 144. 1981; Nayar & Datta, Fascicles of Fl. Ind. 9. 12. 1982; Grierson & Long, Fl. Bhut. 2. 1: 63. 1991.

Medium sized trees, bark brownish, shallowly furrowed. Leaves opposite, sometimes ternate in young stems, oblong or ovate-lanceolate, 5-17 x 3-6 cm, base rounded, 3-nerved, apex acuminate, entire, glaucous beneath. Flowers in terminal or lateral panicles, 6-15 cm long, appearing with leaves. Sepals and petals greenish-white, linear-oblong. Samara 2-winged, wings 2-3 cm long.

**Fl. & Fr.:** June - February

**Distribution:** India (NE India), E & W Himalaya, China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in primary and secondary forest. Khezhakhen. NLNU 0220.

**(Pl. 12)**

*Acer sikkimense* Miq., Arch. Neerl. Sci. Exact. Nat. 2: 481. 1867; Hiern. in Hook.f., Fl. Brit. Ind. 1. 694. 1875; Brandis, Ind. Trees 181. 1906; Nayar & Datta, Fascicles of Fl. Ind. 9. 16. 1982; Grierson & Long, Fl. Bhut. 2. 1: 64. 1991; *A. hookeri* Miq. , Arch. Neerl. Sci. Exact. Nat. 2: 471. 1867.

Tall trees, branchlets reddish. Leaves unlobed, ovate, 8-16 x 5-7 cm, apex caudate-cuspidate, base 5-nerved, sub-cordate to cordate, margin serrate, glabrous. Flowers appearing with leaves, in dense pendulose spikes. Sepals and petals yellowish-green, lanceolate to obovate. Stamens 8, short, glabrous. Ovary glabrous. Fruit glabrous, samara divergent, base narrowed.

**Fl. & Fr.:** April - August

**Distribution:** India (NE India), E Himalaya, Myanmar, Nepal

**Specimen examined:** Grows in primary and secondary forest. Tsupfume. NLNU 0040. (Pl. 12)

## ANACARDIACEAE

R. Br., Narr. Exped. Zaire 431. 1818

Trees or shrubs, sometimes scandent, often with an acrid and milky juice. Leaves alternate, rarely opposite, simple, trifoliate or imparipinnate, exstipulate. Inflorescence axillary or terminal panicle. Flowers small, bisexual or unisexual, actinomorphic. Calyx 3-5 partite. Petals 3-5, free, valvate or imbricate in bud. Stamens 5-10, sometimes not all fertile. Ovary superior, rarely inferior, styles 1-5. Fruit a drupe, with resinous mesocarp.

- |   |                       |
|---|-----------------------|
| 1a. Leaves simple   | <i>Dobinea</i>        |
| 1b. Leaves compound   |                       |
| 2a. Scandent shrubs   | <i>Pegia</i>          |
| 2b. Erect shrubs or trees   |                       |
| 3a. Drupe compressed, dry, less than 1cm  | <i>Rhus</i>           |
| 3b. Drupe oblong, ellipsoid, fleshy, more than 3cm  |                       |
| 4a. Leaflets upto 4 cm broad without intra-marginal veins, membranous<br>fruits upto 3cm long         | <i>Choerospondias</i> |
| 4b. Leaflets more than 5 cm broad with intra-marginal veins, coriaceous,<br>fruits more than 4cm long | <i>Spondias</i>       |

***Choerospondias*** B.L. Burtt & A.W. Hill, Ann. Bot. 1: 254. 1937

Trees, dioecious. Leaves compound, imparipinnate, alternate. Flowers 5-merous, unisexual, male flowers in axillary panicles, female flowers solitary, axillary. Sepals and petals 5. Stamens 10. Ovary 5-celled, styles 5. Drupe oblong, ellipsoidal, succulent with a hard stone.

***Choerospondias axillaris*** (Roxb.) B. L. Burtt & A.W. Hill, in Ann. Bot. n.s. 1: 254. 1937; *Spondias axillaris* Roxb., Fl. Ind. 2: 453. 1832; Hook.f., Fl. Brit. Ind. 2: 42. 1876; Kanjilal *et al.*, Fl. As. 1.2:341. 1936; Chandra & Mukherjee in Singh *et al.*, Fl. Ind. 5: 448. 2000; Singh in Singh *et al.*, Fl. Mizo. 1: 414. 2002; Grierson & Long, Fl. Bhut. 2. 1: 60. 1991.

Trees, upto 25 m tall; branchlets dark purplish brown. Leaves upto 35 cm long; leaflets 4-8 pairs, opposite, short petiolulate, ovate-lanceolate, base oblique, cuneate or rounded, apex acuminate, margin entire, wavy, glabrous. Male flowers in 4-10 cm long panicles, female flowers in 1cm peduncle. Drupe ellipsoid or oblong; stone with 5-6 shallow depression at apex.

**Fl. & Fr.:** April-December

**Distribution:** India (E Himalaya, NE India), Bangladesh, China, Myanmar, Nepal, Taiwan, Thailand, Vietnam

**Specimen examined:** Grows in primary and secondary forest; fruits edible. Chepoketa. NLNU 0933. (Pl. 12)

***Dobinea*** Buch.-Ham.ex D.Don, Prodr. Fl. Nepal. 249. 1825

Shrubs, dioecious. Leaves simple, opposite or alternate. Inflorescence terminal or axillary paniculate. Flowers dimorphic. Male flowers subtended by small, linear bract,

pedicellate; stamens 8-10. Female flowers subtended by large foliose, membranous bracts; style 1. Fruit compressed, indehiscent.

***Dobinea vulgaris*** Buch.-Ham. ex D. Don, Prodr. Fl. Nep.: 249. 1825; Hiern in Hook.f., Fl. Brit. Ind. 1: 696. 1875; Chandra & Mukherjee in Singh *et al.*, Fl. Ind. 5: 451. 2000; Grierson & Long, Fl. Bhut. 2. 1: 62. 1991.

Shrubs, upto 3 m tall. Branchlets long slender, minutely pubescent. Leaves opposite, elliptic-lanceolate or oblong-lanceolate, 8-15 x 3-5 cm, base cuneate, apex acuminate, margin serrate, glabrate; petioles 1-2.5 cm long. Male flowers, yellowish, calyx campanulate, 4-lobed, petals 4. Female flowers calyx, petals and staminodes absent, style longer than ovary, recurved. Fruit orbicular, borne on obovate or rounded bract.

**Fl. & Fr.:** July-October

**Distribution:** India (NE India, E Himalaya), Bangladesh, China, Myanmar, Nepal

**Specimen examined:** Grows in primary and secondary forest. Tsupfume. NLNU 0090. (**Pl. 12**)

***Pegia*** Colebr., Trans. Linn. Soc. London 15.2: 364. 1827

Scrambling shrubs, dioecious. Leaves compound, alternate, imparipinnate. Inflorescence terminal or axillary paniculate. Flowers 5-merous. Calyx and petals 5. Stamens 10, anthers subglobose. Style 5, stigma 3-5 lobed. Drupe ovoid or oblong, fleshy.

***Pegia nitida*** Colebr., Trans. Linn. Soc. London 15: 364. 1827; *Tapirira hirsuta* Hook.f., Fl. Brit. Ind. 2: 28. 1876; Brandis, Ind. Trees 200. 1906; Kanjilal *et al.*, Fl. As. 1.2: 339. 1936; Grierson & Long, Fl. Bhut. 2. 1: 58. 1991; Haridasan & Rao, For. Fl. Megh. 1: 274. 1985.

Woody climbers, densely tomentose. Leaves upto 35 cm, imparipinnate; leaflets 3-7 pairs, ovate-oblong, ovate-elliptic, 3-7 x 1.5-3.5 cm, base subcordate or rounded, apex acuminate, margin crenate, hairy on both surfaces. Inflorescence laxly paniculate, upto 40 cm long. Flowers white, small. Calyx glabrous, lobes ovate. Petals spreading, oblong-elliptic. Drupe obliquely ovoid, black when ripe, 0.8 cm long.

**Fl. & Fr.:** February-July

**Distribution:** India (NE India), E Himalaya, Bangladesh, China, Myanmar, Nepal, Thailand

**Specimen examined:** Grows in forest slopes and forest margins. Tsupfume. NLNU 0091.

**(Pl. 13)**

*Rhus* L., Sp. Pl. 1: 265. 1753

Trees or shrubs, dioecious. Leaves compound, alternate, trifoliate or imparipinnate, leaf rachis sometimes winged, sessile or petiolate. Flowers in axillary or terminal panicles, unisexual. Sepals and petals 4-6, imbricate. Stamens 4-10, inserted at the base of the disk. Styles 3, stigma capitate or simple. Drupe small, compressed.

*Rhus chinensis* Mill., Gard. Dict. ed. 8. n. 7. 1768; *R. semialata* Murray, Comm. Soc. Sci. Gott. 6: 27. 1784; *R. javanica* L. Sp. Pl. 1: 265. 1753; Balakr., Fl. Jowai 1: 147. 1981; Kanjilal *et al.*, Fl. As. 1.2: 331. 1936; Hook.f. Fl. Brit. Ind., 2: 10. 1876; Grierson & Long, Fl. Bhut. 2. 1: 55. 1991; Haridasan & Rao, For. Fl. Megh. 1: 276. 1985.

Small trees, upto 15 m tall. Leaves imparipinnate; leaflets 4-6 pairs, opposite, oblong-lanceolate or elliptic-lanceolate, sessile, base rounded or oblique, acuminate apex, margin deeply dentate or crenate, glabrous above, tomentose beneath. Panicles terminal, conical, dense flowered. Flowers small, whitish or pale green, Sepals small, pubescent. Petals oblong, ciliate. Drupe subglobose, compressed; dark pink when matured.

**Fl. & Fr.:** July-November

**Distribution:** India (NE India), E & W Himalaya, Bangladesh, Bhutan, China, Japan, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in secondary forest, roadsides, around human habitations. Tsupfume, Pfutsero (**Pl. 13**)

*Spondias* L., Gen. Pl. ed. 5 1754

Deciduous trees. Leaves alternate, imparipinnate; leaflets entire or serrate. Inflorescence terminal or axillary paniculate, appearing with young leaves. Flowers 4-5-merous, bisexual or unisexual. Stamens 8-10, inserted beneath the disk. Styles 4-5, free. Fruit a drupe, ellipsoid, fleshy; stone hard.

*Spondias pinnata* (L. f.) Kurz. Prelim. Rep. Forest Pegu 44. 1875; *Mangifera pinnata* L.f. Suppl. 156. 1781; *Spondias mangifera* Willd. Sp. Pl. 2: 751. 1799; Hook.f., Fl. Brit. Ind. 2: 42. 1876; Kanjilal *et al.*, Fl. As. 1.2: 340. 1936; Balakr., Fl. Jowai 1: 146. 1981; Grierson & Long, Fl. Bhut. 2. 1: 60. 1991.

Deciduous trees, upto 20 m tall. Leaves imparipinnate; leaflets 3-6 pairs, oblong-elliptic, base cuneate to rounded or oblique, apex acuminate, margin entire, glabrous, short petioled. Panicles axillary or terminal, glabrous. Flowers sessile, or subsessile, white. Calyx lobes triangular, petals ovate-oblong, acute. Drupe ellipsoid, oblong, 3-5 cm long, fleshy, yellow when ripe; stone woody, fibrous with many cavities.

**Fl. & Fr.:** April-September

**Distribution:** India (NE India), E Himalaya, Bangladesh, Bhutan, China, Myanmar, Nepal, Pakistan, Philippines, Thailand, Vietnam

**Specimen examined:** Grows in primary and secondary forest, forest slopes. Chepoketa. NLNU 0935. (**Pl. 13**)

## FABACEAE Lindl.,

Intr. Nat. Syst. Bot., ed. 2. 148. 1836

Trees, shrubs or herbs, sometimes climbing or twining. Leaves alternate, simple, or compound and usually pinnate, stipules and stipels often present. Flowers zygomorphic or actinomorphic, bisexual rarely unisexual. Sepals 5, gamosepalous, bilipped. Petals usually 5, imbricate; the uppermost petal forms the standard, the two lateral petals which are parallel to each other forms the wings, and the two innermost petals which are free or connate forms the keel. Stamens usually 10, monadelphous or diadelphous, rarely free. Carpel solitary, ovary superior, ovules 1 to many. Fruit a pod (legume), usually dehiscent along one or both sutures.

### 1a. Trees, herbs or shrubs

#### 2a. Trees

3a. Plants often armed with thorns or conical spines *Erythrina*

#### 3b. Plants unarmed without conical spines

4a. Stipels present; stamens diadelphous *Butea*

4b. Stipels absent; stamens monadelphous *Dalbergia*

#### 2b. Herbs or shrubs

#### 5a. Leaves 1-3 foliolate

6a. Stipules absent *Crotalaria*

#### 6b. Stipules present

7a. Pedicels hooked, pods dehiscent along lower suture *Codariocalyx*

7b. Pedicels without hook, pods dehiscent along

both suture *Desmodium*

#### 5b. Leaves 3-foliate or pinnately compound



- 8a. Plants herbaceous; stem prostrate *Trifolium*
- 8b. Plants shrubby; stem erect
  - 9a. Wing petals adherent to keel; anthers apiculate *Indigofera*
  - 9b. Wing petals free; anthers obtuse *Tephrosia*
- 1b. Woody or herbaceous twiners
  - 10a. Flowers 3-6 cm long; pods coriaceous or woody *Mucuna*
  - 10b. Flowers less than 3 cm; pods thin, membranous
    - 11a. Keel curved like a circle *Vigna*
    - 11b. Keel petal not curved *Pueraria*
    - 12a. Leaves 3-foliate
    - 13a. Twining herbs; calyx tubular *Clitoria*
    - 13b. Prostrate herbs; calyx campanulate *Parochetus*
  - 12b. Leaves pinnate
    - 14a. Herbaceous twinners; style coiled through 360°; pods linear, compressed *Apios*
    - 14b. Woody climbers
      - 15a. Flowers in the axil of large bracts *Callerya*
      - 15b. Flowers in the short lateral branches *Millettia*

***Apios*** Fabr., Enum. 176. 1759

Twining herbs. Leaves pinnately 3-7 foliolate, stipels present. Flowers in lax axillary racemes, borne in pairs. Calyx campanulate, 5-toothed. Corolla much exserted, standard broadly elliptic to suborbicular, shortly auricled at base, wings obovate. Stamens diadelphous. Style coiled through 360°. Pods linear, compressed.

*Apios carnea* (Wall.) Benth.ex Baker in Hook.f., Fl. Brit. Ind. 2: 188. 1876; Grierson & Long, Fl. Bhut. 1.3: 689. 1987; *Cryptotropis carnea* Wall., Pl. Asiat. Rar.1: 50, t. 62. 1830.

Twining perennial herb. Stem glabrous. Leaves imparipinnate, 15-30 cm long; leaflets 3-7, ovate or elliptic, 4-12 x 2-6 cm, base rounded or cuneate, apex acute, margin entire; stipels subulate; stipules lanceolate. Flowers on long peduncled flexuos racemes, 12-40 cm long; lower pedicel fascicled, upper solitary. Calyx campanulate, green, glabrous. Corolla pink or reddish. Pods linear, glabrous.

**Fl. & Fr.:** July - September

**Distribution:** India (NE India), E & W Himalaya, Bhutan, China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in margins of forest. Tsupfume. NLNU 0041. **(Pl. 13)**

***Butea*** Roxb.ex Willd. Sp. Pl., ed. 4.3: 917. 1802

Trees, shrubs or perennial herbs. Leaves pinnately 3-foliolate; leaflets entire, stipels present, stipules caducous. Flowers densely clustered in axillary or terminal racemes or panicles. Calyx campanulate, limb tooth, upper 2 connate. Corolla exserted, petals clawed, standard recurved, wings adherent to keel. Stamens diadelphous. Ovary sessile or shortly stalked, ovules 2. Legumes oblong, flat, apex rounded, with 1 seed at the apex, indehiscent.

***Butea minor*** Buch.-Ham. ex Wall., Numer. List (Wallich) n. 5439; Baker in Hook.f. Fl. Brit. Ind. 2: 195. 1876; Kanjilal *et al.*, Fl. As. 2: 74. 1938; Balakr., Fl. Jowai 1: 170. 1981; Haridasan & Rao, For. Fl. Megh. 1: 285. 1985.

Erect shrubs, 1-3 m tall, branches grey tomentose. Leaves 3-foliolate, petioles 10-20 cm long, tomentose; lateral leaflets broadly ovate-elliptic, terminal leaflets rhomboid, 9-35x7-30 cm, acute to rounded at tip, coriaceous, glabrate above, grey silky beneath. Flowers

orange-red, fascicled in axillary or terminal racemes, racemes 10-30 cm long. Calyx silky tomentose, teeth short. Corolla densely velvety; standard broad, recurved; wings falcate; keel ovate and exceeds the wings and standard. Pods oblong-elliptic, 8-12 x 2-3.5 cm, densely tomentose.

**Fl. & Fr.:** June - December

**Distribution:** India, Bangladesh, Bhutan, China, Myanmar, Nepal

**Specimen examined:** Grows in open grasslands, dry valley slopes. Kikruma. NLNU 0457.

**(Pl. 13)**

*Callerya* Endl. Gen. Pl., Suppl. 3: 104. 1843

Scandent shrubs, lianas, rarely trees. Leaves imparipinnate; leaflets opposite; stipels present; stipules small, persistent or caducous. Flowers in axillary or terminal racemes or panicles; bracts deciduous. Calyx campanulate, teeth short or truncate. Corolla standard glabrous to densely hairy outside; wings slightly adnate to keel; wings and keel equally long. Stamens diadelphous, vexillary filament sometimes connate from the middle. Ovary sessile or stipitate. Pod flat or inflated, thin to thickly woody.

*Callerya cinerea* (Benth.) Schot, Blumea 39: 17. 1994; *Millettia cinerea* Benth., Miquel, Pl. Jungh.: 249. 1852; Baker in Hook.f., Fl. Brit. Ind. 2: 106. 1876; Kanjilal *et al.*, Fl. As. 2: 28. 1938; Balakr., Fl. Jowai 1: 161. 1981; Haridasan & Rao, For. Fl. Megh. 1: 304. 1985; Singh in Singh *et al.*, Fl. Mizo. 1: 487. 2002.

Large woody climbers. Leaves 5-foliolate, 13-25 cm long; petioles 2-4 cm long; leaflets elliptic or obovate-oblong, 5-13 x 1.5-5.5 cm, apex acute or shortly acuminate, base rounded or obtuse, glabrous above, sparsely pubescent on veins beneath; petiolules 0.4-0.5 cm long; stipels subulate. Flowers in terminal paniculate racemes; racemes 10-20 cm long

silky pubescent. Calyx densely silky, tube campanulate. Petals crimson or purplish; standard ovate, not auricled, densely silky on the back. Stamens diadelphous. Ovary tomentose. Pods compressed, 7-15 x 2-3 cm densely brown tomentose, constricted between seeds; 1-3 seeded.

**Fl. & Fr.:** May - November

**Distribution:** India, Bangladesh, Bhutan, China, Myanmar, Nepal, Thailand

**Specimen examined:** Grows in secondary and primary broad leaved forest. Phukhungri.

NLNU 0865. (Pl. 13)

*Clitoria* L., Sp. Pl. 753. 1753

Scandent or suberect herbs or subshrubs. Leaves 3-7 foliolate; stipules and stipels present. Flowers large, 1 or 2 flowered; bracteoles slightly larger than bracts or sometimes leaflike. Calyx tubular, 5-lobed. Corolla standard much larger than other petals; wings oblong, clawed, adherent to keel; keel shorter than wings, incurved. Stamens diadelphous. Ovary stipitate; ovules many. Pod linear, compressed.

*Clitoria mariana* L. Sp. Pl. 753. 1753; Baker in Hook.f. Fl. Brit. Ind. 2: 208. 1876; Kanjilal *et al.*, Fl. As. 2: 86. 1938; Grierson & Long, Fl. Bhut. 1.3: 697. 1987; Singh in Singh *et al.*, Fl. Mizo. 1: 437. 2002.

Scandent undershrub with terete branches. Leaves pinnately 3-foliate, petiole 4-7 cm long; leaflets ovate-elliptic, 3.5-10 x 1-4 cm, apex shortly acuminate, base rounded, glabrous above, pubescent beneath; petiolules 0.2-0.3 cm, stipules ovate, upto 1 cm long. Peduncles axillary, usually 2-flowered with a pair of small ovate bracts at the base of calyx and a pair of bracteoles in each flower; flowers 3-5 cm long. Calyx large, tubular, glabrous, membranous, 5-lobed. Corolla light blue or purple; standard broadly elliptic or obovate; wings and keels similar, much shorter than standard. Pods linear, compressed, beaked by a persistent style, glabrous; 1-4 seeded.

**Fl. & Fr.:** May - October

**Distribution:** India, Bangladesh, Bhutan, China, Myanmar, Nepal, Thailand; North America

**Specimen examined:** Grows along roadsides, shrubs and forest margins. Wazeho. NLNU 0595.

*Codariocalyx* Hassk. Linnaea 15 (Litt.): 80. 1841

Herbs or shrubs. Leaves 1-3-foliolate, margins entire or undulate. Flowers in axillary or terminal racemes. Bracts large or small, persistent or deciduous. Calyx tube short. Petals clawed, wings adherent to keel. Pod segments coiled at maturity, dehiscent along lower suture.

*Codariocalyx motorius* (Houtt.) H. Ohashi; *Desmodium motorium* (Houtt.) Merr., J. Arn. Arb. 19: 345. 1938; *Hedysarum motorium* Houtt. Nat. Hist. 2, 10: 246. 1779, *D. gyrans* (L.f.) DC., Prodr. 2: 326. 1825; Baker in Hook.f. Fl. Brit. Ind. 2: 174. 1876; Kanjilal *et al.*, Fl. As. 2: 58. 1938; Balakr., Fl. Jowai 1: 158. 1981; Grierson & Long, Fl. Bhut. 1.3: 670. 1987; Singh in Singh *et al.*, Fl. Mizo. 1: 463. 2002.

Undershrubs, upto 1.5 m. Branchlets with appressed hairs. Leaves normally 3-foliolate; petioles 1-2.8 cm; terminal leaflet large, linear-lanceolate to ovate-oblong, 3-7 x 1-2.5 cm, apex acute, base truncate or rounded, lateral leaflets reduced or very small, linear-lanceolate, 0.4-0.8 cm long; petiolules small, stipules ovate-acuminate, stipels linear-lanceolate. Flowers in axillary and terminal racemes, 5-13 cm long; bracts ovate, encloses flowers in bud. Calyx campanulate, teeth small. Corolla pinkish purple to orange, glabrous. Pods linear, 2-5 cm long, curved, dehiscing and undulating along lower sutures, sparsely pubescent with short hooked hairs.

**Fl. & Fr.:** August - November

**Distribution:** India, Bhutan, China, Laos, Pakistan, Vietnam

**Specimen examined:** Grows in open places among bushes in forest. Thetsumi. NLNU 0741.

***Crotalaria* L. Sp. Pl. 714. 1753**

Herbs or shrubs. Leaves simple or digitately 3-foliate, leaflets entire, stipules small or absent. Flowers in terminal or leaf opposed racemes. Calyx tube short, campanulate, teeth subequal or connate and bilipped, upper lip smaller. Corolla exserted or equaling the calyx; standard orbicular, clawed; wings obovate-oblong, shorter; keel broad and as long as the wings. Stamens monadelphous, tube split dorsally, filaments alternately long; anthers basifixed and versatile. Ovary linear, sessile or stipitate; style long, abruptly incurved at the base, bearded; stigma minute, oblique. Pod straight, linear or oblong, turgid. Seeds few to many.

- |   |                     |
|---|---------------------|
| 1a. Calyx split more than half way                        | <i>C. sericea</i>   |
| 1b. Calyx split to base                                   |                     |
| 2a. Tall herbs or shrubs, upto 2 m tall                   | <i>C. tetragona</i> |
| 2b. Herbs or small to medium sized shrubs, 20-100 cm tall |                     |
| 3a. Raceme terminal, upto 15 cm long                      | <i>C. albida</i>    |
| 3b. Raceme leaf opposed, 3-10 cm long                     | <i>C. lejoloba</i>  |

***Crotalaria albida*** B. Heyne ex Roth, Nov. Pl. Sp.: 333. 1821; Baker in Hook.f., Fl. Brit. Ind. 2: 71. 1876; Balakr., Fl. Jowai 1: 152. 1981. Grierson & Long, Fl. Bhut. 1.3: 735. 1987; Singh in Singh *et al.*, Fl. Mizo. 1: 440. 2002.

Herbs, 25-70 cm high; stem appressed pubescent. Leaves simple, linear-oblong to oblanceolate, 1-3 x 0.2-1 cm, base cuneate, apex obtuse to subacute; glabrescent above,

appressed pubescent beneath; petioles 0.2-0.3 cm, stipules absent. Racemes terminal, upto 15 cm long, hairy, 5-15 flowered; bracts linear. Calyx finely appressed pubescent, deeply divided into 5 teeth. Corolla yellow, standard petal suborbicular, sometimes streaked with purple, wings oblong, keels upcurved at middle. Ovary subsessile. Pods oblong, cylindric, 1.5-2 x 0.5 cm, glabrous; 6-12 seeded.

**Fl. & Fr.:** July - December

**Distribution:** India, Bangladesh, Bhutan, Cambodia, China, Indonesia, Laos, Malaysia, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; Pacific islands

**Specimen examined:** Grows along roadsides, forest edges. Lozaphuhu. NLNU 0493. (Pl. 14)

*Crotalaria lejoloba* Bartl., Index Seminum (GOET, Gottingensis) 1837: 2. 1837; *Crotalaria ferruginea* Graham ex Benth., Hook. Lond. J. Bot. 2: 476, 570. 1843; Baker in Hook.f., Fl. Brit. Ind. 2: 68. 1876; Kanjilal *et al.*, Fl. As. 2: 12. 1938; Balakr., Fl. Jowai 1: 153. 1981; Singh in Singh *et al.*, Fl. Mizo. 1: 443. 2002.

Herbs or undershrubs. Stems erect or trailing, appressed or spreading brown pubescent. Leaves simple, subsessile, elliptic to obovate-oblong, 1.5-6 x 0.5-2.5 cm, apex acute or obtuse, mucronate, base rounded or cuneate, obtuse, appressed sericeous on both surfaces; margin entire; stipules lanceolate, 0.4-0.7 cm long. Raceme leaf opposed, 3-10 cm long, laxly 2-5 flowered. Bracts linear, 0.5-0.9 cm long, hairy. Calyx deeply divided, 1-1.3 cm long, appressed brown sericeous. Petals yellow, as long as the calyx; standard broadly elliptic. Pods linear-oblong, 2-4 cm long, glabrous; 20-40 seeded.

**Fl. & Fr.:** July - November

**Distribution:** India, Bangladesh, Bhutan, China, Indonesia, Laos, Malaysia, Myanmar, Nepal, Papua New Guinea, Philippines, Sri Lanka, Thailand, Vietnam

**Specimen examined:** Grows in open forest, montane grasslands. Lozaphuhu. NLNU 0495.  
(Pl. 14)

*Crotalaria sericea* Burm.f., Fl. Indica 156. 1768; *Crotalaria assamica* Benth., Hook. Lond. J. Bot. 2 : 481. 1843; Baker in Hook.f. Fl. Brit. Ind. 2: 75. 1876; Kanjilal *et al.*, Fl. As. 2: 15. 1938; Balakr., Fl. Jowai 1: 152. 1981.

Shrubs, upto 1.5 m tall; branches terete, sericeous. Leaves simple, petiole 0.2-0.3 cm, oblanceolate-oblong, 5-11 x 2-3 cm, cuneate at base, apex obtuse or subacute, mucronate, rugose above, silky beneath. Flowers in terminal racemes or leaf-opposed, 15-25 cm long, 20-30 flowered; bracts linear. Calyx long, pubescent, lanceolate. Corolla golden yellow. Pods oblanceolate, 5 cm long, glabrous, many seeded.

**Fl. & Fr.:** July - December

**Distribution:** India, China, Laos, Myanmar, Philippines, Thailand, Vietnam

**Specimen examined:** Grows along roadsides, forest edges. Zuketsa. NLNU 0163. (Pl. 14)

*Crotalaria tetragona* Roxb. ex Andrews, Bot. Repos. 10: t. 593. 1810; Baker in Hook.f., Fl. Brit. Ind. 2: 78. 1876; Kanjilal *et al.*, Fl. As. 2: 13. 1938; Singh in Singh *et al.*, Fl. Mizo. 1: 447. 2002.

Shrubs, upto 2 m tall. Stem tetragonous, pubescent. Leaves alternate, distant, simple, linear or lanceolate, 10-28 x 1-3 cm, base rounded, apex acuminate, margin entire, sparsely pilose above, densely pilose beneath; stipules linear-lanceolate. Racemes simple, 15-30 cm long, bracts setaceous. Flowers yellow in loose terminal or axillary racemes. Calyx brown



tomentose, lanceolate, divided upto the base. Corolla glabrous, with brownish purple streaks.

Pods oblong.

**Fl. & Fr.:** September - December

**Distribution:** India (throughout), E & W Himalaya, Bangladesh, Bhutan, China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in forest edges, in cultivated field. Thestumi. NLNU 0743.

*Dalbergia* L.f., Suppl. Pl.: 52. 1782

Trees or shrubs, sometimes twining. Leaves imparipinnate; leaflets entire, usually alternate; stipels absent; stipules often deciduous. Flowers small, in axillary or terminal racemes or panicles; bracts and bracteoles small, caducous, rarely persistent. Calyx campanulate, 5-tooth, upper 2 often connate. Corolla exserted; standard broad; wings oblong as long as the standard; keel obtuse, shorter than the standard, connate at the tip. Stamens 9 or 10, monadelphous or diadelphous, usually in two bundles of 5 each, rarely 9+1. Ovary stipitate; style short, incurved, glabrous, stigma capitate. Pod thin, flat, coriaceous, indehiscent.

*Dalbergia stipulacea* Roxb., Fl. Ind. ed. 1832, 3: 233. 1832; Baker in Hook.f. Fl. Brit. Ind. 2: 237. 1876; Kanjilal *et al.*, Fl. As. 2: 107. 1938; Balakr., Fl. Jowai 1: 168. 1981; Grierson & Long, Fl. Bhut. 1.3: 653. 1987; Singh in Singh *et al.*, Fl. Mizo. 1: 451. 2002.

Scandent shrubs or sprawling trees. Branches sparsely pilose. Leaves 12- 24 cm long; leaflets 17-25, alternate, oblong, 1.5-3 x 0.7-0.9 cm, apex obtuse, base cuneate or rounded, glabrous above, sparsely pubescent beneath; petiolules 0.1-0.3 cm long; stipules oblong, 0.7-0.8 cm long, caducous. Flowers in axillary panicles with elongated racemose branches; bracts oblanceolate or oblong, 0.4-0.6 cm long. Calyx pubescent, teeth ovate. Corolla pale

blue or pale purplish red. Stamens 10 in two sheaths of 5 each. Pods oblong-elliptic, 6-10×2.5-3 cm, apex obtuse, glabrous; 1 seeded.

**Fl. & Fr.:** May - November

**Distribution:** NE India, Bhutan, Cambodia, China, Laos, Malaysia, Myanmar, Thailand, Vietnam

**Specimen examined:** Grows along roadsides, forest edges. Wazeho. NLNU 0596. (Pl. 14)

*Desmodium* Desv., J. Bot. Agric. 1: 122. 1813

Herbs, shrubs or trees. Leaves pinnately 3-foliate, or 1-foliate; margins entire or undulate; stipules and stipels present. Flowers in axillary or terminal racemes, panicles, corymbs or umbels. Calyx campanulate, tube short, teeth 5, upper 2 teeth often subconnate. Corolla exserted; standard obovate or orbicular; wings broadly oblong, more or less adhering to the keel. Stamens monadelphous or diadelphous (9+1). Pods compressed, usually indehiscent or dehiscent along lower suture.

1a. Leaves 1-foliate

2a. Petioles broadly winged *D. triquetrum*

2b. Petioles unwinged *D. velutinum*

1b. Leaves 3-foliate

3a. Pods indented along lower suture

4a. Shrub with slender drooping branches; indentation

between pods deep *D. concinnum*

4b. Prostrate or ascending shrub; indentation between

pods shallow *D. heterocarpon*

3b. Pods indented along both sutures

5a. Leaflets sinuate

*D. sequax*

5b. Leaflets not sinuate

*D. laxiflorum*

***Desmodium concinnum*** DC., Ann. Sci. Nat. 4: 101.1825; Baker in Hook.f., Fl. Brit. Ind. 2: 170. 1876; Kanjilal *et al.*, Fl. As. 2: 52. 1938; Grierson & Long, Fl. Bhut. 1.3: 676. 1987; Singh in Singh *et al.*, Fl. Mizo. 1: 457. 2002.

Shrub with slender drooping branches, young shoots grey pubescent. Leaves 3-foliate; leaflets elliptic-ovate or narrowly obovate, 2.5-6.5 x 1.3-3 cm, base rounded, apex obtuse or subacute, glabrate above, appressed pubescent beneath; petioles 1-2 cm; petiolules 0.3-0.5 cm long; stipels linear stipules lanceolate. Flowers in elongated racemes, axillary or terminal, bracts ovate lanceolate. Calyx campanulate, deeply divided, covered with brown appressed hairs, teeth ovate. Corolla purple, standard broadly ovate, 0.4-0.5 cm broad. Pods straight along the upper suture, undulate along lower suture, joints 4-6.

**Fl. & Fr.:** August - October

**Distribution:** India, Bhutan, China, Laos, Pakistan, Vietnam

**Specimen examined:** Grows in open places along roadsides, slopes. Thetsumi. NLNU 0745.

**(Pl. 14)**

***Desmodium heterocarpon*** (L.) DC., Prodr. 2: 337. 1825; *D. polycarpum* (Poir.) DC., Prodr. 2: 334. 1825; Baker in Hook.f., Fl. Brit. Ind. 2: 171. 1876; Kanjilal *et al.*, Fl. As. 2: 54. 1938; Grierson & Long, Fl. Bhut. 1.3: 674. 1987; Singh in Singh *et al.*, Fl. Mizo. 1: 460. 2002.

Herbs or undershrubs, upto 1.5 m tall, branches grey tomentose. Leaves 3-foliate; petioles 1-3 cm long, grey pubescent; leaflets elliptic-oblong or obvate, 2.5-6 x 1.2-3 cm, base obtuse or rounded, apex rounded and notched; glabrous above, appressed grey pubescent beneath; petiolules small; stipules lanceolate, 0.9-1.2 cm. Flowers in axillary or

terminal dense racemes, 7-15 cm long; bracts ovate, deciduous. Calyx funnel shaped, deeply divided, teeth longer than the tube. Corolla purple, standard elliptic-suborbicular, wings and keel oblong or obovate. Pods 1.5-2 cm long, upper suture nearly straight, lower suture undulate and divided into 5-8 segments, sparsely pubescent.

**Fl. & Fr.:** June - October

**Distribution:** India, Bhutan, China, Laos, Pakistan, Vietnam

**Specimen examined:** Grows in open places along roadsides, slopes. Thetsumi. NLNU 0747.

**(Pl. 14)**

*Desmodium laxiflorum* DC., Ann. Sci. Nat. (Paris) 4: 100. 1825; Baker in Hook.f., Fl. Brit. Ind. 2: 164. 1876; Kanjilal *et al.*, Fl. As. 2: 48. 1938; Balakr., Fl. Jowai 1: 158. 1981; Grierson & Long, Fl. Bhut. 1.3: 678. 1987; Singh in Singh *et al.*, Fl. Mizo. 1: 460. 2002.

Undershrubs, upto 2 m tall, branches angular, appressed hairy. Leaves 3-foliolate; petioles 2-5 cm long; leaflets ovate or ovate-lanceolate, 6-13 x 3.5-6 cm, terminal leaflets larger, lateral ones smaller, base cuneate or rounded, apex acute or acuminate, puberulous above, appressed densely pubescent beneath, ciliate along the margin. Flowers in terminal and axillary fascicled racemes; pedicels 0.2-0.3 cm long, hairy; bracts lanceolate, 0.5-1 cm long, hairy, deciduous. Calyx densely hairy, teeth longer than the tube. Corolla purplish pink, standard broad ovate. Pods falcate, 3-6 cm long, undulate along both sutures and divided into 6-10 segments, densely pubescent with minute hooked hairs.

**Fl. & Fr.:** July - November

**Distribution:** India, Bhutan, China, Indonesia, Laos, Malaysia, Myanmar, Nepal, New Guinea, Philippines, Thailand, Vietnam

**Specimen examined:** Grows in grassy slopes and in secondary forest margins. Thetsumi. NLNU 0752. (Pl. 15)

*Desmodium sequax* Wall., Pl. As. Rar. 2: 46. T. 157. 1831; Baker in Hook.f., Fl. Brit. Ind. 2: 170. 1876; Kanjilal *et al.*, Fl. As. 2: 49. 1938; *D. sinuatum* (Miq.) Bl., Baker in Hook.f., Fl. Brit. Ind. 2: 166. 1876; Kanjilal *et al.*, Fl. As. 2: 49. 1938; Balakr., Fl. Jowai 1: 159. 1981; Grierson & Long, Fl. Bhut. 1.3: 677. 1987; Singh in Singh *et al.*, Fl. Mizo. 1: 467. 2002.

Shrubs, upto 3 m tall. Branches pubescent. Leaves 3-foliolate; petioles 2-4 cm; leaflets ovate-rhomboid, apex acute, base cuneate or rounded, margins undulate, pubescent on both surface; terminal leaflets larger, 4-8 x 2.5-5 cm, lateral leaflets smaller, 2.5-5 x 1.3-3.5 cm, petiolules 0.2-0.3 cm; stipels minute, filiform, stipules linear, deciduous. Flowers in axillary and terminal lax racemes; pedicels 0.4 cm; bracts lanceolate or subulate. Calyx funnel shaped, outside hairy, teeth very short, densely ciliated. Corolla purple or purplish pink. Pods 2-3 cm long, undulate along both sutures, densely covered with hooked hairs.

**Fl. & Fr.:** August - November

**Distribution:** India, Bhutan, China, Indonesia, Laos, Malaysia, Myanmar, Nepal, New Guinea, Philippines, Thailand, Vietnam

**Specimen examined:** Grows in grassy slopes and forest margins. Thetsumi. NLNU 0753.

*Desmodium triquetrum* (L.) DC., Prodr. 2: 326. 1825; Baker in Hook.f., Fl. Brit. Ind. 2: 163. 1876; Kanjilal *et al.*, Fl. As. 2: 56. 1938; Balakr., Fl. Jowai 1: 157. 1981; Grierson & Long, Fl. Bhut. 1.3: 669. 1987; Singh in Singh *et al.*, Fl. Mizo. 1: 471. 2002.

Undershrub, upto 2.5 m tall, branches triquetrous. Leaves 1-foliolate, ovate-oblong or lanceolate, 5-15.5 x 2-5 cm, apex acuminate, base rounded, glabrous or sparsely pilose

above, pilose on nerves beneath, margin entire; petioles 2.7-3.2 x 0.5-0.8 cm, winged; wing oblanceolate; petiolules about 0.2 cm long, pilose hairy; stipules ovate-lanceolate, 1.3-1.8 cm long, strait, glabrous. Flowers fascicled in terminal and axillary racemes; pedicels 0.2-0.4 cm long. Bracts ovate-lanceolate, 0.4-0.6 cm long. Calyx campanulate, pubescent outside, teeth ovate-lanceolate. Corolla purplish pink, 0.4-0.7 cm long. Pods oblong, 2.5-3.5 cm, joints 5-8 segments, densely hairy.

**Fl. & Fr.:** August - December

**Distribution:** India, Bhutan, China, Indonesia, Laos, Malaysia, Myanmar, Nepal, New Guinea, Philippines, Thailand, Vietnam

**Specimen examined:** Grows in grassy slopes, along roadsides and forest edges. Thetsumi. NLNU 0755. (Pl. 15)

*Desmodium velutinum* (Willd.) DC., Prodr. 2: 328. 1825; *Hedysarum velutinum* Willd., Sp. Pl. 3: 117. 1803; *Desmodium latifolium* (Roxb.) DC., Prodr. 2: 328. 1825; Baker in Hook.f., Fl. Brit. Ind. 2: 168. 1876; Kanjilal *et al.*, Fl. As. 2: 56. 1938; Grierson & Long, Fl. Bhut. 1.3: 672. 1987; Singh in Singh *et al.*, Fl. Mizo. 1: 471. 2002.

Shrubs, upto 1-2 m tall. Branches densely tomentose. Leaves 1-foliolate, broadly ovate, 3.5-8 x 3-5 cm, apex acute, base truncate or cuneate, hispid above, densely tomentose beneath, margin entire; petiole 0.5-1 cm long, densely hairy; stipules subulate, 0.2-0.7 cm long, hairy. Flowers in axillary or terminal panicle dense racemes, 5-15 cm long. Calyx 0.2-0.3 cm, campanulate, hairy, teeth lanceolate, equaling tube. Corolla purplish pink, 0.4-0.8 cm; standard ovate. Pods narrowly oblong, 1.5-2.5 cm long, indented along both sutures, densely pubescent.

**Fl. & Fr.:** August - November

**Distribution:** India, Bhutan, China, Indonesia, Laos, Malaysia, Myanmar, Nepal, New Guinea, Philippines, Sri Lanka, Thailand, Vietnam; Tropical Africa

**Specimen examined:** Grows in grassy slopes, along roadsides and forest edges. Thetsumi. NLNU 0757. (Pl. 15)

*Indigofera* L. Sp. Pl.: 751. 1753

Herbs, shrubs or small trees, usually bearing appressed medifixed, branched hairs. Leaves imparinnate, sometimes digitately 3- foliate or simple; leaflets usually opposite but sometimes subopposite or alternate, margin entire; stipules small; stipels present, caducous, sometimes absent. Flowers in lax or dense axillary racemes or clusters, bracts small, deciduous. Calyx campanulate, teeth 5, usually subequal. Corolla caducous; standard sessile or clawed; wings narrow, base auricled; keel falcate or spatulate, with spur adnate to wings. Stamens diadelphous. Ovary sessile, ovules 1 to many. Pods linear or oblong, septate, dehiscent.

1a. Leaflets 11-17; racemes 15-30 cm long *I. atropurpurea*

1b. Leaflets 9-15 cm; racemes 10-15 cm *I. nigrescens*

*Indigofera atropurpurea* Buch.-Ham.ex Hornem., Hort. Bot. Hafn., Suppl.: 152. 1819; Baker in Hook.f., Fl. Brit. Ind. 2: 101. 1876; Kanjilal *et al.*, Fl. As. 2: 20. 1938; Balakr., Fl. Jowai 1: 166. 1981; Grierson & Long, Fl. Bhut. 1.3: 667. 1987; Singh in Singh *et al.*, Fl. Mizo. 1: 482. 2002.

Large shrubs, much branched, branches glabrescent. Leaves imparipinnate, 10-30 cm; 7-15-foliolate, leaflets elliptic or obovate, oblong, 2.5-5 x 1.5-2.5 cm, base rounded or cuneate, apex obtuse, mucronate, sparsely appressed pubescent on both surfaces; petiolules 0.2-0.3 cm. Flowers in axillary racemes of 15-30 cm, bearing flowers nearly to base of

rachis; bracts subpersistent, lanceolate, exceeding the buds; pedicels short. Calyx with appressed hairs outside. Corolla dark pink or dark purple; standard elliptic, glabrous; wings and keel margin ciliate. Pods linear, upto 4cm long, narrowed into a beak; 6-10 seeded.

**Fl. & Fr.:** May - September

**Distribution:** India, Bhutan, China, Myanmar, Nepal, Vietnam

**Specimen examined:** Grows in scrubs, sparse forests, along trailsides. Lozaphuhu. NLNU 0497. (Pl. 15)

*Indigofera nigrescens* Kurz ex King & Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 67: 286. 1899; Kanjilal *et al.*, Fl. As. 2: 21. 1938; Balakr., Fl. Jowai 1: 166. 1981.

Shrubs, upto 1.5 m tall. Stem reddish brown, young branches green with appressed brown trichomes. Leaves 10-16 cm long; 9-15-foliolate; leaflets opposite, oblong-ovate or elliptic-oblong, 1.5-2.5 x 0.5-1 cm, base cuneate or rounded, apex obtuse and mucronate; petiole 1.5- 2 cm, appressed hairy, rachis adaxially grooved. Flowers in dense racemes of upto 20 cm; bracts linear-lanceolate, with brown trichomes. Calyx pubescent with appressed black or brown hairs outside, teeth ovate. Corolla red; standard obovate, with appressed brown and white hairs outside, inside basally hairy, base clawed; wings margin ciliate; keel as long as wings, outside apically hairy, margin ciliate. Ovary glabrous. Pods 1.5- 3 cm long, drooping, terete; 6-8seeded.

**Fl. & Fr.:** June - November

**Distribution:** India, China, Japan, Laos, Philippines, Thailand, Vietnam

**Specimen examined:** Grows in scrubs, sparse forests, along trailsides. Lozaphuhu. NLNU 0500. (Pl. 15)



***Erythrina*** L. Sp. Pl. 706. 1753

Trees or shrubs, branches often armed with prickles. Leaves pinnately 3-foliolate; leaflets entire or sometimes undulate; stipels fleshy and glandular; stipules small, deciduous or persistent. Flowers in axillary or terminal racemes, usually appearing before or with new leaves. Calyx spathaceous, campanulate, bilabiate or truncate. Corolla usually longer than the calyx; petals very unequal, shortly clawed; standard large, folded over wings and keel; wings short, sometimes absent; keels much shorter than standard. Stamens monadelphous, as long as standard. Ovary stipitate, ovules 2 to many, style incurved. Pod linear, curved, often constricted between seeds, not septate.

1a. Calyx spathaceous; flowers appear before leaves *E. stricta*

1b. Calyx not spathaceous; flowers appear with leaves *E. arborescens*

***Erythrina arborescens*** Roxb., Pl. Coromandel 3: 14. 1811; Baker in Hook.f., Fl. Brit. Ind. 2: 190. 1876; Kanjilal *et al.*, Fl. As. 2: 72. 1938; Balakr., Fl. Jowai 1: 170. 1981; Haridasan & Rao, For. Fl. Megh. 1: 300. 1985; Grierson & Long, Fl. Bhut. 1.3: 684. 1987; Singh in Singh *et al.*, Fl. Mizo. 1: 476. 2002.

Trees, upto 15 m tall, with spreading crown, bark grayish brown, branches with few spines. Leaves 3-foliolate; leaflets broadly ovate or rhomboid, 13-20 x 11-22 cm, base broadly cuneate, apex acute or acuminate, glabrous above and pubescent beneath; petioles 20-25 cm long; petiolules upto 1 cm long; stipules lanceolate, deciduous. Flowers in axillary or terminal racemes, 20-25 cm long; pedicels upto 0.5 cm. Calyx 0.8-1 cm, sparsely brown pubescent, shallowly bilabiate. Corolla orange red; standard ovate-elliptic, 3-4 cm, wings oblong, keel ovate triangular. Pods oblong-ellipsoid, 15-20 cm, curved, narrowed at both ends; 4-6 seeded.

**Fl. & Fr.:** August - December

**Distribution:** India, Bangladesh, Bhutan, China, Myanmar, Nepal, Thailand

**Specimen examined:** Grows in forest cleared areas, secondary forest. Lozaphuhu. NLNU 0501.

*Erythrina stricta* Roxb., Fl. Ind. ed. 1832, 3: 251. 1832; Baker in Hook.f., Fl. Brit. Ind. 2: 189. 1876; Kanjilal *et al.*, Fl. As. 2: 70. 1938; Haridasan & Rao, For. Fl. Megh. 1: 301. 1985; Grierson & Long, Fl. Bhut. 1.3: 683. 1987; Singh in Singh *et al.*, Fl. Mizo. 1: 476. 2002.

Trees, upto 20 m tall. Branches with conical spines. Leaves pinnately 3-foliolate; petioles 12-20 cm long; leaflets broader than long, broadly ovate or rhomboid-orbicular 11-20 x 10-20 cm, base rounded, apex acute or acuminate, glabrous and shining above, sparsely pubescent beneath; petiolules upto 1 cm. Flowers scarlet, appearing before leaves, in secund racemes crowded at the end of branchlets. Calyx spathaceous, about 1.5 cm long, densely brown pubescent. Standard ovate-lanceolate, 4-5 cm long, wings shorter than calyx, keel longer than wings. Pods 7-15 cm long, spindle shaped, sharply pointed, glabrous; 1-3 seeded.

**Fl. & Fr.:** February - April

**Distribution:** India, Bhutan, Cambodia, China, Laos, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in forest cleared areas, mountain slopes. Khuza. NLNU 0805.

*Flemingia* Roxb. ex W.T.Aiton Hortus Kew 4: 349. 1812

Shrubs or undershrubs. Leaves simple or digitately 3-foliolate, gland-dotted beneath; stipels absent, stipules present, striate. Flowers in axillary or terminal racemes, panicles or globose heads; bracts conspicuous, deciduous or persistent, bracteoles minute or absent.

Calyx campanulate, teeth 5, acute. Corolla equal to or longer than calyx, standard auricled at base, wings obliquely oblong or obovate, adnate to beaked keel. Stamens diadelphous (9+1). Ovary subsessile, ovules 2; style filiform, stigma capitate. Pod obliquely oblong, inflated, not septate.

***Flemingia macrophylla*** (Willd.) Kuntze ex Merr., Philipp. J. Sci., C 5: 130. 1910; *Crotalaria macrophylla* Willd. Sp. Pl. 3: 982. 1800; *F. congesta* Roxb. Fl. Ind. 3: 340. 1832; Baker in Hook.f., Fl. Brit. Ind. 2: 228. 1876; Kanjilal *et al.*, Fl. As. 2: 90. 1938; Balakr., Fl. Jowai 1: 165. 1981; Haridasan & Rao, For. Fl. Megh. 1: 302. 1985; Grierson & Long, Fl. Bhut. 1.3: 707. 1987; Singh in Singh *et al.*, Fl. Mizo. 1: 478. 2002.

Shrubs, upto 2 m tall, branches angular, sericeous. Leaves 3-foliolate; petioles 3-6.5 cm long, narrowly winged; leaflets ovate or oblong-lanceolate, 6-14 x 3-4 cm, base rounded or cuneate, apex acute or shortly acuminate, glabrescent or scabrous above, pubescent along the nerves and gland dotted beneath; petiolules about 0.3 cm long, stipules lanceolate 0.6-0.9 cm, deciduous. Flowers in axillary racemes, 5.5-9 cm, or sometimes in terminal panicles. Bracts ovate, appressed brown tomentose, caducous. Calyx densely silky, teeth lanceolate. Corolla pinkish purple, slightly longer than calyx. Pods ovoid-ellipsoid, 1-1.5 cm long, turgid, brown velvety; 2-seeded.

**Fl. & Fr.:** April - September

**Distribution:** India, Bangladesh, Bhutan, Cambodia, China, Indonesia, Laos, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in forest edges, roadsides. Chizami. NLNU 0535.

*Millettia* Wight & Arn. Prodr. Fl. Ind. Orient. 1: 263. 1834

Trees or woody climbing shrubs. Leaves imparipinnate; leaflets opposite; stipels present; stipules small, persistent or deciduous. Flowers in simple axillary racemes or terminal panicles. Calyx campanulate, teeth short or truncate. Corolla much longer than the calyx; standard broad, spreading or reflexed; wings oblong, free from keel, auricled and clawed at base, keel upcurved, clawed at base. Stamens monodelphous or diadelphous; vexillary filament sometimes connate from the middle. Style filiform, incurved, glabrous, stigma capitate. Pod linear or oblong, flat or turgid.

*Millettia pachycarpa* Benth., F.A.W. Miquel, Pl. Jungh.: 250. 1852; Baker in Hook.f., Fl. Brit. Ind. 2: 106. 1876; Kanjilal *et al.*, Fl. As. 2: 27. 1938; Haridasan & Rao, For. Fl. Megh. 1: 305. 1985; Grierson & Long, Fl. Bhut. 1.3: 658. 1987; Singh in Singh *et al.*, Fl. Mizo. 1: 487. 2002.

Tall climbers. Young parts brown, velvety. Leaves 30-50 cm long, 11-17 foliolate; petioles upto 12 cm long; leaflets obovate or oblanceolate, 5-18 x 2.4-6 cm, apex shortly acuminate, base cuneate, glabrous above, densely appressed brown tomentose beneath. Petiolules 0.3-0.6 cm long; stipules broadly ovate-triangular. Flowers pinkish white in 12-30 cm long panicles. Calyx densely brown pubescent, teeth short. Corolla 2-2.5 cm long. Stamens monodelphous. Pod 6-20 x 3-5 cm, constricted between seeds, woody, rugose, glabrous. 1-3 seeded.

**Fl. & Fr.:** April - November

**Distribution:** India, Bangladesh, Bhutan, China, Laos, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows on slopes along roadsides, and trees in open places. Thetsumi. NLNU 0760. (Pl. 15)

***Mucuna*** Adans., Fam. Pl. 2: 325. 1763

Climbers, woody or herbaceous. Leaves pinnately 3-foliolate; leaflets entire, stipels usually present, stipules small, caducous. Flowers large, racemes axillary or on old leafless wood, erect or drooping. Calyx broadly campanulate, bilipped, upper lip entire or 2-lobed, lower one 3-lobed. Corolla longer than calyx, standard rounded, auricled, usually smaller than other petals, keel slightly longer than or equal to wings. Stamens 10, diadelphous. Pods hard, usually covered with irritating bristles.

1a. Large woody twiners; inflorescence borne on old wood *M. sempervirens*

1b. Semi woody twiners; inflorescence borne on axils of leaves *M. pruriens*

***Mucuna pruriens*** (L.) DC., Prodr. 2: 405. 1825; Baker in Hook.f., Fl. Brit. Ind. 2: 187. 1876; *Mucuna prurita* Wight, Bot. Misc. 2: 348. 1831; Kanjilal *et al.*, Fl. As. 2: 66. 1938; Haridasan & Rao, For. Fl. Megh. 1: 309. 1985; Grierson & Long, Fl. Bhut. 1.3: 707. 1987; Singh in Singh *et al.*, Fl. Mizo. 1: 492. 2002.

Climbers, young parts pubescent. Leaves 3-foliolate; petioles 4-9 cm, hairy; leaflets glabrescent above, adpressed grey pubescent beneath; terminal leaflet elliptic or ovate, 5-10 x 4-7 cm, apex acute, base rounded or broadly cuneate; lateral leaflets 4.5-12 cm, apex acute, mucronate, base truncate or cordate; stipels subulate. Flowers dark purple in axillary, pendulous pedunculate many flowered racemes, 10-20 cm long; bracts and bracteoles small. Calyx bilipped, tomentose, intermixed with brown bristles, tube about 0.5-1 cm. Corolla about 4 cm long, keel bent inward. Pods S-shaped, inflated, covered with dense brown bristles; 5-6 seeded.

**Fl. & Fr.:** August - December

**Distribution:** Widely distributed, cosmopolitan

**Specimen examined:** Grows on bushes and trees in open forest, roadsides. Chizami. NLNU 0537.

*Mucuna sempervirens* Hemsl., J. Linn. Soc., Bot. 23: 190. 1887; Grierson & Long, Fl. Bhut. 1.3: 686. 1987.

Large woody climber. Leaves 3-foliolate; petiole 6-15 cm long, stipels deciduous; leaflets coriaceous, glabrescent above, tomentose beneath; terminal leaflet elliptic-ovate, 7-15 x 3-7 cm, base cuneate, apex acuminate; lateral leaflets 6-13 x 2.5-5 cm, apex acuminate, base truncate or cordate. Racemes axillary, usually on old leafless stem, 10-28 cm long. Bracts caducous, bracteoles ovate, velvety, caducous. Calyx with dense appressed brown bristles, tube 0.9-1.3 cm, lobes 0.5-0.8 cm. Corolla deep purple, glabrous; standard broadly ovate or suborbicular, 2-3 cm, wings falcate, fleshy, keel abruptly beaked, far exceeding wings and standard. Legume linear, thick, woody, with dense brown bristles, constricted between the seeds; 4-12 seeded.

**Fl. & Fr.:** March - August

**Distribution:** India (NE India), Bhutan, China, Myanmar, Japan

**Specimen examined:** Grows in secondary or primary forest. Chizami. NLNU 0540. (Pl. 16)

*Parochetus* Buch.-Ham. ex D. Don, Prodr. Fl. Nepal.: 240. 1825

Prostrate herbs, rooting at nodes. Leaves 3-foliolate; stipules free or adnate to base of petiole; leaflets entire or toothed. Flowers solitary or 2 on axillary peduncles. Calyx campanulate, unequally 5 lobed, upper two teeth connate to near apex. Corolla free from staminal tube; standard obovate, clawed, wings oblong, keel shorter than wings and hooked at apex. Stamens diadelphous. Ovary sessile, linear, glabrous. Pods linear, inflated.

***Parochetus communis*** Buch.-Ham. ex D. Don, Prodr. Fl. Nepal.: 240. 1825; Baker in Hook.f., Fl. Brit. Ind. 2: 86. 1876; Kanjilal *et al.*, Fl. As. 2: 17. 1938; Grierson & Long, Fl. Bhut. 1.3: 728. 1987.

Slender creeping herbs, rooting at nodes. Leaves 3-foliolate; petiole 5-8 cm, slender; leaflets subsessile, broadly obovate, 0.5-2 x 0.62 cm, base cuneate, apex retuse, margin entire or subentire, glabrous or finely pubescent. Flowers in long peduncles of 7-10 cm, 1-2 flowered. Calyx campanulate, toothed to middle, pubescent. Corolla blue or purple, standard broadly obovate, clawed, wings and keel much shorter. Stamens diadelphous. Pods linear, straight, 1-2.5 cm long, glabrous.

**Fl. & Fr.:** April - October

**Distribution:** NE India, Bhutan, China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows trailing on roadsides, forest edges, grasslands. Tsupfume. NLNU 0043.

***Pueraria*** DC., Ann. Sci. Nat. (Paris) 4: 97. 1825

Herbaceous or woody twiners. Leaves 3-foliolate; leaflets large, entire, often sinuately lobed; stipules persistent; stipels present. Flowers in axillary racemes or terminal panicles; bracts and bracteoles small, caducous. Calyx campanulate, teeth 5, upper 2 teeth connate. Corolla exserted, petals subequal; standard usually spurred at base, wings narrow, often falcate, adnate to keel. Stamens 10, monadelphous, rarely diadelphous. Style long, filiform, stigma capitate. Pods linear, compressed, glabrous or hairy.

- |   |   |
|---|---|
| 1a. Large climbers; flowers in simple racemes           | <i>P. montana</i> var. <i>thomsonii</i> |
| 1b. Twinning herbs; flowers in long pedunculate racemes | <i>P. peduncularis</i>                  |

*Pueraria montana* var. *thomsonii* (Benth.) M.R.Almeida, Fl. Maharashtra 2: 122. 1998; *P.thomsonii* Benth. J. Linn. Soc., Bot. 9: 122.1867; Baker in Hook.f., Fl. Brit. Ind. 2: 198. 1876; *P.thunbergiana* (Siebold Zucc.) Benth., J. Linn. Soc., Bot. 9: 122. 1867; Kanjilal *et al.*, Fl. As. 2: 81. 1938; *P. lobata* (Willd.) Ohwi, Bull. Tokyo Sci. Mus. 18: 16. 1947; Balakr., Fl. Jowai 1: 160. 1981; Haridasan & Rao, For. Fl. Megh. 1: 310. 1985; Singh in Singh *et al.*, Fl. Mizo. 1: 493. 2002.

Large climbers; branches slender, covered with deflexed brownish hairs. Leaves 3-foliolate; petiole 10-15 cm long, appressed brown hairs; leaflets simple or 3-lobed, ovate-rhomboid, 12-18 x 10-16 cm, lateral leaflets oblique, base rounded or broadly cuneate, apex acuminate, glabrescent above, appressed hairy beneath; stipules ovate-oblong, 1-1.5 cm long, hairy, stipels linear, 1-1.2 cm long. Flowers in simple raceme of 20-35 cm; slightly scented; bracts linear-lanceolate, bracteoles ovate. Calyx purplish green, 1.2- 2 cm long, lobes deeply divided, lanceolate, pubescent. Corolla 2-2.5 cm, purple or blue; standard suborbicular, with yellow patch at base, wings falcate, slightly shorter than keel. Stamen free. Pods flat, straight, 8-13 cm long, densely brown hairy; 8-12 seeded.

**Fl. & Fr.:** August - November

**Distribution:** India, Bhutan, China, Laos, Myanmar, Philippines, Thailand, Vietnam

**Specimen examined:** Grows on trees and bushes in open forest and forest edges. Lozaphuhu. NLNU 0503. **(Pl. 16)**

*Pueraria peduncularis* (Benth.) Graham ex Benth., J. Linn. Soc., Bot. 9: 124. 1867; Baker in Hook.f., Fl. Brit. Ind. 2: 197. 1876; Kanjilal *et al.*, Fl. As. 2: 80. 1938; Grierson & Long, Fl. Bhut. 1.3: 692. 1987.



Twining herbs, stem softly brown deflexed pubescent. Leaves 3-foliolate; petioles 6-12 cm long, pubescent; leaflets ovate-rhomboid, 6-16 x 4-11 cm, lateral oblique, membranous, scabrous above, appressed brown pubescent beneath, base cuneate or rounded, apex acuminate; stipules lanceolate, 0.7-0.8 cm long, stipels linear, 0.3-0.4 cm long. Flowers in long axillary pedunculate racemes of upto 40 cm long. Calyx densely pubescent, tube about 0.2 cm long, teeth short, triangular. Corolla white with purple tip, 1-1.4 cm long; standard obovate, not spurred. Pods 5-8 cm long, membranous, glabrous; 4-8 seeded.

**Fl. & Fr.:** August - November

**Distribution:** India, Bhutan, China, Myanmar, Nepal, Pakistan, Vietnam

**Specimen examined:** Grows on trees and bushes in open forest and forest edges. Lozaphuhu. NLNU 0507. **(Pl. 16)**

*Tephrosia* Pers. Syn. Pl. 2: 328. 1807

Herbs or shrubs. Leaves imparipinnate; leaflets numerous, opposite, stipules deciduous, stipels absent. Flowers in axillary or leaf opposed or terminal racemes. Calyx campanulate, teeth 5, short. Petals clawed; standard suborbicular, wings adnate to incurved keel. Stamens diadelphous. Pods flat, continuous or less septate between the seeds.

*Tephrosia candida* DC. Prodr. 2: 249. 1825; Baker in Hook.f., Fl. Brit. Ind. 2: 111. 1876; Kanjilal *et al.*, Fl. As. 2: 31. 1938; Balakr., Fl. Jowai 1: 171. 1981; Haridasan & Rao, For. Fl. Megh. 1: 313. 1985; Grierson & Long, Fl. Bhut. 1.3: 659. 1987; Singh in Singh *et al.*, Fl. Mizo. 1: 499. 2002.

Shrubs, 2-3 m tall. Stems much branched, densely brown tomentose. Leaves imparipinnate, 12-25 cm; rachis tomentose; leaflets 13-27, elliptic-oblong, 2-7 x 1-1.5 cm, apex acute, mucronate, base cuneate, pubescent above, densely appressed silky beneath;

stipules lanceolate. Flowers creamy white, in axillary and terminal racemes, fascicled, 15-23 cm long. Calyx campanulate, oblique, hairy, teeth short. Corolla silky outside, about 2 cm; standard obovate; wings slightly adnate to keel. Stamens diadelphous. Style flat, silky. Pods linear, flattened, 6-10 cm, sericeous; 8-12 seeded.

**Fl. & Fr.:** August - November

**Distribution:** India, Bangladesh, Bhutan, China, Nepal

**Specimen examined:** Grows in forest edges, along roadsides. Lozaphuhu. NLNU 0502.

*Trifolium* Tourn. ex L. Sp. Pl.: 764. 1753

Herbs, annual or perennial. Stems erect or prostrate. Leaves pinnately or palmately 3-foliolate; stipules adnate to petiole. Flowers axillary in dense heads; bracts small or absent. Calyx unequally 5-toothed, tube turbinate. Corolla adnate to stamina tube, persistent; standard and wings narrow, keel straight, shorter than wings. Stamens diadelphous. Pods small, indehiscent; 1 or few seeded.

*Trifolium repens* L. Sp. Pl.: 767. 1753; Baker in Hook.f., Fl. Brit. Ind. 2: 86. 1876; Grierson & Long, Fl. Bhut. 1.3: 731. 1987.

Creeping herbs, stem slender, glabrous, rooting at nodes. Leaves palmately 3-foliolate; leaflets obovate, 0.9-2.5 x 0.7-2 cm, base cuneate, apex rounded, emarginate, upper surface of leaves with whitish V-shaped marking, margin denticulate; petioles 4-10 cm; stipules narrow, lanceolate. Flower heads globose umbels, 1.5-2.5 cm, peduncle 8-20 cm long, pedicel 0.2-0.4 cm. Calyx tube 0.3-0.5 cm, teeth subequal, shorter than tube. Corolla white with a light pink tinge; standard elliptic oblong, twice the length of wings and keel; keel shorter than wings. Pods linear, oblong; 2-4 seeded.

**Fl. & Fr.:** May - October

**Distribution:** Cosmopolitan

**Specimen examined:** Grows in roadsides, grassy slopes. Tsupfume. NLNU 0045. (Pl. 16)

*Vigna* Savi, Nuovo Giorn. Lett., ser. 3, 8: 113. 1824

Erect or twining herbs or shrubs. Leaves pinnately 3-foliolate, leaflets entire or lobed; stipels present; stipules auriculate. Flowers in axillary or terminal racemes on glandular swellings. Bracts and bracteoles deciduous. Calyx campanulate, 5-toothed. Corolla much exserted; standard suborbicular, keel incurved or spirally twisted. Stamens diadelphous. Ovary sessile, style filiform, bearded on inner side below the oblique stigma. Pods linear, subseptate, terete or flat.

1a. Flowers blue or purple; calyx tube brown bristly *V. vexillata*

1b. Flowers yellow; calyx tube glabrous *V. radiata*

*Vigna radiata* (L.) R. Wilczek, Fl. Congo Belge 6: 286. 1954; Grierson & Long, Fl. Bhut. 1.3: 731. 1987.

Twining herbs. Stems, petioles and peduncles covered with long spreading brown hairs. Leaves 3-foliolate; petioles 5-13 cm long; leaflets ovate, 5-10 x 2-6 cm, lateral ones oblique, base broadly cuneate or rounded, apex acute or acuminate, margin entire, appressed hairy on both surface. Stipels linear-lanceolate, hairy; stipules ovate, peltate, margin ciliate. Flowers yellow, on long peduncled axillary racemes; peduncle 5-9 cm long; pedicels 0.2-0.3 cm. Bracts ovate, bracteoles linear-lanceolate. Calyx tube glabrous, 0.2-0.3 cm long, lobes minutely toothed or truncate, ciliate. Corolla 0.9-1.5 cm; standard oblate, emarginate, keel incurved through 180°. Stamens diadelphous. Pod cylindric, 6-8 cm long, covered with dense spreading bristly hairs.

**Fl. & Fr.:** August - November

**Distribution:** India, Bangladesh, Bhutan, China, Indonesia, Laos, Sri Lanka, Taiwan, Thailand, Vietnam; Africa; widely cultivated in tropical and subtropical regions.

**Specimen examined:** Grows in open secondary forest twining on bushes, roadsides. Thetsumi. NLNU 0761. **(Pl. 16)**

*Vigna vexillata* (L.) A. Rich., R.de la Sagra, Hist. Fis. Cuba, Bot. 10: 191. 1845; Baker in Hook.f., Fl. Brit. Ind. 2: 206. 1876; Kanjilal *et al.*, Fl. As. 2: 84. 1938; Balakr., Fl. Jowai 1: 171. 1981; Grierson & Long, Fl. Bhut. 1.3: 700. 1987.

Slender twining herbs. Stems and petioles with deflexed brown hairs, glabrescent. Leaves 3-foliolate; petioles 3-10 cm; leaflets ovate-lanceolate, or linear-lanceolate, 5-13 x 2-3 cm, lateral ones oblique, base cuneate or rounded, apex acuminate; stipules ovate-lanceolate, cordate at base, ciliate. Flowers blue or purple, on long peduncled axillary raceme, peduncle 6-20 cm long. Bracteoles bristly, caducous. Calyx tube brown bristly, teeth linear-lanceolate, as long as the tube. Corolla 2-3 cm; standard as broad as long, emarginated, wings broad falcate, keel falcate, incurved through 180°. Pods linear-terete, 5-10 cm, brown bristly hairs. Seeds 10-20.

**Fl. & Fr.:** August - October

**Distribution:** Widely cultivated in tropical and subtropical regions.

**Specimen examined:** Grows in open secondary forest twining on bushes, roadsides. Thetsumi. NLNU 0762. **(Pl. 16)**

## CAESALPINIACEAE R. Br.,

Tuckey, Narrat. Exped. Congo 430. 1818

Trees, shrubs or herbs, sometimes twining or climbing. Leaves pinnate, simple or 1-foliolate. Flowers zygomorphic, large, in elongated racemes or spikes. Sepals 5. Petals 5 or fewer, unequal. Stamens 10, free. Fruit a legume, indehiscent.

1a. Leaves simple, entire or bilobed

2a. Trees or shrubs, without tendrils

*Bauhinia*

2b. Climbers with tendrils

*Cheniella*

1b. Leaves pinnate

3a. Leaflets 25-50 pairs

*Chamaecrista*

3b. Leaflets 3-4 pairs

*Senna*

### ***Bauhinia*** Plum. ex L., Sp. Pl.: 374. 1753

Trees or shrubs, erect or climbing by tendrils. Leaves simple, usually bilobed at apex, palmately nerved; stipules small, caducous. Flowers bisexual or dioecious, in axillary or terminal racemes or panicles. Bracts and bracteoles small, caducous. Calyx tube cylindric or turbinate, limb 5, entire or spathe-like. Petals 5, subequal, usually clawed at base. Stamens 10, often 5 or more reduced to staminodes, filaments free, anthers versatile. Ovary stalked, many ovuled. Pods linear, oblong, flat, dehiscent or indehiscent.

***Bauhinia variegata*** L., Sp. Pl.: 375. 1753; Baker in Hook.f., Fl. Brit. Ind. 2: 284. 1878; Kanjilal *et al.*, Fl. As. 2: 140. 1938; Balakr., Fl. Jowai 1: 172. 1981; Haridasan & Rao, For. Fl. Megh. 1: 318. 1985; Grierson & Long, Fl. Bhut. 1.3: 634. 1987; Singh in Singh *et al.*, Fl. Mizo. 1: 510. 2002.

Trees, 5-10 m tall. Leaves broadly ovate, suborbicular, 5-13 x 5-11 cm, apex deeply cleft, lobes blunt obtuse, base cordate, glabrous above, glaucous and puberulous along the nerves beneath; petiole 2-3.5 cm. Flowers white, pink or purplish-pink, in lateral or terminal corymbose racemes. Calyx grey, pubescent, limb 5-toothed, spathaceous. Petals variegated, obovate, clawed. Fertile stamens 5, filaments as long as petals. Pods flat, subfalcate, 15-50 cm; 10-15 seeded.

**Fl. & Fr.:** March - June

**Distribution:** India, Bangladesh, Bhutan, China, Laos, Myanmar, Nepal, Thailand, Vietnam; cultivated in tropics and sub tropics.

**Specimen examined:** Grows in primary and secondary forests. Thetsumi. NLNU 0765. (**Pl. 17**)

*Cheniella* R. Clark & Mackinder, Eur. J. Taxon. 360: 9. 2017

*Cheniella quinnanensis* subsp. *gandhiana* (Gogoi & Bandyop.) R. Clark & Mackinder, Eur. J. Taxon. 360: 16. 2017; *Phanera glauca* var. *murlenensis* Ram.Kumar, Bandyop. & S.Sharma, Phytotaxa 166: 155. 2014; *Bauhinia glauca* (Wall. ex Benth.) Benth. Fl. Hongkong 99. 1861; Baker in Hook.f., Fl. Brit. Ind. 2: 282. 1878; Singh in Singh *et al.*, Fl. Mizo. 1: 506. 2002.

Large scandent shrub with tendrils, simple or forked. Young branches and inflorescence covered with brown hairs. Leaves broadly ovate, suborbicular, 5-8 x 5-7 cm, base cordate, apex bilobed, lobes rounded or obtuse at apex, basal nerves 7-9; petioles 2-3 cm. glabrate above, sparsely pubescent beneath. Flowers white, in lateral and terminal corymbs; bracts subulate, bracteoles filiform. Calyx tube 1.5-2.5 cm long, lobes ovate-lanceolate. Petals broadly obovate, margin erose, clawed. Fertile stamens 3, filaments as

long as petals, anthers red, staminodes 7, connate at base. Ovary glabrous, style short, stigma peltate. Pods flat, oblong, 17-25 cm long, indehiscent, glabrous.

**Fl. & Fr.:** May - August

**Distribution:** India, Cambodia, Laos, Myanmar, Vietnam.

**Specimen examined:** Grows in primary and secondary forests. Khezhakheno. NLNU 0212.

**(Pl. 17)**

*Chamaecrista* Moench, Methodus: 272. 1794

Herbs, or shrubs, erect or prostrate. Leaves pinnate; leaflets opposite, petioles bearing disk or cup shaped gland. Flowers axillary, 1-3 flowered. Sepals and petals 5, unequal. Stamens 10. Pods linear, flat.

*Chamaecrista mimosoides* (L.) Greene, Pittonia 4: 27. 1901; *Cassia mimosoides* L. Sp. Pl. 379. 1753; Baker in Hook.f., Fl. Brit. Ind. 2: 266. 1878; Kanjilal *et al.*, Fl. As. 2: 133. 1938; Balakr., Fl. Jowai 1: 175. 1981; Grierson & Long, Fl. Bhut. 1.3: 630. 1987; Singh in Singh *et al.*, Fl. Mizo. 1: 516. 2002.

Diffuse undershrubs, woody at base; branches and leaf rachis covered with appressed hairs. Leaves 4-9 cm, with a sessile discoid gland in upper part of petiole; leaflets 20-50 pairs, sessile, oblong, 0.4-0.7 x 0.1 cm, apex acute, mucronate, base oblique truncate, glabrous; stipules linear subulate. Flowers yellow, axillary or extra-axillary, solitary or in pairs. Bracts and bracteoles similar to stipules but smaller. Calyx ovate, lanceolate, unequal, pilose. Petals ovate-orbicular. Stamens 10, alternately 5 longer and 5 shorter. Pods flat, falcate, covered with fine bristles.

**Fl. & Fr.:** July - October

**Distribution:** India, Southeast Asia, tropics and subtropics.

**Specimen examined:** Grows in grasslands, wastelands. Wazeho. NLNU 0598. **(Pl. 17)**

***Senna*** Mill., Gard. Dict. Abr. ed. 4: s.p. 1754

Herbs, shrubs or small trees. Leaves pinnate; leaflets opposite, rachis and petiole with or without glands. Flowers in axillary or terminal racemes. Bracteoles absent. Sepals and petals 5, subequal. Stamens 10. Pods linear, flat or cylindric, dehiscent or indehiscent; seeds many.

***Senna septemtrionalis*** (Viv.) H. S. Irwin & Barneby, Mem. New York Bot. Gard. 35: 365. 1982; *Cassia septemtrionalis* Viviani, Elench. Pl. 14. 1802.

Shrubs, 1-2 m tall. Branchlets glabrous. Leaves about 16 cm; leaflets 3 or 4 pairs, lightly farinose on the upper surface, ovate-lanceolate. 4-8 x 1-2.5 cm, base cuneate, apex acute to acuminate, glabrous, margin entire. Flowers yellow, in axillary or terminal racemes. Bracts caducous, linear-lanceolate. Calyx yellow-green, lobes ovate, unequal. Petals ovate-orbicular. Fertile stamens 7, unequal, 3 staminodes. Pods terete, 5-10 cm; many seeded.

**Fl. & Fr.:** July - September

**Distribution:** Cosmopolitan

**Specimen examined:** Grows along roadsides, forest edges, wastelands. Kikrumba. NLNU 0460. (Pl. 17)

## MIMOSACEAE

R.Br., Flinders Voy. Terran Austr. 2: 551. 1814

Trees, shrubs or climbers. Leaves bipinnate. Flowers actinomorphic, small, in spikes or globose heads. Calyx tubular, teeth, short. Corolla free or united at base. Stamens 10 – many, free, filaments united at base. Fruit a legume.

1a. Stamens definite, usually 10



- 2a. Flowers in elongated spikes *Entada*
- 2b. Flowers in heads
  - 3a. Prickly undershrubs; pods splitting into 1-seeded segment *Mimosa*
  - 3b. Unarmed trees; pods not splitting into 1-seeded segments *Parkia*
- 1b. Stamens indefinite, more than 10
  - 4a. Stamens free; armed shrubs or trees *Senegalia*
  - 4b. Stamens united; unarmed trees *Albizia*

***Albizia*** Durazz, Mag. Tosc. 3:11. 1772

Unarmed shrubs or trees. Leaves evenly bipinnate, petiole and rachis with glands; stipules usually small, caducous. Flowers small in globose heads, arranged in axillary or terminal panicles. Calyx tubular or campanulate, obscurely 5-toothed. Corolla funnel shaped, 5-lobed. Stamens numerous, exserted, filaments connate into a tube at base, anthers small. Central flowers of heads slightly larger with much longer filament tube. Style long, stigma minute. Pods flat, oblong, indehiscent or dehiscent along both sutures, continuous inside.

- 1a. Leaflets 5-12 pairs; pinnae 2-4 pairs *A. lebbek*
- 1b. Leaflets more than 10 pairs; pinnae more than 5 pairs
  - 2a. Filaments yellowish or greenish white *A. chinensis*
  - 2b. Filaments white at base, pink above *A. julibrissin*

***Albizia chinensis*** (Osbeck) Merr., Amer. J. Bot. 3: 575. 1916; *Mimosa chinensis* Osb. Dag. Ostind. Res. 233. 1757; *M.stipulata* Roxb., Fl. Ind. 2: 549. 1832; *A. stipulata* (Roxb.) Boivin, Encycl. 19. 2: 33. 1838; Baker in Hook.f., Fl. Brit. Ind. 2: 300. 1878; Kanjilal *et al.*,

Fl. As. 2: 167. 1938; Balakr., Fl. Jowai 1: 177. 1981; Grierson & Long, Fl. Bhut. 1.3: 646. 1987; Singh in Singh *et al.*, Fl. Mizo. 1: 530. 2002.

Trees, 20-30 m tall, with spreading crown. Bark dark brown, horizontally wrinkled, lenticellate. Leaf rachis 15-30 cm long, with a large gland near the base, sometimes one or more between the pinnae; pinnae 7-20 pairs; leaflets 20-40 pairs, oblong-lanceolate, 0.5-0.9 cm long, apex obliquely acute, base obliquely truncate, glabrous above, pubescent beneath. Stipules ovate, base cordate. Flowers yellowish-white, in axillary and terminal paniced racemes of globose heads. Bracts stipule like, persistent, pubescent. Calyx tubular, tomentose, teeth short. Corolla pubescent outside, ovate-lanceolate. Stamens numerous, much longer than corolla, connate at base. Pods elliptic-oblong, 10-16 cm long, flattened, glabrous, indehiscent.

**Fl. & Fr.:** April - August

**Distribution:** India, South and Southeast Asia

**Specimen examined:** Grows in forests and open fields. Chepoketa. NLNU 0936. **(Pl. 17)**

*Albizia julibrissin* Durazz., Mag. Tosc. 3.4: 11. 1772; Baker in Hook.f., Fl. Brit. Ind. 2: 300. 1878; Kanjilal *et al.*, Fl. As. 2: 168. 1938; Grierson & Long, Fl. Bhut. 1.3: 645. 1987.

Medium sized trees, upto 15 m tall, with broad crown. Bark dark brown or almost black, fissured. Young shoots, leaf rachis and inflorescence tomentose. Leaf rachis 10-30 cm, with an oval gland near base of petiole and leaf rachis of uppermost pinnae; pinnae 4-8(-12) pairs; leaflets 10-30 pairs, oblong, 0.9-1.5 cm, apex acute, base truncate, appressed pubescent on both surfaces. Flowers pink, fragrant, in peduncled heads, solitary or in fascicles of 2-3, axillary or in terminal panicles. Bracts 0.3-0.6 cm, linear, caducous. Calyx

pubescent, teeth triangular. Corolla pubescent, lobes oblong-lanceolate. Stamens exserted, filaments white at base, pink above. Pods strap-shaped, 10-15 cm, glabrous.

**Fl. & Fr.:** May - August

**Distribution:** India, Central, East and Southwest Asia

**Specimen examined:** Grows in forests and open fields. Khezhakheno. NLNU 0215. **(Pl. 17)**

*Albizia lebbeck* (L.) Benth., London J. Bot. 3: 87. 1844; Baker in Hook.f., Fl. Brit. Ind. 2: 298. 1878; Kanjilal *et al.*, Fl. As. 2: 165. 1938; Grierson & Long, Fl. Bhut. 1.3: 644. 1987; Singh in Singh *et al.*, Fl. Mizo. 1: 531. 2002; *Mimosa lebbeck* L., Sp. Pl. 516. 1753.

Large trees, with spreading crown; bark grey-brown, irregularly fissured, branches lenticellate. Leaf rachis 7-15cm, with a large oblong gland at base; pinnae 2-4 pairs; leaflets 4-10 pairs, oblong-elliptic, 2-4 cm, apex obtuse, emarginate, base unequal, glabrous above, sparsely pubescent beneath. Flowers greenish-white, fragrant, in axillary or supra-axillary pedunculate heads, heads 15-30 flowered; solitary or 3-4 fascicled. Bracts linear, tomentose, caducous. Calyx funnel-shaped, pubescent, teeth short. Corolla funnel-shaped, lobed to middle. Stamens exserted, filaments greenish above, white at base. Pods oblong, flat, 15-30 cm; 5-12 seeded.

**Fl. & Fr.:** May - October

**Distribution:** India, Bangladesh, Bhutan, China, Myanmar, Nepal, Pakistan, Sri Lanka; Africa

**Specimen examined:** Grows in forests and open fields. Chizami. NLNU 0541.

*Entada* Adans., Fam. Pl. 2: 318. 1763

Large woody climbers, or scandent shrubs. Leaves bipinnate; petiolar gland absent; rachis usually ending in a branched tendril; stipules small. Flowers bisexual or polygamous,

in axillary spikes, solitary or in raceme like panicle, 5-merous. Calyx campanulate, shortly toothed. Petals free or slightly united at base. Stamens 10, shortly connate at base and adnate to petals, anthers with a deciduous apical gland. Pod oblong, curved to spirally twisted, compressed, woody; valves splitting transversely into 1 seeded segments.

*Entada rheedei* Spreng., Syst. Veg. 2: 325. 1825; *E.pursaetha* DC., Prodr. 2:425. 1825; Baker in Hook.f., Fl. Brit. Ind. 2: 287. 1878; Kanjilal *et al.*, Fl. As. 2: 149. 1938; Haridasan & Rao, For. Fl. Megh. 1: 338. 1985; Grierson & Long, Fl. Bhut. 1.3: 638. 1987; Singh in Singh *et al.*, Fl. Mizo. 1: 537. 2002.

Large woody climbers. Leaves bipinnate; rachis usually ending into deciduous tendrils; pinnae usually 2 pairs; leaflets 2-5 pairs, obovate-oblong or obovate-lanceolate, 2.5-8 x 1.5-3 cm, apex obtuse or shortly acuminate, base obliquely cuneate, glabrous; stipules small, bristle-like. Flowers pale greenish to pale yellowish, crowded on elongated peduncled axillary paniced spikes. Bracts minute, linear. Calyx campanulate, pubescent, obscurely 5-toothed. Petals 5, oblong-lanceolate, unequal, connate at base. Stamens 10, exserted. Style as long as the stamens. Pods oblong, straight to slightly curved, compressed, woody, 30-90 cm.

**Fl. & Fr.:** May - October

**Distribution:** India; Tropics

**Specimen examined:** Grows climbing on trees in primary and secondary forests. Chizami. NLNU 0542.

*Mimosa* L., Sp. Pl.: 516. 1753

Herbs or shrubs, climbers, usually armed. Leaves bipinnate or pinnae digitately arranged, often sensitive; stipules persistent. Flowers bisexual or polygamous, small, sessile in globose heads or spikes, solitary or fasciculate, axillary, pedunculate. Calyx campanulate,

minutely toothed. Petals 4, connate at base. Stamens 4 or 8, free, exserted; anthers without glands. Pod compressed, 1 seeded in each segment.

*Mimosa pudica* L., Sp. Pl.: 518. 1753; Baker in Hook.f., Fl. Brit. Ind. 2: 291. 1878; Kanjilal *et al.*, Fl. As. 2: 152. 1938; Haridasan & Rao, For. Fl. Megh. 1: 340. 1985; Grierson & Long, Fl. Bhut. 1.3: 639. 1987; Singh in Singh *et al.*, Fl. Mizo. 1: 539. 2002.

Straggling prickly shrubs. Branchlets bristly hairy. Leaves sensitive, petiole deflexed, bristly hairy; pinnae digiately 4; leaflets 10-20 pairs, oblong, 0.5-1 cm, obliquely rounded at base, apex acute, sparsely hairy beneath, margin ciliate with bristles; stipules lanceolate, bristly. Flowers small, purplish-pink, in axillary pedunculate heads; peduncle 2-4 cm; heads 1-4, usually in pairs in each axil; bracts linear. Stamens 4, exserted. Pods linear, oblong, 1.5-2.5 cm long, divided into 2-5 rounded segments, covered with soft bristled.

**Fl. & Fr.:** May - September

**Distribution:** India; Tropics

**Specimen examined:** Grows in open areas, wastelands, roadsides. Chizami. NLNU 0600.

*Parkia* R. Br., Narr. Travels Africa: 234. 1826

Trees. Leaves bipinnate with numerous leaflets. Flowers numerous in dense long peduncled heads, solitary and axillary, or several at branch tips. Calyx tubular, shortly 5-toothed. Petals 5, free or connate to middle. Stamens 10, free or connate at base and adnate to corolla, anthers usually with gland tip. Pod large, straight or curved, compressed, 2-valved.

*Parkia timoriana* (DC.) Merr., Philipp. J. Sci., C 5: 33. 1910; *P. roxburghii* G. Don, Gen. Syst. 2: 397. 1832; Baker in Hook.f., Fl. Brit. Ind. 2: 289. 1878; Kanjilal *et al.*, Fl. As. 2:

151. 1938; Haridasan & Rao, For. Fl. Megh. 1: 340. 1985; Singh in Singh *et al.*, Fl. Mizo. 1: 539. 2002.

Large unarmed trees. Branches spreading, pubescent, branchlets lenticellate. Leaves bipinnate; leaf rachis hairy, 30-60 cm long, with a solitary gland near base; pinnae 8-30 pairs; leaflets 40-80 pairs, linear-oblong, or oblique-oblong, 0.4-0.6 cm, apex acute, base unequally truncate, glabrous, margin ciliate. Flowers pale yellow or dull white, in dense turbinate or clavate long peduncled heads; peduncle 30-45 cm long. Bracts spatulate, silky pubescent. Calyx tube tubular, glabrous, teeth short, pilose. Corolla tubular, lobes spreading. Stamens 10, exserted, filaments fused at base and adnate to corolla tube; stigma capitate. Pod flattened, slightly twisted, 25-50 cm long.

**Fl. & Fr.:** October - May

**Distribution:** India, Bangladesh, China, Myanmar, Sumatra, Thailand

**Specimen examined:** Grows in secondary forests, usually widely cultivated. Losami. NLNU 0343.

*Senegalia* Raf., Sylva Tellur.: 119. 1838

Trees or shrubs, sometimes scandent climbers. Stems and branches spinose. Leaves bipinnate, leaflets minute, with large gland towards the base of primary rachis and often with several smaller glands between the pinnae, stipules often spiny. Flowers in globose heads or cylindrical spikes, bisexual or polygamous. Calyx campanulate, toothed. Petals united at base. Stamens numerous, much exserted, free or connate at base. Pods oblong, compressed or terete.

*Senegalia pennata* (L.) Maslin, Nuytsia 22: 466. 2012; *Acacia pennata* (L.) Willd., Sp. Pl., ed. 4. 4: 1090. 1806; Baker in Hook.f., Fl. Brit. Ind. 2: 297. 1878; Kanjilal *et al.*, Fl. As. 2:

156. 1938; Balakr., Fl. Jowai 1: 179. 1981; Haridasan & Rao, For. Fl. Megh. 1: 329. 1985; Singh in Singh *et al.*, Fl. Mizo. 1: 528. 2002.

Large scandent, prickly climbing shrubs, prickles recurved. Leaf rachis 18-25 cm, prickly at the lower side, pubescent, with large cup-like gland on petiole near base, and smaller glands at upper pairs of pinnae; pinnae 16-23 pairs; leaflets 40-55 pairs, linear-oblong, 0.2-0.4 cm, apex obtuse or sub-acute, base obliquely truncate or rounded, glabrous, pale beneath, sessile. Flowers pale white, in terminal leafy panicles of globose heads; head 1-4 together at each node. Stamens numerous. Pods oblong, apex beaked. 10-18 cm.

**Fl. & Fr.:** June - October

**Distribution:** India, Bangladesh, China, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam

**Specimen examined:** Grows in open secondary forest and on slopes along roadsides.

Chozuba. NLNU 0332. **(Pl. 18)**

## ROSACEAE

Juss., Gen. Pl. 334. 1789

Herbs, shrubs or trees, sometimes armed. Leaves alternate, rarely opposite, simple or compound, stipulate, stipules sometimes adnate to the petiole. Flowers regular, bisexual, rarely unisexual, solitary or in fascicles, racemes, cymes, corymbs or panicles. Calyx tube (hypanthium) free or adnate to the ovary, 4-6 lobed. Petals 4-6 or more, free. Stamens many, filaments free, partially united. Carpels free or connate; styles free or united; ovules 1 or more in each cell. Fruit various, an achene, follicle, drupe or pome.

1a. Epicalyx present

2a. Leaves interruptedly pinnate

*Argentina*

- 2b. Leaves digitately 3 or 3-5 foliolate *Potentilla*
- 1b. Epicalyx absent
  - 3a. Fruit dehiscent, follicular *Neillia*
  - 3b. Fruit indehiscent, consists of achenes, berries, drupes or pomes
    - 4a. Stamens less than 10 *Agrimonia*
    - 4b. Stamens 10 to many
      - 5a. Carpels not adnate with calyx tube
        - 6a. Trees or shrubs; carpel 1 *Prunus*
        - 6b. Straggling shrubs; carpels many *Rubus*
      - 5b. Carpels adnate with calyx tube
        - 7a. Flowers in terminal panicles *Eriobotrya*
        - 7b. Flowers in fascicles or corymbs
          - 8a. Inflorescence 1-3-flowered; styles united at base *Docynia*
          - 8b. Inflorescence more than 3-flowered; styles free *Pyrus*

***Agrimonia* L., Sp. Pl. 448. 1753**

Slender erect leafy herbs. Leaves interruptedly pinnate, leaflets serrate, stipules adnate to petioles. Flowers small, many in terminal spike-like racemes. Calyx persistent, tube turbinate, spinous, lobes 5, triangular. Petals 5. Stamens 5-10. Disk lining the calyx tube. Carpels 2, included in the calyx tube; style exserted. Fruit an achene, 1 or 2, enclosed in persistent spinous calyx.

***Agrimonia pilosa*** Ledeb., Index Seminum 1. 1823; Hook.f., Fl. Brit. Ind. 2:361, 1878; Grierson & Long, Fl. Bhut. 1.3: 582. 1987.



Erect herbs, about 100 cm tall. Stem sparsely hairy, densely hairy in lower part. Leaves 10-15 cm; leaflets 7-11, sessile, with smaller leaflets in between, elliptic-ovate, or obovate, base cuneate, apex rounded or acute, margin serrate, sparsely pilose on both surfaces; stipules leafy, obliquely ovate. Flowers yellow, in terminal spicate racemes, rachis pilose. Calyx lobes ovate. Petals oblong. Stamens 5. Stigma 2-lobed, capitate. Fruiting calyx tube 10-grooved, bearing hooked spines at apex.

**Fl. & Fr.:** May - September

**Distribution:** India (NE India), E Himalaya, Bhutan, China, Japan, Myanmar, Nepal, Russia, Thailand, Vietnam; Europe

**Specimen examined:** Grows in forest margins, roadsides, thickets, wastelands. Kapamodzu. NLNU 0257. **(Pl. 18)**

*Argentina* Hill, Brit. Herb. 6. 1756

Herbs or shrubs, annual or perennial. Stems erect or prostrate. Leaves pinnate or palmately compound, stipules adnate to petiole. Flowers bisexual, terminal, in cymes or corymbose panicles. Calyx lobes 5, epicalyx segments 5. Petals 5, yellow. Stamens many. Carpels many, free; style subterminal. Fruit an achene, many, borne on dry receptacle with persistent sepals.

*Argentina lineata* (Trevir.) Sojak, Thaiszia 20: 94. 2010; *Potentilla lineata* Trevir., Index Seminum 3. 1823; Singh in Singh *et al.*, Fl. Mizo. 1: 545. 2002; Hook.f., Fl. Brit. Ind. 2: 349, 1878; Grierson & Long, Fl. Bhut. 1.3: 571. 1987.

Herbs, erect or prostrate, upto 60 cm high, plant hairy. Leaves interruptedly pinnate, 5-15 cm long; larger lateral leaflets 4-8 pairs, elliptic or obovate, base rounded or cuneate, apex obtuse, margin serrate, silvery white hairy beneath; minor alternating leaflets similar;

stipules leafy, membranous. Flowers yellow, in terminal corymbose cymes. Calyx lobes ovate, hairy. Petals obovate, glabrous. Achenes ovoid, glabrous.

**Fl. & Fr.:** May - September

**Distribution:** India (NE India), E&W Himalaya, Bhutan, China, Myanmar, Nepal, Tibet, Vietnam

**Specimen examined:** Grows in grassy slopes, roadsides, thickets, wastelands. Kapamodzu. NLNU 0258. (**Pl. 18**)

*Docynia* Decne., Nouv. Arch. Mus. Hist. Nat. 10: 131. 1874

Trees, young parts usually wooly. Plant sometimes spiny when young. Leaves simple, sometimes lobed in young trees; stipules subulate, deciduous. Flowers solitary or fascicled at branch ends, appearing with young leaves. Calyx tube tubular, lobes 5, reflexed. Petals 5, clawed at base. Stamens numerous, inserted at throat of corolla tube. Ovary 5-celled; ovules 3 in each cell; style 5-6, connate at base. Fruit a pome, subglobose or ovoid, calyx lobes persistent.

*Docynia indica* (Wall.)Decne., Nouv. Arch. Mus. Hist. Nat. 10: 131. 1874; Hook.f., Fl. Brit. Ind. 2:369, 1878; Kanjilal *et al.*, Fl. As. 2: 210. 1938; Balakr., Fl. Jowai 1: 190. 1981; Grierson & Long, Fl. Bhut. 1.3: 603. 1987; Haridasan & Rao, Forest Fl. Megh. 1: 345. 1985.

Trees, upto 15 m high. Bark blackish brown, with thorns at base of the trunks. Leaves ovate-lanceolate, 3-8 x 2-5 cm, base rounded or cuneate, apex acute to acuminate, margin serrate, densely wooly beneath when young, glabrous when matured; petioles 1.5-2.5 cm long. Flowers white, solitary or 2-3 in fascicles. Calyx densely woolly outside, tube elongated, lobes lanceolate. Petals obovate-oblong, white with pink tinge. Filaments unequal. Pome subglobose, or ovoid, crowned with persistent calyx.

**Fl. & Fr.:** February - June

**Distribution:** India (NE India), E Himalaya, Bhutan, China, Myanmar, Nepal, Vietnam

**Specimen examined:** Grows in primary or secondary forest. Tsupfume. NLNU 0046. (**Pl. 18**)

*Eriobotrya* Lindl., Trans. Linn. Soc. London 13: 102. 1821

Trees or shrubs. Leaves simple, coriaceous, serrate or entire, stipules present. Flowers in dense terminal panicles, 5-merous. Calyx tube cup-shaped, adnate to ovary, lobes 5, small, erect or spreading, persistent. Petals 5, obovate or orbicular, margins sinuate. Stamens many. Ovary 2-5-celled, inferior; styles 2-5, connate at base. Fruit a pome, fleshy, 1-2 seeded, calyx lobes persistent.

*Eriobotrya bengalensis* (Roxb.) Kurz, Prelim. Rep. For. Pegu App. A. 57. 1875; Hook.f., Fl. Brit. Ind. 2:371, 1878; Kanjilal *et al.*, Fl. As. 2: 213.1938; Grierson & Long, Fl. Bhut. 1.3: 602. 1987; Haridasan & Rao, Forest Fl. Megh. 1: 347. 1985; Singh in Singh *et al.*, Fl. Mizo. 1: 541. 2002.

Trees upto 15 m tall. Leaves elliptic, elliptic-oblong or lanceolate 10-18 x 5-7 cm; apex acuminate or coarsely obtusely serrate or lobulate, entire near base, base cuneate, coriaceous, glabrous above, slightly puberulous along the nerves beneath, lateral nerves 8-12, petioles 3-5 cm. Inflorescence terminal, panicles 8-12 cm long, tomentose; flowers 1cm across, fragrant, white. Calyx obconic, apex acute or obtuse, pubescent. Petals obovate 0.4-0.5 cm long. Stamens 20. Styles 2-3, ovary hairy. Pomes ovoid, glabrous.

**Fl. & Fr.:** September - April

**Distribution:** India (NE India), E Himalaya, Bangladesh, Bhutan, China, Myanmar, Sumatera, Thailand, Vietnam

**Specimen examined:** Grows in primary and secondary forest. Thetsumi. NLNU 0766. **(Pl. 18)**

*Neillia* D. Don, Prodr. Fl. Nepal. 228. 1825

Shrubs or undershrubs. Leaves simple, usually 3-lobed, serrate; stipules large, deciduous. Flowers axillary and terminal, in racemes or panicles, 5-merous. Calyx tube campanulate. Stamens 10-30. Ovary of 5-carpel; ovules many in each carpel. Fruit a follicle.

*Neillia thyrsoflora* D. Don, Prodr. Fl. Nepal. 228. 1825; Kanjilal *et al.*, Fl. As. 2: 206. 1938; Balakr., Fl. Jowai 1: 181. 1981; Grierson & Long, Fl. Bhut. 1.3: 536. 1987; Haridasan & Rao, Forest Fl. Megh. 1: 349. 1985.

Bushy shrubs, 1-3 m, with drooping branches. Leaves ovate, 4-11 x 2-7 cm, base sub-cordate or rounded, apex long acuminate, margin biserrate, often lobed, finely pubescent along the nerves beneath; petioles 1.5-2 cm, stipules serrate. Flowers in branched terminal and axillary racemes. Calyx lobes lanceolate, longer than or equal to petals, persistent and glandular-bristly in fruit. Petals 5, white, obovate. Stamens 20-25. Fruit a follicle enclosed by the calyx.

**Fl. & Fr.:** May - October

**Distribution:** India (NE India), E Himalaya, Bhutan, China, Myanmar, Nepal, Vietnam

**Specimen examined:** Grows in open forest, forest edges. Pfutsero. NLNU 0131. **(Pl. 18)**

*Potentilla* L., Sp. Pl. 1: 495. 1753

Herbs or shrubs, annual or perennial. Stems erect or prostrate. Leaves pinnate or palmately compound, stipules adnate to petiole. Flowers bisexual, solitary or in corymbose cymes. Calyx lobes 5, epicalyx segments 5. Petals 5, usually yellow. Stamens many. Carpels

many, free; style subterminal. Fruit an achene, many, borne on dry receptacle with persistent sepals.

1a. Leaves 3-foliolate; flowers solitary on long peduncles *P. indica*

1b. Leaves 3-5-foliolate; flowers 2-5 in terminal cymes *P. sundaica*

***Potentilla indica*** (Andrews) Th. Wolf, Synop. Mitt. Fl. 6: 661. 1904; *Duchesnea indica* (Andrews) Focke in Engl. & Prantl., Nat. Pflanzenfam. III. 3: 33. 1888; Singh in Singh *et al.*, Fl. Mizo. 1: 541. 2002; Balakr., Fl. Jowai 1: 187. 1981; *Fragaria indica* Andrews, Bot. Rep. t. 479. 1807; Hook.f., Fl. Brit. India 2: 343. 1878; Kanjilal *et al.*, Fl. As. 2: 203. 1938.

Prostrate pubescent herbs with slender stolons. Leaves digitately 3-foliolate; leaflets obovate, base cuneate, apex obtuse, margin crenate, white pilose on both surfaces. Flowers solitary on long axillary peduncles. Sepals 5, epicalyx obovate, lobe at apex, longer than calyx. Petals 5, obovate, yellow. Achene on a fleshy red receptacle, conical or subglobose.

**Fl. & Fr.:** Almost throughout the year

**Distribution:** India (throughout), E&W Himalaya, Bhutan, China, Myanmar, Nepal, Pakistan, Philippines, Thailand, Tibet, Vietnam

**Specimen examined:** Common in moist and shady places. Pfutsero. NLNU 0132. **(Pl. 19)**

***Potentilla sundaica*** (Blume) W. Theob, Burmah 2: 490. 1883; Singh in Singh *et al.*, Fl. Mizo. 1: 545. 2002; Grierson & Long, Fl. Bhut. 1.3: 567. 1987; *Fragaria sundaica* Blume, Bijdr. Fl. Ned. Ind. 17: 1106. 1826; *Potentilla kleiniana* Wight & Arn., Prodr. Fl. Ind. Orient. 1: 300. 1834; Hook.f., Fl. Brit. Ind. 2: 359. 1878; Kanjilal *et al.*, Fl. As. 2: 204. 1938.

Herbs, rosette with spreading prostrate stems, pubescent. Leaves digitately 3-5-foliolate; leaflets obovate, base cuneate, apex rounded, margin serrate, pubescent beneath,

more or less glabrous above; petioles upto 8 cm long, stipules lanceolate. Flowers in terminal cymes. Petals yellow, obovate. Achenes small, ellipsoid, glabrous, wrinkled.

**Fl. & Fr.:** March - July

**Distribution:** India (throughout), E&W Himalaya, Bhutan, China, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam

**Specimen examined:** Grows in open places, along roadsides. Pfutsero. NLNU 0133. **(Pl. 19)**

*Prunus* L., Sp. Pl. 1: 473. 1753

Shrubs or trees. Leaves alternate, simple, entire or toothed; petiole often glandular near apex. Flowers in axillary racemes or fascicles, 5-merous. Calyx tube various, lobes free. Petals inserted at the mouth of calyx tube. Stamens 15-30. Carpel 1, 2-ovuled. Fruit a drupe, with a hard indehiscent, 1-seeded stone.

*Prunus cerasoides* Buch.-Ham.ex D.Don, Prodr. Fl. Nepal. 239. 1825; Kanjilal *et al.*, Fl. As. 2: 180. 1938; Singh in Singh *et al.*, Fl. Mizo. 1: 546. 2002; Balakr., Fl. Jowai 1: 182. 1981; *Prunus carmesina* H. Hara, J. Jap. Bot. 43: 46. 1968; Grierson & Long, Fl. Bhut. 1.3: 541. 1987.

Trees, upto 30 m tall. Bark brown or grayish brown, more or less smooth, peeling off in horizontal strips. Leaves ovate-lanceolate or elliptic-lanceolate, 5-11 x 3-5 cm, base rounded or broadly cuneate, apex acuminate, margin serrate, glabrous on both surfaces; petioles with 4-5 glands at apex, stipules linear lanceolate, glandular fimbriate. Flowers in corymbs or fascicles, 1-3-flowered, with leafy bracts. Calyx tube crimson, lobes ovate. Petals deep pink, obovate. Drupes ellipsoid, stone pitted.

**Fl. & Fr.:** March - July

**Distribution:** India (NE India), E&W Himalaya, Bhutan, China, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand, Vietnam

**Specimen examined:** Grows in primary and secondary forest. Chizami. NLNU 0543. (Pl. 19)

*Pyrus* L., Sp. Pl. 479. 1753

Shrubs or trees. Leaves simple or pinnate, stipules deciduous. Flowers in terminal cymes or corymbs, bracteate. Calyx tube urceolate, turbinate or obconic, lobes 5. Petals 5, imbricate in buds. Stamens 20-many. Carpels 2-5, connate and adnate to the calyx tube; styles 2-5, free or connate below. Fruit a pome, ellipsoid or obovoid, granular flesh.

*Pyrus pashia* Buch.-Ham. ex D. Don, Prodr. Fl. Nepal. 236. 1825; Hook.f., Fl. Brit. Ind. 2: 374. 1878; Kanjilal *et al.*, Fl. As. 2: 216. 1938; Balakr., Fl. Jowai 1: 190. 1981; Haridasan & Rao, Forest Fl. Megh. 1: 360. 1985; Singh in Singh *et al.*, Fl. Mizo. 1: 548. 2002.

Medium sized trees. Bark dark grey or blackish, scaly, rough in old trees; branchlets smooth, young parts woolly. Leaves ovate, ovate-lanceolate, 3.5-7 x 2.5-3.5 cm, base rounded or truncate, apex acute to acuminate, margin serrulate, glabrous when matured; stipules adnate to petioles in lower half. Flowers in axillary or terminal, umbels or corymbs or fascicles. Calyx ovate, tomentose within. Petals white, obovate. Fruit globose, depressed at apex, glabrous, with white specks, dark brown when ripened.

**Fl. & Fr.:** March - July

**Distribution:** India (throughout), E&W Himalaya, Bhutan, China, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand, Vietnam

**Specimen examined:** Grows in primary and secondary forest. Tsupfume. NLNU 0047. (Pl. 19)

***Rubus* L., Sp. Pl. 492. 1753**

Erect or scandent shrubs or sometimes creeping herbs, usually prickly. Leaves alternate, simple or compound, stipules free or adnate to petiole. Flowers in terminal and axillary panicles or corymbs, sometimes solitary. Calyx persistent, tube broad, lobes 5. Petals 5. Stamens many. Carpels many, on a convex receptacle, style subterminal; ovules 2. Fruit a cluster of fleshy drupes on a conical receptacle.

1a. Leaves simple

2a. Herb; stem creeping, rooting at nodes ; leaves unlobed

or shallowly lobed

*R. calycinus*

2b. Straggling shrub; leaves usually 3-7 lobed

*R. rugosus*

1b. Leaves imparipinnate

3a. Leaflets 5-11-foliolate

*R. niveus*

3b. Leaflets 3 or 3-5-foliolate

4a. Leaflets 3-5

*R. sumatranus*

4b. Leaflets 3

5a. Leaflets broadly obovate, apex rounded or obtuse

*R. ellipticus*

5b. Leaflets ovate, apex acute

*R. pedunculatus*

***Rubus calycinus*** Wall. ex D. Don, Prodr. Fl. Nepal. 235. 1825; Hook.f., Fl. Brit. Ind. 2: 327. 1878; Kanjilal *et al.*, Fl. As. 2: 189. 1938; Grierson & Long, Fl. Bhut. 1.3: 549. 1987.

Herb, with long creeping stem, often rooting at nodes. Stem hirsute and with recurved prickles. Leaves simple, orbicular-reniform, unlobed or shallowly lobed, apex rounded, base deeply cordate, margin toothed, hirsute on nerves with slender prickles



beneath; petioles 3-8 cm, hirsute and prickly. Flowers 1-2 in leaf axils; pedicles prickly. Calyx hairy and covered with prickles, lobes ovate. Petals white, obovate. Fruit globose, drupelets red.

**Fl. & Fr.:** March - July

**Distribution:** India (NE India), E&W Himalaya, Bhutan, China, Myanmar, Nepal, Tibet

**Specimen examined:** Grows in primary and secondary forest. Thevopisu. NLNU 0342. **(Pl. 19)**

*Rubus ellipticus* Sm., Rees, Cycl. 30: no. 16. 1819; Hook.f., Fl. Brit. Ind. 2: 336. 1878; Kanjilal *et al.*, Fl. As. 2: 196. 1938; Balakr., Fl. Jowai 1: 184. 1981; Haridasan & Rao, Forest Fl. Megh. 1: 365. 1985; Singh in Singh *et al.*, Fl. Mizo. 1: 555. 2002.

Suberect shrubs, 2-3 m tall. Stem pubescent, with scattered curved prickles. Leaves pinnately 3-foliolate; leaflets broadly obovate, elliptic to suborbicular, 3-8 x 2-6 cm, base rounded, apex obtuse, margin serrate, glabrous above, densely pubescent beneath; petioles 3-5 cm long. Flowers in axillary and terminal panicles. Calyx bristly, lobes ovate, pubescent. Petals obovate, white. Fruits globose, orange-yellow, drupelets crowded.

**Fl. & Fr.:** March - July

**Distribution:** India (throughout), E Himalaya, Bhutan, China, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Tibet, Vietnam

**Specimen examined:** Grows in forest edges, roadsides. Khezhakheno. NLNU 0217. **(Pl. 19)**

*Rubus niveus* Thunb., De Rubo 9. 1813; Balakr., Fl. Jowai 1: 184. 1981; Haridasan & Rao, Forest Fl. Megh. 1: 367. 1985; Singh in Singh *et al.*, Fl. Mizo. 1: 558. 2002; *R. lasiocarpus* Sm., Rees, Cycl. 30: no. 6. 1815; Hook.f., Fl. Brit. Ind. 2: 339. 1878; Kanjilal *et al.*, Fl. As. 2: 200. 1938.

Large spreading shrubs; branches reddish with white bloom, prickles recurved. Leaves pinnately 5-11-foliolate; leaflets ovate-lanceolate or elliptic, 3-5 x 1-2 cm, cuneate at base, apex acute, margin serrate, tomentose on veins beneath, stipules lanceolate. Flowers in terminal corymbose panicles. Calyx densely tomentose. Petals pink or purple-pink, obovate or suborbicular, often shorter than the calyx. Fruits red, globose.

**Fl. & Fr.:** March - July

**Distribution:** India (throughout), E&W Himalaya, Bhutan, China, Myanmar, Nepal, Pakistan, Sri Lanka, Taiwan, Thailand, Tibet, Vietnam

**Specimen examined:** Grows in forest edges, roadsides. Chepoketa. NLNU 0937. **(Pl. 20)**

*Rubus pedunculatus* D. Don, Prodr. Fl. Nepal. 234. 1825; Hook.f., Fl. Brit. Ind. 2: 335. 1878; *R. hypargyrus* Edgew. Trans. Linn. Soc. London 20: 45. 1846; Grierson & Long, Fl. Bhut. 1.3: 559. 1987; Hook.f., Fl. Brit. Ind. 2: 335. 1878; *R. niveus* var. *pedunculatus* (D. Don) Hook.f., Fl. Brit. Ind. 2: 335. 1878.

Scrambling shrubs, branches brownish to reddish brown, pubescent, with scattered prickles. Leaves 3-foliolate; leaflets ovate, 2.5-5 x 1.5-3 cm, base cuneate or rounded, apex acute, margin doubly serrate, thinly pubescent above, densely white tomentose beneath; stipules linear, woolly. Flowers in axillary corymbose, 1- several flowered, pedicels unarmed. Calyx tube short, lobes ovate- lanceolate, tomentose on both surfaces, more densely outside. Petals pink, obovate, much smaller than the calyx lobes. Stamens numerous. Fruit globose, yellow, black at maturity.

**Fl. & Fr.:** March - July

**Distribution:** India (NE India), E&W Himalaya, Bhutan, China, Nepal, Tibet

**Specimen examined:** Grows in forest slopes, thickets. Tsupfume. NLNU 0048. **(Pl. 20)**

*Rubus rugosus* Sm., Rees, Cycl. 30: no. 34. 1815; Balakr., Fl. Jowai 1: 186. 1981; Haridasan & Rao, Forest Fl. Megh. 1: 368. 1985; Singh in Singh *et al.*, Fl. Mizo. 1: 560. 2002; *R. moluccanus* (non L. 1753) Hook.f., Fl. Brit. Ind. 2: 330. 1878; Kanjilal *et al.*, Fl. As. 2: 194. 1938.

Straggling, scandent shrubs. Branchlets tomentose, stems eglandular with recurved prickles. Leaves broadly ovate or suborbicular, 5-9 x 4-7 cm, 3-7 shallow lobes, lobes rounded or subacute, base cordate, margin crenate-serrate, rugose above, densely grey tomentose beneath, 5-basal nerves. Flowers in terminal and axillary panicles. Calyx densely hairy, toothed at apex. Petals white, obovate, smaller than sepals. Fruit globose, red, about 1 cm across.

**Fl. & Fr.:** April - July

**Distribution:** India (throughout), E Himalaya, Bhutan, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in forest slopes, thickets. Khezhakheno. NLNU 0221. **(Pl. 20)**

*Rubus sumatranus* Miq., Fl. Ned. Ind., Eerste Bijv. 307. 1861; Grierson & Long, Fl. Bhut. 1.3: 562. 1987; *R. rosaefolius* Smith, Pl. Ic. Ined. 3: t. 60. 1791; Hook.f., Fl. Brit. Ind. 2: 341. 1878; Kanjilal *et al.*, Fl. As. 2: 200. 1938; '*rosifolius*' Balakr., Fl. Jowai 1: 185. 1981; Haridasan & Rao, Forest Fl. Megh. 1: 368. 1985; Singh in Singh *et al.*, Fl. Mizo. 1: 558. 2002.

Scrambling shrubs, with slender branches and with scattered curved prickles, purple gland-tipped hairs in younger parts. Leaves pinnately 3-5-foliolate; leaflets ovate-lanceolate, 2-5 x 1-1.5 cm, base rounded or cuneate, apex acuminate, margin doubly serrate, terminal leaflets larger than lateral ones; stipules linear-lanceolate. Flowers in axillary panicles, 1-few

flowered. Calyx deeply lobed, glandular, lanceolate. Petals white, obovate, 1-1.5 cm long. Fruit oblong to subglobose, orange yellow or scarlet when ripened.

**Fl. & Fr.:** April - July

**Distribution:** India (NE India), E Himalaya, Bhutan, China, Japan, Korea, Myanmar, Nepal, Sri Lanka, Thailand, Tibet, Vietnam

**Specimen examined:** Grows in forest slopes, forest margins, thickets. Pflutsero. NLNU 0134. (Pl. 20)

## SAXIFRAGACEAE

Juss., Gen. Pl. 308. 1789

Herbs. Leaves simple or compound, basal leaves sometimes rosette, stem leaves alternate. Flowers regular, bisexual or sometimes unisexual, cymes, racemes or panicles, or solitary. Sepals 4-5, often united at base. Petals alternate with the sepals, 4-5 or 0, free. Stamens 5-10, free. Ovary 1-5 celled; styles 2. Fruit a capsule, seeds numerous.

1a. Leaves compound ; inflorescence paniculate

*Astilbe*

1b. Leaves simple; inflorescence cymose

2a. Plants with thick rhizome; petals present

*Bergenia*

2b. Plants succulent, weak; petals absent

*Chrysosplenium*

*Astilbe* Buch.-Ham. ex D. Don, Prodr. Fl. Nepal. 210. 1825

Erect perennial herbs, rhizomatous. Stems hairy or pilose. Leaves alternate, bi or ternate, long petiolate, stipules membranous, large, adnate to the petiole. Flowers small in terminal elongated panicles, bracteate. Sepals 4-5. Petals 1-5, sometimes absent. Stamens

usually 8-10. Carpels 2 or 3, connate at base, ovules numerous. Fruit a capsule, dehiscing ventrally.

*Astilbe rivularis* Buch.-Ham. ex D. Don, Prodr. Fl. Nepal. 211. 1825; C.B. Clarke in Hook.f, Fl. Brit. Ind. 2: 389. 1878; Kanjilal *et al.*, Fl. As. 2: 233. 1938; Grierson & Long, Fl. Bhut. 1.3: 488. 1987; Dash & Singh, Fl. Kurung Kumey Dist. Aruna. P. 541. 2017.

Herbs upto 2 m tall. Stems with brown villous hairs. Leaves 2 or 3 pinnately compound; leaflets lanceolate, narrowly to broadly ovate or elliptic, 4-12 x 2-8 cm, apex acuminate, base rounded or cordate, margin doubly serrate, hairy on both surfaces; petioles pilose. Flowers many in panicked racemes, panicle upto 45 cm, rachis brown pubescent. Calyx lobes 4 or 5, green, ovate or elliptic. Petals absent. Stamens 5-10. Carpels 2, united at base. Capsule ovoid.

**Fl. & Fr.:** June - October

**Distribution:** India (NE India), E & W Himalaya, Bhutan, China, Jawa, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in open forest margins, riversides and moist areas. Pfitsero. NLNU 0140. (Pl. 20)

***Bergenia*** Moench, Methodus: 664. 1794

Perennial herbs with thick rhizomes, forming large clumps. Leaves all basal, simple, margin entire or dentate, gland dotted beneath. Inflorescence paniculate, cymose, bracteate. Sepals 5. Petals 5. Stamens 10. Carpels 2, connate at base, ovules many; styles 2. Fruit a capsule, seeds numerous.

***Bergenia ciliata*** (Haw.) Sternb., Revis. Saxifrag. Suppl. 2: 2. 1831; *Megasea ciliata* Haw., Saxifrag. Enum. 1:7. 1821; *Saxifraga ciliata* Royle, Ill. Bot. Himal. Mts: 226, t. 49, f. 2.

1835; *Saxifraga ligulata* (Wall.) C.B. Clarke in Hook.f , Fl. Brit. Ind. 2: 398. 1878; Grierson & Long, Fl. Bhut. 1.3: 492. 1987; Singh in Singh *et al.*, Fl. Mizo. 1: 562. 2002.

Perennial herbs with thick rhizomes. Leaves suborbicular or broadly obovate, 5-16 x 5-15 cm, apex and base rounded, margins finely ciliate and denticulate, glabrous on both surfaces. Flowers pinkish white, 1-20. Calyx 5, cupular, green. Petals 5, obovate. Stamens 10. Fruit a capsule, ellipsoid, base with persistent calyx.

**Fl. & Fr.:** February - April

**Distribution:** India (NE India), W Himalaya, Bhutan, Nepal

**Specimen examined:** Grows in rocky slopes, cliffs. Kapamodzu. NLNU 0259. **(Pl. 20)**

*Chrysosplenium* L., Sp. Pl. 398. 1753

Succulent, weak herbs, usually growing in damp places. Leaves opposite or alternate, simple, petiolate, stipules absent. Flowers axillary and terminal, solitary or several in bracteate cymes. Calyx tube adnate to ovary, lobes 4. Petals absent. Stamens 8. Ovary 1-celled, ovules numerous. Fruit a capsule, valves spreading at maturity.

*Chrysosplenium nepalense* D.Don, Prodr. Fl. Nepal. 210. 1825; C.B. Clarke in Hook.f , Fl. Brit. Ind. 2: 400. 1878; Grierson & Long, Fl. Bhut. 1.3: 489. 1987.

Erect, glabrous herb, rhizomatous. Leaves opposite, ovate or suborbicular, 0.3-1.2 x 0.4-1.8 cm, apex obtuse, base broadly cuneate to subtruncate, margin crenate. Flowers yellowish green, in leafy cymes. Sepals broadly ovate. Stamens 8, shorter than sepals. Capsule lobes divergent. Seeds ellipsoid, smooth.

**Fl. & Fr.:** April - June

**Distribution:** India (NE India), E Himalaya, Bhutan, China, Myanmar, Nepal

**Specimen examined:** Grows in damp areas and streamsides. Pfutsero. NLNU 0142. **(Pl. 21)**

## HYDRANGEACEAE

Dumort, Anal. Fam. Pl. 36, 38. 1829

Shrubs or trees, or climbers. Leaves simple, opposite, stipules absent. Inflorescence terminal, in cymosely branched corymbs or panicles, bisexual or outer flowers sterile with 4-5 large petaloid sepals. Bracts and bracteoles present. Calyx tube adnate to ovary, 4-5 lobed. Petals 4-5, free, rarely connate. Stamens 8-12, filaments linear. Ovary inferior or semi-inferior, 2-5-loculed, ovules numerous; styles 2-6, free or basally connate. Fruit a capsule or berry; seeds many.

*Hydrangea* Gronov. ex L., Sp. Pl.: 397. 1753

Shrubs or subshrubs. Leaves opposite, petiolate, stipules absent. Flowers in terminal panicle, sometimes axillary, corymbose cyme; bracts deciduous. Flowers fertile or sterile. Calyx tube adnate to ovary, 4-5-toothed. Petals 4 or 5, free, rarely connate. Stamens 10-14, inserted on disc, filaments filiform. Ovary inferior to semi-superior; ovules numerous; styles 2-4, free or connate at base; stigma terminal or decurrent. Fruit a capsule; seeds numerous.

*Hydrangea febrifuga* (Lour.) Y.De Smet & Granados, Taxon 64: 750. 2015; *Dichroa febrifuga* Lour., Fl. Cochinch. 301. 1790; C.B. Clarke in Hook.f., Fl. Brit. Ind. 2: 406. 1878; Kanjilal *et al.*, Fl. As. 2: 228. 1938; Balakr., Fl. Jowai 1: 193. 1983; Singh in Singh *et al.*, Fl. Mizo. 1: 563. 2002.

Shrubs, 1-3 m tall. Leaves simple, opposite, elliptic-oblongate, 9-17 x 3.5-7 cm, base cuneate or attenuate, apex acuminate, margin serrate, sparsely pubescent on both sides; petioles 1-3 cm long. Flowers in terminal paniculate cymes, 5-15 cm long, blue. Calyx tube adnate to ovary, lobes acute. Petals elliptic, becoming reflexed. Stamens 10 or 12. Ovary

inferior, 1-celled; styles 3-5; ovules numerous. Fruit a berry, subglobose, blue, crowned by persistent calyx lobes. Seeds numerous.

**Fl. & Fr.:** July-December

**Distibution:** India (NE India), East Himalaya, Bhutan, Myanmar, Nepal, Philippines, Taiwan, Thailand, Vietnam

**Specimen examined:** Grows in forest edges, roadsides. Pfutsero. NLNU 0145. (Pl. 21)

### CRASSULACEAE J.St.-Hil.

Succulent herbs. Leaves alternate, opposite, or verticillate, sometimes forming a basal rosette, simple, entire or rarely lobed or imparipinnate; exstipulate. Inflorescence terminal or axillary, cymes, corymbs or panicles, regular, bisexual or unisexual. Flowers 3-6 merous. Sepals shortly united at base. Petals free or connate. Stamens as many as petals, free or united with them. Ovary superior or semi-inferior. Nectar glands scale like at base of carpels. Fruit a cluster of follicles, free or basally connate. Seeds few or numerous.

#### **Sedum L.**

Annual or perennial herbs, usually glabrous. Roots fibrous, rootstock usually thin sometimes tuberous. Stems erect or decumbent. Leaves alternate, opposite, or whorled, simple, usually sessile. Inflorescence terminal or axillary cymose. Flowers bisexual. Calyx 4-6. Petals 4-6, free or connate at base. Stamens 8-12. Carpels 4-6, free or basally connate. Follicles many or few seeded.

***Sedum multicaule*** Wall.ex Lindl., Bot. Reg. 26: 58. 1840; Grierson & Long, Fl. Bhut. 1.3: 484. 1987; C.B. Clarke in Hook.f., Fl. Brit. Ind. 2: 422. 1878.

Perennial herbs. Stems branched below, sprawling. Leaves alternate, linear-lanceolate, 1-2 x 0.1-0.2 cm, acuminate, margin entire. Flowers yellow, cymes with



spreading spike-like branches, 5-merous. Sepals oblong-lanceolate, 0.5-0.6×0.2-0.3 cm. Petals free, elliptic-lanceolate, as long as sepals. Stamens 10. Carpels connate at base, erect at first, spreading in fruit. Follicles 5. Seeds ovoid.

**Fl. & Fr.:** August-November

**Distribution:** India (Himalaya, NE India), Bhutan, China, Myanmar, Nepal

**Specimen examined:** Grows on moist forested slopes, rock surfaces. Tsupfume. NLNU 0060. (Pl. 21)

## DROSERACEAE

Salisb., Parad. Lond. 2: ad t. 95. 1808

Perennial or annual insectivorous herbs. Leaves alternate, or basal rosettes, stipulate or exstipulate, densely covered with stalked insect-trapping glands. Flowers in subterminal or terminal racemes, bisexual, regular, 4-5 merous. Sepals connate at base, persistent. Petals free, persistent. Stamens 4 or 5, free, alternate with petals. Ovary superior, 1-3 locular, styles 3-5. Fruit a capsule, 3-5 valves.

*Drosera* L., Sp. Pl. 1: 281. 1753

Description same as family.

*Drosera peltata* Thunb., Drosera: 7. 1797; C.B. Clarke in Hook.f., Fl. Brit. Ind. 2: 424. 1878; Kanjilal *et al.*, Fl. As. 2: 235. 1938; Balakr., Fl. Jowai 1: 194. 1981.

Erect insectivorous perennial herbs. Tuber globose. Basal leaves whorled or absent; stem leaves alternate, peltate, suborbicular, margins with spreading gland tipped cilia, upper surface with short-stalked glands; petioles slender, 0.5-1.3 cm. Flowers white in subterminal racemes, 4-10 flowered, bracteate. Sepals 5, ovate, margins fimbriate. Petals 5, obovate,

apex truncate. Stamens 5. Ovary ellipsoid; styles 3, deeply divided, stigma simple. Capsule 3-5 valved, subglobose, enclosed by persistent sepals and petals.

**Fl. & Fr.:** May-October

**Distibution:** Asia, C and N Europe, North America

**Specimen examined:** Grows on wet places on rocky cliffs, grasslands and marshes.

Kapamodzu. NLNU 0253. **(Pl. 21)**

## **RHIZOPHORACEAE**

Pers., Syn. Pl. 2: 2. 1806

Trees or shrubs. Leaves simple, opposite, entire or serrulate near apex, coriaceous; stipules interpetiolar, deciduous. Flowers regular, bisexual, in dense axillary cymes. Calyx 5-8-lobed, tube adnate to ovary, persistent. Petals as many as sepals, usually 2-fid or laciniate. Stamens twice the number of petals. Ovary inferior; styles connate. Fruit subglobose, coriaceous; 1-seeded.

*Carallia* Roxb., M.Flinders, Voy. Terra Austral. 2: 549. 1814

Description as of Rhizophoraceae.

*Carallia brachiata* (Lour.) Merr., Philipp. J. Sci. 15: 249. 1919; Singh in Singh *et al.*, Fl. Mizo. 1: 571. 2002; Balakr., Fl. Jowai 1: 196. 1981; *Diatoma brachiata* Lour. Fl. Cochinch. 296. 1790; *C. lucida* Roxb., Pl. Corom. 3: 8. 1811; Kanjilal *et al.*, Fl. As. 2: 241. 1938; *C. integerrima* DC., Prodr. 3: 33. 1828; Henslow in Hook.f., Fl. Brit. Ind. 2: 439. 1878.

Small to medium sized trees. Branches often with adventitious roots. Leaves oblong-obovate or broadly elliptic, 6-15 x 3-8 cm, base cuneate, apex acuminate or obtuse, margin entire or rarely serrate, coriaceous, glossy; petioles 0.5-1 cm; stipules lanceolate, deciduous.

Flowers white-greenish, in axillary cymes, sessile. Calyx lobes triangular, thick, green.

Petals 5-8, white, orbicular. Berries globose; 1-seeded.

**Fl. & Fr.:** March - May

**Distribution:** India (throughout), E Himalaya, Bangladesh, Bhutan, China, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam; Madagascar, W Australia

**Specimen examined:** Grows in primary forest, foothills. Khuza. NLNU 0807. **(Pl. 21)**

## HERNANDIACEAE

Blume, Bijdr. Fl. Ned. Ind. 11: 550. 1826

Shrubs or trees, or climbers. Leaves simple or compound, alternate, petiolate, stipules absent. Flowers bisexual, unisexual or polygamous, regular, in axillary or terminal cymes or panicles. Perianth 3-5, in two whorls. Stamens 3-5. Ovary inferior; 1-celled. Fruit a drupe, dry, indehiscent, sometimes winged.

*Illigera* Blume, Bijdr. Fl. Ned. Ind. 1153. 1827

Scandent shrubs, climbing by leaf petioles. Leaves alternate, 3(or 5) foliolate, petiolate; leaflets petiolulate. Flowers bisexual, in paniculate cymes, axillary rarely terminal, segments 5. Perianth segments in 2 rows, valvate in bud. Outer segments oblong or elliptic; inner segments similar to outer ones. Stamens 5, with 2 hooded scales at the base of filaments. Ovary 1-celled; style filiform; stigma peltate, undulate. Fruit 2-4 winged. Seeds oblong.

*Illigera grandiflora* W. W. Sm. & Jeffrey, Notes Roy. Bot. Gard. Edinburgh 8: 189. 1914.

Climbers, upto 6 tall. Stem dark red, angulate, hairy, sometimes glabrous. Leaves 3-foliate, petiole 3-11 cm; leaflets ovate, lanceolate-elliptic, 4-13 x 3-8 cm, sub-coriaceous,

glabrous beneath and villous on midvein, upper surface sparsely hispid on midvein otherwise glabrous, base cordate, apex shortly acuminate, margin entire, hispid; petiolules 0.5-2 cm. Flowers pinkish red with speckled red or purple-red spots, in axillary compact cymes; cymes shorter than leaves, rachis and peduncle pubescent. Perianth in 2 rows; outer 5 segments oblong-lanceolate, 1-1.3 cm, acuminate apex, pubescent outside, inner 5 segments smaller. Stamens 5, glandular pubescent with 2 white staminodes on each side near the base of filament, ovate-lanceolate, membranous. Ovary tomentose; style villous, stigma dilated undulate. Fruit winged.

**Fl. & Fr.:** June - October

**Distibution:** Northeast India, China, Myanmar

**Specimen examined:** Grows climbing on trees and shrubs in shady places in forests.

Wazeho. NLNU 0601. (**Pl. 21**)

## MELASTOMATACEAE

Juss., Gen. Pl. 328. 1789

Shrubs or herbs, pubescent. Leaves opposite, decussate, rarely alternate, sessile or petiolate, entire or finely denticulate, 3-7 nerved, palmate and parallel; stipules absent. Flowers bisexual, regular, in cymes, panicles or clustered, rarely solitary. Calyx 3-5-lobed. Petals 3-5, free or connate at base. Stamens as many as or more than petals. Ovary inferior, 3-5-celled; ovules numerous. Fruit a berry or capsule.

1a. Stamens equal

2a. Inflorescence cymes or panicles; petals 4 or 5

*Osbeckia*

2b. Inflorescence scorpioid; petals 3

*Sonerila*

1b. Stamens unequal

3a. Stamens 8; ovary 4-celled

*Oxyspora*

3b. Stamens 10-12; ovary 5-6-celled

*Melastoma*

***Melastoma* L., Sp. Pl. 389. 1753**

Shrubs. Leaves opposite, petiolate, margin entire. Flowers in terminal cluster or panicles. Calyx campanulate, covered with scale like hairs, lobes 5. Petals 5. Stamens 10, unequal in length, 5 long with elongated connective and 5 short. Ovary 5-celled. Fruit a capsule or berry like, enclosed in the persistent calyx tube.

***Melastoma malabathricum*** subsp. ***normale*** (D.Don) Karst. Mey., Blumea 46: 368. 2001; *M. napalensis* Lodd. Bot. Cab. 8: t. 707. 1823; Balakr., Fl. Jowai 1: 202. 1981; Singh in Singh *et al.*, Fl. Mizo. 1: 597. 2002; *M. normale* D.Don, Prodr. Fl. Nepal, 220. 1825; C.B. Clarke in Hook.f., Fl. Brit. Ind. 2: 524. 1879; Kanjilal *et al.*, Fl. As. 2: 298. 1938.

Large shrubs, stems reddish, densely bristly haired. Leaves ovate-lanceolate, 5-10 x 2-4 cm, base rounded to acute, apex acute or acuminate, appressed hairy above, densely pubescent beneath, basal nerve 3-5; petiole 0.5-1 cm long. Flowers purplish-pink, in terminal clusters of 5-10; bracts ovate, hairy. Calyx cup shaped, densely silky, lobes lanceolate. Corolla obovate. Fruit ovoid, pulpy.

**Fl. & Fr.:** April - November

**Distribution:** India (NE India), E Himalaya, Bhutan, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in open places in forests, along roadsides. Sakraba. NLNU 0685. (Pl. 22)

***Osbeckia* L., Sp. Pl. 345. 1753**

Herbs or shrubs, branches often 4-angled, pubescent. Leaves opposite, entire, 3-7 basal nerves. Flowers in terminal, capitate cymes or in panicles, sometimes solitary, 4 or 5-merous. Calyx tube ovoid with stellate hairs. Stamens 8 or 10, anthers beaked. Ovary 4 or 5-celled. Capsule enclosed by persistent calyx tube, opening by 4 or 5 pores at apex.

***Osbeckia stellata*** Buch.-Ham. ex D.Don, Bot. Reg. 8: t. 674. 1822; Balakr., Fl. Jowai 1: 206. 1981; *O. crinita* Naud., Ann. Sci. Nat. Bot. ser. 3. 14: 72. 1850; C.B. Clarke in Hook.f., Fl. Brit. Ind. 2: 517. 1879; Kanjilal *et al.*, Fl. As. 2: 293. 1938.

Shrubs, branches covered with spreading hairs. Leaves ovate-oblong or elliptic, 5-12 x 2-4.5 cm, base rounded to cuneate, apex acute to acuminate, sparsely or densely appressed hairy on both surfaces, basal nerves 5-7; petioles 0.5-2 cm. Flowers in terminal and upper axillary corymbose cymes. Calyx tube with stellate hairs, lobes 4. Petals 4, purplish pink, obovate. Stamens 8. Capsule ovoid, narrowed into a neck, about 2 cm long.

**Fl. & Fr.:** June - September

**Distribution:** India (NE India), E & W Himalaya, Bhutan, China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in open places in forests, along roadsides. Tsupfume. NLNU 0070. (Pl. 22)

***Oxyspora* DC., Prodr. 3: 123. 1828**

Shrubs. Leaves opposite, petiolate. Flowers in terminal lax cymose panicles. Calyx turbinate, 4-toothed. Petals 4. Stamens 8, unequal, longer stamens anthers purple, connective not spurred at base, shorter stamens anthers yellow, connective shortly spurred at base. Ovary inferior, 4-celled. Fruit a capsule with 8 ribs.

***Oxyspora paniculata*** (D. Don) DC., Prodr. 3: 123. 1828; C.B. Clarke in Hook.f., Fl. Brit. Ind. 2: 525. 1879; Kanjilal *et al.*, Fl. As. 2: 300. 1938; Balakr., Fl. Jowai 1: 203. 1981; Singh in Singh *et al.*, Fl. Mizo. 1: 602. 2002.

Shrubs, upto 1.5 m tall. Leaves broadly lanceolate to elliptic-lanceolate, 10-20 x 5-9 cm, base rounded or subcordate, apex acute or acuminate, glabrescent above, bristly and scurfy along nerves beneath, obscurely serrate, basal nerves 5-7; petioles 2.5-6 cm. Flowers in terminal lax drooping panicles, about 25 cm long. Calyx tubular, campanulate, teeth triangular. Petals pink, ovate-oblong. Stamens 8, 4 longer with purple anthers, shorter 4 with yellow anthers. Style slender, curved at apex. Capsule ellipsoid, 8-ribbed.

**Fl. & Fr.:** July – November

**Distribution:** India (NE India), E Himalaya, Bhutan, China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in open places in forests, along roadsides. Pfutsero. NLNU 0147. (Pl. 22)

***Sonerila*** Roxb., Fl. Ind. 1: 180. 1820

Small herbs, with or without distinct stems, stem with simple or glandular hairs. Leaves opposite, petiolate. Flowers terminal or sometimes axillary, in scorpioid cymes, pedunculate. Calyx tube fused to ovary, lobes 3, short, triangular. Petals 3. Stamens 3, equal, connective without appendage. Ovary 3-celled; style filiform. Fruit a capsule, dehiscing at apex.

***Sonerila tenera*** Royle, Ill. Bot. Himal. Mts. 215. 1835; C.B. Clarke in Hook.f., Fl. Brit. Ind. 2: 530. 1879; Grierson & Long, Fl. Bhut. 2.1: 298. 1991; Singh in Singh *et al.*, Fl. Mizo. 1: 609. 2002.

Erect herbs, upto 15 cm tall. Stems and leaves glandular hairy. Leaves ovate-elliptic, 1.5-3 x 1-1.3 cm, base cuneate to often attenuate, apex acute, margins subentire to serrulate with scattered pilose hairs mainly on upper surface; petioles upto 0.5 cm. Flowers 3-merous, peduncles 3-5 cm long, in axillary and terminal scorpioid spikes. Calyx tube funnel-shaped, with few spreading glandular hairs, lobes small. Petals purplish-pink, ovate. Anthers oblong elliptic, 0.7 cm. Capsule tubular-obconical, narrowed towards base.

**Fl. & Fr.:** September – December

**Distribution:** India (NE India), E & W Himalaya, Bhutan, China, Myanmar, Nepal, Philippines, Vietnam

**Specimen examined:** Grows in moist shady places, along roadsides. Thetsumi. NLNU 0772. (Pl. 22)

## LYTHRACEAE

J.St.-Hil., Expos. Fam. Nat. 2: 175. 1805

Herbs, shrubs or trees. Leaves simple, opposite, sometimes whorled, entire, pinnately nerved, stipules present or absent. Flowers solitary or clustered in axils or terminal racemes, spikes or panicles, bisexual, regular or irregular. Calyx tubular at base, 4-6-lobed, often persistent. Petals 4-6, inserted on upper parts of calyx tube. Stamens many or definite, inserted on the calyx tube. Ovary superior, or inferior, stigma capitate, rarely 2-lobed. Fruit a capsule, dehiscing by valve, enclosed by persistent calyx.

1a. Stem pubescent; flowers solitary, interpetiolar, irregular *Cuphea*

1b. Stem glabrous; flowers in axillary racemes or in spikes; regular *Rotala*



**Cuphea** P. Browne, Civ. Nat. Hist. Jamaica: 216. 1756

Herbs, annual or biennial. Leaves opposite, decussate. Flowers solitary, interpetiolar, irregular. Calyx tubular, base expanded into short spur, lobes 6, unequal. Petals 6, inserted on calyx tube, upper two larger. Stamens 12, borne within calyx tube in two rows, unequal, included. Capsule ellipsoid, membranous, enclosed in persistent calyx tube.

***Cuphea carthagenensis*** (Jacq.) J.F. Macbr., Publ. Field Columb. Mus., Bot. Ser. 8: 124. 1930; *Cuphea balsamona* Cham. & Schltdl., Linnaea 2: 363. 1827; Singh in Singh *et al.*, Fl. Mizo. 1: 611. 2002.

Erect, annual herbs up to 60cm high, branching from the base, young stem bristly pubescent. Leaves opposite, subsessile or shortly petioled, elliptic to obovate-lanceolate, 2-3 x 1-1.5cm, apex acute, entire, puberulous on both sides. Flower axillary, solitary or in small leafy racemes in between the leaves, purplish pink. Calyx tubular upto 0.5 cm long longitudinally ribbed with a short spur at base of posterior side; petals 6, unequal. Stamens 11; style enclosed within calyx. Seed round, flat.

**Fl. & Fr.:** April - October

**Distribution:** Introduced in NE India, native of Mexico to Tropical America

**Specimen examined:** Grows in open spaces along roadsides. Chozuba. NLNU 0335. (Pl. 22)

**Rotala** L., Mant. Pl. 2: 143. 1771

Herbs, annual or perennial, aquatic, amphibious or terrestrial, glabrous. Leaves opposite or whorled, sessile or subsessile. Flowers regular, solitary, axillary or terminal racemes or spikes, each subtended by a bract and 2 bracteoles. Calyx 4-5-lobed,

campanulate. Petals 4-5-lobed or absent. Stamens 1-6, opposite the sepals. Ovary 2-4-loculed. Fruit a capsule, 2-4-valved, surrounded by persistent calyx. Seeds numerous.

***Rotala rotundifolia*** (Buch.-Ham. ex Roxb.) Koehne.; Bot. Jahrb. Syst. 1: 175. 1880; *Ammannia rotundifolia* Buch.-Ham. ex Roxb., Fl. Ind. 1: 446. 1820; Kanjilal *et al.*, Fl. As. 2: 316. 1938; Balakr., Fl. Jowai 1: 207. 1981.

Perennial herbs, glabrous, 10-25cm, rhizomes creeping. Leaves opposite, sessile, suborbicular, base cordate or rounded, entire, submerged leaves oblong-obovate. Flowers purplish pink in terminal simple or branched raceme. Bracts ovate; sepals 4, 0.1cm long; petals 4, 0.2 – 0.3 cm. Capsule ellipsoid-oblong. Seeds minute, ellipsoid.

**Fl. & Fr.:** May - September

**Distribution:** India (throughout), Bangladesh, China, Myanmar, Nepal, Taiwan, Thailand, Vietnam

**Specimen examined:** Grows in open marshy places. Tsupfume. NLNU 0072. **(Pl. 22)**

## ONAGRACEAE

Juss., Gen. Pl. 317. 1789

Herbs or shrubs, annual or perennial, sometimes aquatic. Leaves simple, opposite or spirally arranged, entire or toothed, stipules present or absent. Flowers bisexual, regular or irregular, axillary, solitary or in racemes. Calyx tube adnate to ovary, lobes 2-5(-7). Petals as many as sepals, rarely absent. Stamens as many or twice as many as petals. Ovary inferior, style simple, stigma lobed or globose. Fruit a capsule, berry, or nut; many seeded.

1a. Sepals 2; fruit with hooked hairs

*Circaea*

1b. Sepals 2-4; fruit without hooked hairs

2a. Seeds with apical tuft of hairs

*Epilobium*

2b. Seeds without apical tuft of hairs

*Oenothera*

***Circaea* L., Sp. Pl. 9: 1753**

Herbs, perennial. Leaves opposite, subentire to distantly serrate, glabrous, petiolate, sparsely pubescent. Flowers terminal or lateral, peduncled racemes, lax. Sepals 2. Petals 2, notched at apex, subentire to emarginated. Stamens 2, opposite sepals. Ovary 1 or 2 celled; ovules 1 per cell; stigma 2-lobed. Fruit a capsule, indehiscent, covered with hooked hairs.

***Circaea repens*** Wall.ex Asch. & Magnus, Bot. Zeitung 28. 761. 1870; Grierson & Long, Fl. Bhut. 2. 1: 313. 1991; *C. lutetiana* L., Sp. Pl. 9: 1753; C. B. Clarke in Hook. f., Fl. Brit. 2: 589. 1879.

Herbs. Stem pubescent. Leaves opposite, ovate-lanceolate, 2-7 x 1.5-4 cm, base cuneate or rounded, apex acute to acuminate, margin distantly toothed, finely pubescent on both surfaces. Flowers small, white, in terminal and lateral pedunculate lax racemes; pedicels pubescent. Sepals 2, ovate. Petals 2, apex emarginated. Fruit clavate, covered with white spreading hooked hairs.

**Fl. & Fr.:** September - October

**Distribution:** India (NE India), E&W Himalaya, Bhutan, China, Myanmar, Nepal, Pakistan

**Specimen examined:** Grows in shady moist places. Tsupfume. NLNU 0073. **(Pl. 23)**

***Epilobium* L., Sp. Pl. 1: 347. 1753**

Erect or decumbent herbs, stem pubescent to glabrous, often with lines of hairs from margins to petioles. Leaves opposite, or becoming alternate and bractlike in inflorescence; margin entire or serrulate; petiolate or sessile; stipules absent; bracteoles absent. Flowers in axillary racemes. Sepals 4, free or connate at base. Petals 4, entire or notched at apex, free or

connate at base. Stamens 8, usually in 2 whorls. Style erect, stigma 4-lobed, entire or lobed. Fruit an elongated capsule, 4-celled, loculicidal. Seeds many with apical tuft of hairs.

***Epilobium brevifolium*** D. Don subsp. ***trichoneurum*** (Hausskn.) Raven, Bull. Brit. Mus. Bot. 2: 362. 1962; Grierson & Long, Fl. Bhut. 2.1:318. 1991; Singh in Singh *et al.*, Fl. Mizo. 1: 618. 2002; *E. hookeri* C.B. Clarke in Hook. f., Fl. Brit. Ind. 2: 585. 1879; Kanjilal *et al.*, Fl. As. 2: 371. 1938.

Erect herbs. Stems covered with appressed hairs. Leaves alternate at upper part, opposite at lower nodes, elliptic to oblong, lanceolate, 1-4 x 0.7-2 cm, base cuneate to rounded, apex acute, margin serrulate-dentate, pubescent on both surfaces; petioles 0.2 cm long. Flowers pink to purple, solitary or in paniced terminal racemes. Sepals hairy, 4-lobed, oblong-lanceolate. Petals obovate. Capsule linear, 4-7 cm long; seeds numerous.

**Fl. & Fr.:** August - October

**Distribution:** India (NE India), E Himalaya, Bhutan, China, Myanmar, Philippines, Taiwan, Thailand, Vietnam

**Specimen examined:** Grows in shaded places, forest edges. Tsupfume. NLNU 0075. (**Pl. 23**)

***Oenothera*** L., Sp. Pl. 346. 1753

Herbs, caulescent or acaulescent. Leaves alternate, stipules absent. Flowers regular, in axils of upper leaves, opening near sunrise or near sunset. Floral tube well developed, deciduous soon after anthesis. Sepals 4. Petals 4. Stamens 8. Ovary 4-celled; stigma deeply 4-lobed. Fruit a loculicidal capsule, terete or 4-angled or winged.

***Oenothera rosea*** Aiton, Hort. Kew. 2: 3. 1789; Grierson & Long, Fl. Bhut. 2.1:323. 1991

Erect herbs. Stem with appressed stiff hairs. Leaves alternate, elliptic to ovate-lanceolate, 2-5 x 0.8-1.8 cm, base attenuate, apex acute, appressed hairy, margin subentire to sinuate –dentate; petioles 0.3-2.5 cm long; uppermost reduced to linear-lanceolate bracts. Flowers pink to purple, solitary, in the axils of leaves; opening near sunrise. Sepals subulate. Petals obovate or suborbicular. Stamens 8. Stigma 4-lobed. Capsule clavate or obovoid, valves angled or winged.

**Fl. & Fr.:** April - July

**Distribution:** Cosmopolitan

**Specimen examined:** Grows in shaded places, forest edges. Tsupfume. NLNU 0080. (Pl. 23)

## PASSIFLORACEAE

Juss. ex Roussel, Fl. Calvados 2: 334. 1806

Herbaceous or woody climbers with axillary tendrils. Leaves alternate, entire or palmately lobed, often with a glandular petiole; stipules small, caducous. Flowers bisexual or unisexual, regular, in axillary cymes. Bracteoles 3, forming an epicalyx, rarely absent. Sepals 5, connate into tube at base. Petals as many as sepals, imbricate. Extra staminal corona, consisting of sterile filaments, sometimes present. Stamens 5; filaments united below and raised from an androgynophore. Ovary 1-celled; ovules numerous; styles 3, connate at base; stigma capitate. Fruit a capsule or berry.

1a. Flowers unisexual; corona absent

*Adenia*

1b. Flowers bisexual; corona present

*Passiflora*

*Adenia* Forssk., Fl. Aegypt.-Arab. 77. 1775

Herbaceous or woody climbers; tendrils axillary. Leaves alternate, entire or palmately lobed, petiole with 2 glands at apex. Plant monoecious or dioecious. Flowers in axillary cymose, central flower replaced by a tendril. Sepals connate into a tube. Petals 5, free, included. Corona absent. Disk glands 5, linear, inserted near base. Male flowers, stamens 5; pistillode minute. Female flowers with staminodes; ovary superior on gynophore; ovules numerous. Fruit a 3-valved capsule; bright red when ripe.

*Adenia trilobata* (Roxb.) Engl., Bot. Jahrb. Syst. 14: 375. 1891; Balakr., Fl. Jowai 1: 209. 1981; Singh in Singh *et al.*, Fl. Mizo. 1: 623. 2002; Haridasan & Rao, Forest Fl. Megh. 1: 418. 1985; *Modecca trilobata* Roxb., Fl. Ind. 3: 133. 1832; Masters in Hook. f., Fl. Brit. Ind. 2: 602. 1879; Kanjilal *et al.*, Fl. As. 2: 323. 1938.

Large climbers, glabrous, base woody. Leaves palmately 3 or 5 lobed, lobes elliptic-lanceolate, 11-16 x 10-16 cm, base cordate or subtruncate, glabrous on both surfaces, margin distantly sinuate; petioles 5-8 cm long. Flowers in axillary cymes; peduncles terminating in a tendril. Male flowers: calyx campanulate, 5-lobed; petals 5, obovate oblong; stamens 5. Female flowers: sepals and petals as in male. Capsule oblong; seeds many, covered with slimy aril.

**Fl. & Fr.:** May - September

**Distribution:** India (NE India), E&W Himalaya, Bangladesh, Bhutan, China, Myanmar, Pakistan

**Specimen examined:** Grows in forest edges and scrubs. Lozaphuhu. NLNU 0505. (Pl. 23)

***Passiflora* L., Sp. Pl. 955. 1753**

Climbers. Leaves simple, alternate, entire or palmately lobed, petiole often glandular. Flowers bisexual in axillary cymes or solitary. Calyx tube campanulate, 5-lobed. Petals 5, free, inserted on the throat of the calyx. Corona of 1 or more whorls, filamentous. Stamens 5, anthers dorsifixed. Ovary on androgynophore, sessile or stipitate. Fruit a berry, indehiscent, pulp mucilaginous.

- 1a. Leaves simple, ovate-lanceolate *P. napalensis*
- 1b. Leaves 3-lobed
  - 2a. Leaves sub-orbicular, apex truncate and 3 cuspidate *P. leschenaultii*
  - 2b. Leaves broadly ovate, lobed to middle, apex acute
    - 3a. Calyx with subapical projection; corona white *P. subpeltata*
    - 3b. Calyx without subapical projection; corona greenish purple *P. edulis*

***Passiflora edulis*** Sims, Bot. Mag. 45: t. 1989. 1818; Kanjilal *et al.*, Fl. As. 2: 323. 1938; Grierson & Long, Fl. Bhut. 2. 1: 230 .1991; Singh in Singh *et al.*, Fl. Mizo. 1: 623. 2002.

Woody climbers, glabrous. Leaves alternate, 3-lobed, broadly ovate, 6-13 x 8-13, lobe wider than the lateral lobes, obovate or elliptic, base cordate or cuneate, middle, apex acute to acuminate, margins serrate, glabrous on both surfaces; petioles 2-3 cm. Flowers solitary in axillary or in terminal peduncles. Calyx lobes oblong, serrate. Petals oblong, white or purplish. Corona in 4-5 whorls. Stamens 5. Fruit ovoid or globose, 4-6 cm across, purplish or yellow, pulpy.

**Fl. & Fr.:** April - July

**Distribution:** Native of Brazil to NE Argentina, naturalized in NE India

**Specimen examined:** Cultivated, also escaped in forest edges. Tsupfume. NLNU 0082.

*Passiflora leschenaultii* DC., Prodr.. 3: 326. 1828; Masters in Hook. f., Fl. Brit. Ind. 2: 599. 1879; Kanjilal *et al.*, Fl. As. 2: 321. 1938.

Climbing shrub, branches angular. Leaves suborbicular, broader than long, base cordate or rounded, apex truncate and 3 cuspidate at the apex, 3-nerved, glabrous or pubescent on the nerves beneath; petiole 2-5 cm long, with 2 glands below the middle. Flowers white, solitary on slender peduncles. Calyx tube short, lobes oblong. Petals as long as the sepals. Outer corona of two rows linear; inner corona short, tubular, plicatebasilar corona small, cup-shaped, surrounding the base of gynophore. Fruit ovoid, glabrous, rind, leathery.

**Fl. & Fr.:** March - May

**Distribution:** India (NE India), Bangladesh, Myanmar

**Specimen examined:** Grows in primary or secondary forest. Lozaphuhu. NLNU 0510. (Pl. 23)

*Passiflora napalensis* Wall., Tent. Fl. Napal. 20. 1826; Masters in Hook. f., Fl. Brit. Ind. 2: 600. 1879; Kanjilal *et al.*, Fl. As. 2: 322. 1938; Balakr., Fl. Jowai 1: 209. 1981; Singh in Singh *et al.*, Fl. Mizo. 1: 625. 2002.

Slender climbers, stems angular. Leaves alternate, simple, entire, ovate-lanceolate, 4.5-9 x 3-5 cm, base rounded or subcordate, apex acute, apiculate, glabrous on both surfaces; petioles 2-5 cm, with two raised glands below middle. Flowers in axillary cymes, creamy white, peduncles 4-5, from each axil. Calyx tube cylindric, lobes equaling petals. Corona filiform of several rows. Stamens 5. Fruit globose, glabrous, purplish.

**Fl. & Fr.:** June - September

**Distribution:** India (NE India), E Himalaya, Nepal



**Specimen examined:** Grows in forest edges. Wazeho. NLNU 0610. **(Pl. 23)**

*Passiflora subpeltata* Ortega, Nov. Rar. Pl. Descr. Dec. 78. 1798; *P. adenophylla* Mast., C. F. P. von Martius & auct. Suc. (eds.), Fl. Bras.13.1: 568. 1872; Kanjilal *et al.*, Fl. As. 2: 323. 1938.

Slender climber. Leaves alternate, 3-lobed, pale green, base rounded or sub-truncate, apex acute, lobes oblong, glabrous, entire except for few serratures near the sinuses; petioles 2.5-5 cm long, with raised glands. Flowers white, solitary, peduncles with 3 leafy bracteoles near the calyx. Calyx with sub-apical projection. Corona filiform, long. Stamens 5.

**Fl. & Fr.:** May - September

**Distribution:** Native of Mexico to Venezuela, naturalized in NE India

**Specimen examined:** Grows in open forest slopes. Zuketsa. NLNU 0252. **(Pl. 24)**

## CUCURBITACEAE

Juss., Gen. Pl. 393. 1789

Herbs or shrubs, climbing or prostrate. Leaves alternate, simple, palmately or pedately lobed, stipules absent; tendrils axillary, simple or branched, spirally twisted. Flowers unisexual, monoecious or dioecious, solitary, axillary in racemes, corymbs, or panicles, regular, yellow or white. Calyx tubular or campanulate, 5-lobed, imbricate. Petals 5, inserted on margin of calyx tube, free or united, sometimes with fimbriated margins, imbricate or valvate in bud. Male flowers: stamens inserted on calyx tube, free or variously united, mostly 3, rarely 1-5, anthers straight or conduplicate. Female flowers: ovary inferior, carpels 3, free or connate, stigma bifid, staminodes present or absent. Fruit a dehiscent or indehiscent berry or capsule. Seeds usually many, often compressed.

- 1a. Stamens 5
  - 2a. Leaves pedately 5-7 lobed; tendrils bifid; fruit dehiscent *Hemsleya*
  - 2b. Leaves ovate; tendrils simple; fruit indehiscent *Thladiantha*
- 1b. Stamens 3
  - 3a. Tendrils simple
    - 4a. Leaves angular or deeply lobed; flowers in axillary clusters
      - 5a. Plant subglabrous; flowers subumbellate *Solena*
      - 5b. Plant bristly; flowers in sessile fascicles *Cucumis*
    - 4b. Leaves unlobed or shallowly lobed; flowers in long axillary peduncle *Momordica*
  - 3b. Tendrils 2-3 or 2-5 fid
    - 6a. Petals fimbriate at margin
      - 7a. Leaves coriaceous; ovules 12, seeds 6 *Hodgsonia*
      - 7b. Leaves membranous; ovules and seeds numerous *Trichosanthes*
    - 6b. Petals segments entire *Herpetospermum*

***Cucumis* L., Sp. Pl. 2: 1011. 1753**

Annual bristly climbing herbs; tendrils simple. Leaves simple, 3-7 lobed. Monoecious, flowers in axillary clusters. Male flowers: calyx campanulate, segments 5; corolla 5-lobed; stamens 3, free. Female flowers: ovary ovoid, hispid. Fruit a berry, globose or elongate, smooth or tubercled, indehiscent. Seeds ovoid, compressed.

- 1a. Fruit globose, smooth *C. maderaspatana*
- 1b. Fruit oblong, echinate or muricate *C. hystrix*

*Cucumis hystrix* Chakravarty, J. Bombay Nat. Hist. Soc. 50: 896. 1952; Singh in Singh *et al.*, Fl. Mizo. 1: 627. 2002.

Climbing herbs, stem angular-sulcate, hirsute; tendrils simple. Leaves ovate, shallowly 3-5 lobed, 5-10 x 5-8 cm, base cordate, lobes triangular, apex acute, margin denticulate; petiole 5-8 cm long. Flowers monoecious. Male flowers solitary or fasciculate; calyx tubular, segments ovate-acute, densely hairy; corolla yellow, segments ovate-oblong. Female flowers solitary, ovary ovoid-oblong, hispid, stigmas 3-lobed. Fruit oblong, echinate.

**Fl. & Fr.:** June-September

**Distribution:** India, Myanmar, China, Thailand

**Specimen examined:** Grows climbing on shrubs and bushes in shady places. Lozaphuhu. NLNU 0509. (Pl. 24)

*Cucumis maderaspatana* L., Sp. Pl. 1012. 1753; *Mukia scabrella* (L.f.) Arn. in Hook. J. Bot. 3: 276. 1841; *Mukia maderaspatana* (L.) M. Roem., Fam. Nat. Syn. Monogr. 2: 47. 1846; C. B. Clarke in Hook.f., Fl. Brit. Ind. 2: 623. 1879; Balakr., Fl. Jowai 1: 211. 1981; Grierson & Long, Fl. Bhut. 2.1: 258. 1991.

Scabrid scandent herbs. Leaves simple, broadly ovate to subdeltoid, 4-9 x 3-8 cm, apex acute to short acuminate, base cordate, margin irregularly denticulate, hispid on both surface; petioles 1-4 cm. Male flowers fascicled; pedicels short; calyx campanulate, corolla yellow, lobes ovate, oblong, filaments short. Female flowers solitary or fascicled, subsessile. Berry globose, 1 cm across, smooth, turning dark red when ripened.

**Fl. & Fr.:** May-November

**Distribution:** India, Bhutan, China

**Specimen examined:** Grows climbing on shrubs and bushes, on slopes. Thestumi. NLNU 0770. (Pl. 24)

*Hemsleya* Cogn. ex F.B.Forbes & Hemsl. J. Linn. Soc., Bot. 23: 490. 1888

Scandent herbs. Leaves pedately 5-7 foliolate, tendrils bifid. Dioecious. Male flowers in racemes or panicles. Calyx tube short, lobes ovate to lanceolate. Corolla rotate, lobed divided almost to base. Stamens 5, filaments exserted. Female flowers in lax racemes; ovary cylindrical, style short, 3-lobed, bifid. Fruit cylindric, globose, 3 valved, seeds numerous, ellipsoid, compressed.

*Hemsleya macrocarpa* (Cogn.) C.Y.Wu ex C. Jeffrey, Kew Bull. 36: 739. 1982; Grierson & Long, Fl. Bhut. 2.1: 269. 1991.

Leaflets lanceolate or oblanceolate, 3.5-16 x 1.5-5 cm, apex acuminate, base cuneate, margin crenate serrate, sparsely pubescent; petioles 3.5-7.5 cm. Male flowers: calyx segments spreading, ovate-lanceolate, 0.3-0.4 x 0.2-0.3 cm, corolla pale yellow, lobes strap-shaped, 0.6-0.7 x 0.2-0.3 cm, fleshy. Female flowers: ovary conical. Fruit conical, seeds dark brown surrounded by wing.

**Fl. & Fr.:** July-November

**Distribution:** India (E Himalya, NE India), Bhutan, China

**Specimen examined:** Grows in primary forest, thickets, mountain slopes. Lozaphuhu. NLNU 0511. (Pl. 24)

*Herpetospermum* Wall. ex Benth. & Hook.f., Gen. Pl. 1: 834. 1867.

An annual climbing herbs. Leaves simple, lobed, tendrils bifid. Flowers dioecious. Male flowers in raceme or seldom solitary, calyx tube cylindric, corolla yellow, tubular at

base, broadly campanulate above, stamens 3, filaments free, anthers connate; ovary rudimentary. Female flowers: solitary, calyx and corolla as male, staminodes 3 or absent, ovary oblong, 3-locular, stigmas 3, bifid. Fruit a berry, trigonous, 3-valved to middle; seeds oblong, compressed.

***Herpetospermum pedunculatum*** (Ser.) C.B. Clarke, J. Linn. Soc., Bot. 15: 115. 1876;  
*Herpetospermum caudigerum* Wall. ex C.B. Clarke in Hook.f., Fl. Brit. Ind. 2: 613. 1879;  
Grierson & Long, Fl. Bhut. 2.1: 267. 1991.

Leaves ovate, 6-15 x 4-11 cm, apex acuminate, base cordate, margin serrate, pubescent on both surface, shallowly 3-lobed; petiole 4-9 cm. Male flowers solitary or in raceme; calyx tubular with linear segments; corolla yellow, funnel-form, lobes elliptic; ovary rudimentary. Female peduncle 1.5-3.5 cm. Berry ellipsoid, fibrous, 6-7 cm long. Seeds oblong, compressed.

**Fl. & Fr.:** June-October

**Distribution:** India, Bhutan, China

**Specimen examined:** Grows in secondary forest, on slopes, trailing on bushes. Tsupfume. NLNU 0083.

***Hodgsonia*** Hook.f. & Thomson, Proc. Linn. Soc. London 2: 257. 1854

A large extensive woody climber. Leaves simple, palmately 3-5 lobed, tendrils 2-3 fid. Dioecious. Male flowers in racemes; calyx tube elongate, campanulate, 5-lobed, segments fimbriate; corolla rotate; stamens 3, anthers exserted. Female flowers solitary; calyx and corolla as in male; ovary globose, 1-celled; stigma bifid. Fruit large, subglobose. Perfect seeds usually 6, with a barren seed attached to its side.

*Hodgsonia macrocarpa* Cogn., DC. Monogr. Phan. 3: 349. 1881; *Trichosanthes macrocarpa* Bl., Bijdr. 935. 1826; *H. heteroclite* (Roxb.) Hook.f. & Th. in Prodr. Linn. Soc.2: 257. 1853; C.B. Clarke in Hook.f. Fl. Brit. Ind. 2: 606. 1879; Kanjilal *et al.*, Fl. As. 2: 326. 1938; Singh in Singh *et al.*, Fl. Mizo. 1: 629. 2002.

Large climbing shrubs, stem angular, glabrous. Leaves suborbicular, 15-20 cm across, coriaceous, lobes oblong, entire, apex apiculate, base cordate, glabrous, lobed to middle; petioles 4-7 cm. Flowers large, tomentose. Male flowers in long pedunculate racemes, peduncles 10-25 cm long, bracteate; calyx tube 6-9 cm long, lobes 5; corolla lobes 5, white outside, yellow inside, fimbriate. Female flowers on short peduncle, 3-5 cm. Fruit depressed-globose, reddish brown, 12 grooved, 7-13 x 9-15 cm. Seeds in 3-6 pairs, flat, ellipsoid.

**Fl. & Fr.:** March-September

**Distribution:** India, Bhutan, China

**Specimen examined:** Grows in secondary forest climbing on big trees. Lozaphuhu. NLNU 0513. (Pl. 24)

*Momordica* L., Sp. Pl. 2: 1009. 1753

Scandent or creeping, perennial herbs. Leaves simple, unlobed or pedately lobed, tendrils simple. Monoecious or dioecious. Male flowers: calyx tube short, campanulate, lobes 5; corolla campanulate, lobes deeply 5-lobed; stamens 3, anthers free. Female flowers: calyx and corolla same as male; ovary oblong or ellipsoid, styles slender, stigmas 3, bifid. Fruit oblong, ovoid or elliptic, verrucose or spinescent. Seeds oblong, compressed.

***Momordica dioica*** Willd., Sp. Pl. 4: 605. 1805; C.B. Clarke in Hook.f. Fl. Brit. Ind. 2: 617. 1879; Kanjilal *et al.*, Fl. As. 2: 330. 1938; Balakr., Fl. Jowai 1: 214. 1981; Grierson & Long, Fl. Bhut. 2.1: 254. 1991; Singh in Singh *et al.*, Fl. Mizo. 1: 635. 2002.

Leaves ovate-orbicular, 4-10×3-8 cm, base cordate, apex mucronate, margin entire or variously lobed with denticulate or undulate margin, glabrous; petioles 4-8 cm. Flowers yellow. Male flowers solitary on peduncles of 4-12 cm, bracts cuculate. Female flowers on peduncles of 5-12 cm with a small bract below the middle. Fruit ovoid or ellipsoid, 5-8 cm long, densely echinate with soft spines. Seeds ovoid, compressed.

**Fl. & Fr.:** May-October

**Distribution:** India, Bangladesh, Bhutan, China, Nepal, Pakistan, Sri Lanka

**Specimen examined:** Grows in forest edges, climbing on trees and bushes, near villages. Wazeho. NLNU 0612. **(Pl. 24)**

***Solena*** Lour., Fl. Cochinch. 2: 477, 514. 1790

Climbing herbs, stem and branches subglabrous, tendrils simple. Leaves simple, unlobed, triangular or 3-5 lobed, often with glands at base. Plant dioecious. Male flowers sessile or in stalked clusters; calyx campanulate, segments 5; corolla short, stamens 3. Female flowers solitary; staminodes 3, ovary oblong. Fruit a berry, oblong or ovoid, bearing numerous elliptical glands.

***Solena heterophylla*** Lour., Pl. Cochinch. 514. 1790; *Melothria heterophylla* (Lour.) Cogn., DC. Monogr. Phan. 3: 618. 1881; *Zehneria umbellata* Thw., Enum. Pl. Zeyl. 125. 1853; C. B. Clarke in Hook.f., Fl. Brit. Ind. 2: 625. 1879; Balakr., Fl. Jowai 1: 211. 1981.

Stems and branches slender and glabrous. Leaves entire to 3-5 lobed, ovate, oblong-lanceolate, 6-15 x 4-8 cm, base cordate to hastate, apex acute or obtuse, margin remotely

dentate, glabrous; petioles 1-2 cm. Flowers dull white. Male flowers in corymbs, pedicels 0.2-0.7cm. Female flowers solitary, pedicels 0.4-1 cm, ovary ovoid, stigmas 3. Berry oblong, or subglobose, 4-5 cm long, reddish when ripened.

**Fl. & Fr.:** May-November

**Distribution:** India, Bhutan, China, Indonesia, Malaysia, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows climbing on shrubs and bushes, on slopes, along roadsides. Razeba. NLNU 0150.

*Thladiantha* Bunge, Enum. Pl. Chin. Bor. 29. 1833

Climbing herbs with tuberous roots, tendrils simple or rarely 2-fid. Leaves simple, polymorphic, divided. Plant dioecious. Male flowers in crowded racemes, rarely solitary; calyx tube campanulate, lobes 5, spreading; corolla yellow, campanulate, 5-lobed; stamens 5. Female flowers solitary, calyx and corolla as in male; staminodes 5; ovary oblong ; style 3-fid. Fruit berry-like, smooth or verrucose.

*Thladiantha cordifolia* (Blume) Cogn., DC. Monogr. Phan. 3: 424. 1881; *Thladiantha dubia* Hk.f., Bot. Mag. t. 5469. 1864; C. B. Clarke in Hook.f., Fl. Brit. Ind. 2: 631. 1879; Kanjilal *et al.*, Fl. As. 2: 329. 1938; Balakr., Fl. Jowai 1: 211. 1981; Haridasan & Rao, For. Fl. Megh. 1: 422. 1985; Grierson & Long, Fl. Bhut. 2.1: 251. 1991; Singh in Singh *et al.*, Fl. Mizo. 1: 635. 2002.

Large climbers, stems villous; tendrils simple. Leaves ovate, 7-13 x 5-8 cm, base deeply cordate, apex acuminate, appressed scabrid on upper surface, softly pubescent beneath, margins denticulate, base 5-nerved; petioles 4-5 cm long. Flowers yellow. Male



flowers in racemes, bracts ovate; calyx tube villous campanulate; corolla lobes ovate or elliptic. Female flowers solitary; ovary oblong, pubescent. Fruit oblong, 3-4 cm long.

**Fl. & Fr.:** May-November

**Distribution:** India, Bhutan, China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows climbing on shrubs and bushes, on slopes. Pfutsero. NLNU 0149. (Pl. 25)

*Trichosanthes* L., Sp. Pl. 2: 1008. 1753

Annual or perennial climbing herbs; tendrils 2-5 fid. Leaves simple, entire or 3-9 lobed. Dioecious or monoecious. Male flowers white, usually in axillary racemes together with a basal solitary flowers, often bracteate; calyx tube long, 5-lobed; corolla 5-lobed, oblong, fimbriate; stamens 3. Female flowers solitary; calyx and corolla as in male; staminodes absent; ovary ellipsoid or ovoid. Fruit globose, or elongated.

1a. Leaves leathery; bract margin lacerate *T. lepiniana*

1b. Leaves membranous; bract margin dentate *T. wallichiana*

*Trichosanthes lepiniana* (Naudin) Cogniaux, DC. Monogr. Phan. 3: 377. 1881; Grierson & Long, Fl. Bhut. 2.1: 251. 1991

Robust climbers, glabrous; tendrils 2-3 fid. Leaves suborbicular, 8-14 x 7.5-13.5 cm, shallowly 3-5 lobed, apex acute, base cordate, margin denticulate; petiole 3-8 cm long. Male flowers on long peduncles of 12-17 cm; bracts obovate, fimbriate; calyx tube attenuate from apex toward base, pubescent; corolla obovate, lacinate. Female flowers solitary, pedicel 2-3 cm. Fruit ovoid, smooth, red.

**Fl. & Fr.:** May-November

**Distribution:** India, Bhutan, China, Myanmar, Nepal

**Specimen examined:** Grows climbing on shrubs and bushes, on slopes. Pfitsero. NLNU 0148.

*Trichosanthes wallichiana* (Ser.) Wight, Ann. Mag. Nat. Hist. 8: 270. 1842; *Involucraria wallichiana* Ser., Mem. Soc. Phys. Geneve 3.1: 25. 1825; *T. multiloba* Clarke, Hook.f., Fl. Brit. Ind. 2: 607. 1879; Kanjilal *et al.*, Fl. As. 2: 328. 1938; Balakr. Fl. Jowai 1: 213. 1981; Haridasan & Rao, For. Fl. Megh. 1: 423. 1985.

Extensive climbing herbs; tendrils 2-3 fid. Leaves suborbicular, 10-20 x 10-20 cm, palmately 3-9 lobed, lobes oblong or lanceolate, base widely cordate, apex acute or obtuse, margin denticulate, petioles 3-9 cm. Flowers purple white. Male flowers in axillary racemes on long peduncles, 14-30 cm long, 6-12 flowered; bracts broadly ovate, 2-3 cm long; calyx tubular, segments lanceolate; petals obovate, fimbriate. Female flowers solitary, on short peduncles, 2-4 cm long; ovary oblong. Fruit ovoid, 5-8 cm long, bright red with orange stripes.

**Fl. & Fr.:** May-November

**Distribution:** India (Himalaya, NE India), Bhutan, China, Myanmar, Nepal

**Specimen examined:** Grows climbing on shrubs and bushes, on slopes, along roadsides. Wazeho. NLNU 0613. **(Pl. 25)**

## BEGONIACEAE

C. Agardh, Aphor. Bot. 200. 1824

Succulent herbs, with rhizomes or tubers, stemless or with stem. Leaves simple, radical or alternate, entire or lobed, more or less unequal sided, palmately or pinnately veined, stipules 2, large often deciduous. Flowers monoecious, in terminal or axillary cymes,

bracteate at base. Male flowers: perianth petaloid, outer 2 larger and inner 2 smaller; stamens numerous, filaments free or connate at base. Female flowers: perianth segments 2-5, outer ones larger than inner; ovary inferior, ovules numerous; styles 2-4, free or connate at base, stigma branched or tortuose. Fruit a capsule, often winged, variously dehiscent or breaking up irregularly. Seeds numerous, minute.

***Begonia* L. Sp. Pl. 2: 1056. 1753**

Description as of the family.

1a. Leaf margin unlobed

*B. roxburghii*

1b. Leaf margin shallowly or deeply lobed

2a. Flowers pinkish white

*B. palmata*

2b. Flowers yellow

*B. flaviflora*

***Begonia flaviflora*** Hara, J. Jap. Bot. 45: 91. 1970; Grierson & Long, Fl. Bhut. 2.1: 245. 1991.

Rootstock rhizomatous. Rhizomes creeping, brown tomentose. Stems erect, appressed brown tomentose when young. Leaves broadly ovate, asymmetric, 10-23 x 7-19 cm, base obliquely cordate, shallowly lobed, lobes sinuate, triangular, apex acuminate, venation palmate, brown tomentose on veins beneath; petioles upto 20 cm long, stipules lanceolate. Flowers yellow, axillary on peduncled cymes, 3-6 flowered. Bracts oblong, caducous. Male flowers: perianth 2+2, outer segments ovate; inner ones elliptic; stamens numerous. Capsule 3 winged, pilose, becoming inverted.

**Fl. & Fr.:** August-October

**Distribution:** India (NE India), E Himalaya, Bhutan, Myanmar, Nepal

**Specimen examined:** Grows in shaded moist places in forest edges. Wazeho. NLNU 0615.

(Pl. 25)

*Begonia palmata* D. Don, Prodr. Fl. Nepal. 223. 1825; Balakr., Fl. Jowai 1: 215. 1981; *B. laciniata* Roxb. Fl. Ind. 3: 649. 1832; C.B. Clarke in Hook.f., Fl. Brit. Ind. 2: 645. 1879; Kanjilal *et al.*, Fl. As. 2: 334. 1938; Kumar in Singh *et al.*, Fl. Mizo. 1: 648. 2002; Grierson & Long, Fl. Bhut. 2.1: 245. 1991.

Rhizomatous rootstock. Stem first erect then procumbent, jointed, brown villous or tomentose. Leaves asymmetric, broadly ovate or suborbicular, 8-18 x 5-12 cm, base shallowly cordate to obliquely cordate, acute to acuminate at apices of lobes, tomentose on nerves beneath, margin serrate and ciliated; petioles 5-12 cm long, appressed villous, stipules oblong lanceolate, persistent. Flowers pinkish white, in axillary long peduncled tomentose few flowered cymes. Male flowers: perianth segments 2+2, outer long, elliptic; inner smaller, obovate; stamens numerous, in a globose mass. Female flowers: perianth segments 4-5, inner smaller elliptic; style 2, divided from base into 2 branches; ovary pubescent. Capsules 3 winged, one larger wing and two narrow wings, becoming inverted, pinkish.

**Fl. & Fr.:** May-September

**Distribution:** India (E Himalaya, NE India), Bangladesh, Bhutan, China, Laos, Myanmar, Nepal, Taiwan, Thailand, Vietnam

**Specimen examined:** Grows in shaded moist places in forest edges. Lozaphuhu. NLNU 0515. (Pl. 25)

*Begonia roxburghii* (Miq.) A.DC., Prodr. 15. 1: 398. 1864; C.B. Clarke in Hook.f., Fl. Brit. Ind. 2: 635. 1879; Kanjilal *et al.*, Fl. As. 2: 333. 1938; *B. malabarica* Roxb., Fl. Ind. 3: 648.

1832; *Diploclinium roxburghii* Miq., Fl. Ind. Bot. 1.1: 692. 1856; Balakr., Fl. Jowai 1: 217. 1981; Kumar in Singh *et al.*, Fl. Mizo. 1: 651. 2002.

Stout herbs with fibrous roots. Stems erect, with red streaks, often branched. Leaves opposite, asymmetrical, broadly ovate, 10-25 x 7-18 cm, apex acuminate, base cordate, margin obscurely serrate, glabrous; petioles 5-25 cm long, stipules lanceolate. Flowers white, in short peduncled axillary cymes, few flowered; bracts linear, persistent. Male flowers: perianth segments 2+2, outer segments large, concave; inner segments narrow; stamens numerous, clustered in a globose mass. Female flowers: perianth 4-5, densely hairy outside; outer ones oval; inner ones oval-oblong; styles 4, bifid nearly from the base winding spirally. Fruit pendant, 4-angled, succulent, with red spots.

**Fl. & Fr.:** August-October

**Distribution:** India (NE India), E & W Himalaya, Bangladesh, Bhutan, Myanmar, Nepal

**Specimen examined:** Grows in shaded moist places in forest edges. Lozaphuhu. NLNU 0517. (Pl. 25)

## APIACEAE

Lindl., Intr. Nat. Syst. Bot., ed. 2. 21. 1836

Annual, biennial or perennial herbs. Leaves basal or alternate, rarely simple, usually pinnately or ternately divided, petioles usually with a sheathing base, stipules absent. Flowers small, in simple or compound umbel, rarely in heads or whorls, bisexual or polygamous. Calyx 5 or 0, tube adnate to the ovary. Petals 5, free, usually unequal, often 2-fid with a median fold and reflexed apex. Stamens 5, alternating with the petals. Ovary inferior, styles 2, usually swollen at the base to form stylopodium. Fruit a dry schizocarp.

- 1a. Leaves simple, margin entire or toothed, sometimes shallowly lobed
  - 2a. Leaves and bracts spinous, toothed; flowers in capitate heads *Eryngium*
  - 2b. Leaves and bracts not spinous; flowers in umbels
    - 3a. Petals acute, valvate; carpels 5-ribbed *Centella*
    - 3b. Petals obtuse, imbricate; carpels 7-9-ribbed *Hydrocotyle*
- 1b. Leaves compound, ternately or pinnately divided
  - 4a. Umbels simple, leaves palmately divided *Sanicula*
  - 4b. Umbels compound, leaves pinnately divided *Oenanthe*

***Centella* L., Sp. Pl., ed. 2, 2. 1393. 1763**

Prostrate herbs, rooting at nodes. Leaves simple, sub-orbicular, reniform, entire or shallowly dentate, palmately veined, base deeply cordate, long petioled. Inflorescence umbels or subcapitate, axillary, densely clustered. Flowers small, bracts small, pedicels short. Calyx teeth small or obsolete. Petals small, entire. Fruit globose, laterally compressed.

***Centella asiatica* (L.) Urb.**, Fl. Bras. 11.1: 287. 1879; *Hydrocotyle asiatica* L. Sp. Pl. 234. 1753; C. B. Clarke in Hook.f., Fl. Brit. Ind. 2: 669. 1879; Kanjilal *et al.*, Fl. As. 2: 340. 1938; Balakr., Fl. Jowai 1: 218. 1981; Singh in Singh *et al.*, Fl. Mizo. 1: 660. 2002.

Stems creeping, rooting at nodes. Leaves in rosettes, orbicular-reniform, crenate or lobulate, base cordate; petioles 1-15 cm. Flowers in umbels, solitary or 2-5 together in axils; peduncles upto 5 cm. Petals red. Fruits laterally compressed, ribs 7-9, mericarps 0.3 cm long.

**Fl. & Fr.:** April-November

**Distribution:** Tropical and subtropical regions of the world.

**Specimen examined:** Grows in moist places, in paddy fields. Chozuba. NLNU 0336. **(Pl. 25)**

***Eryngium*** Tourn.ex L., Sp. Pl. 1: 232. 1753

Perennial herbs, strongly aromatic. Leaves simple, margin spinose, entire, lobed or dissected, leathery. Flowers densely crowded in simple umbels. Bracteoles lanceolate. Calyx teeth rigid, ovate to lanceolate, persistent. Petals ovate to oblong, apex incurved. Fruit globose to obovoid, covered with minute rounded scales, ribs obsolete.

***Eryngium foetidum*** L., Sp. Pl. 1: 232. 1753; Kanjlal *et al.*, Fl. As., 2: 340. 1938; Singh in Singh *et al.*, Fl. Mizo. 1: 662. 2002; Grierson & Long, Fl. Bhut., 2.2: 447. 1999.

Glabrous erect perennial herbs, strongly aromatic. Leaves simple, oblanceolate, 5-12×1.2-4 cm, base cuneate to decurrent, apex obtuse, margin serrate. Bracts oblong-elliptic. Flowers in umbellate peduncled heads, white; bracts spinulose. Calyx teeth rigid, acute, 0.2cm long. Fruit ellipsoid.

**Fl. & Fr.:** April-December

**Distribution:** Tropical and subtropical regions of the world.

**Specimen examined:** Grows in moist places, in cultivated patches, clear open spaces. Chozuba. NLNU 0337.

***Oenanthe*** L., Sp. Pl. 1: 254. 1753

Stoloniferous marshland herbs. Leaves pinnately divided, ultimate segments large or minute. Umbels compound; bracts few or absent, bracteoles several, linear. Calyx small. Petals obovate, emarginated. Fruit ellipsoid, glabrous, mericarps unequally ribbed.

***Oenanthe javanica*** (Blume) DC., Prodr. 4: 138. 1840; *O.stolonifera* DC. Prodr. 4: 138. 1830; C. B. Clarke in Hook.f., Fl. Brit. Ind. 2: 696. 1879; Kanjlal *et al.*, Fl. As., 2: 341. 1938; Balakr., Fl. Jowai 1: 220. 1981; Grierson & Long, Fl. Bhut., 2.2: 486. 1999.

Perennial, marshy, glabrous herbs. Leaves biternate or bipinnate; leaflets ovate to elliptic-lanceolate, shallowly serrate to pinnatifid. Umbels terminal or leaf-opposed, compound; peduncles 10-20 cm long, rays 4-20, 2-3 cm long. Flowers white; calyx teeth small, petals emarginate. Fruits ellipsoid, mericarps with 3 subconfluent ribs.

**Fl. & Fr.:** April-October

**Distribution:** India (throughout), Bangladesh, China, Jawa, Mongolia, Myanmar, Nepal, Pakistan, Philippines, Thailand, Vietnam

**Specimen examined:** Grows in moist places. Tsupfume. NLNU 0084. **(Pl. 26)**

*Sanicula* L., Sp. Pl. 1: 235. 1753

Erect perennial herbs. Leaves ternate, lateral segments often deeply divided almost to base and leaf appearing palmate; petioles narrowly sheathing at base. Flowers small in simple or compound umbels; bracts leaf like, usually serrate, bracteoles small, entire or rarely lobed; bisexual or unisexual. Calyx teeth connate and persistent. Petals minute, emarginate, slightly imbricate. Fruit ovoid-oblong, covered with bristles.

*Sanicula elata* Buch.-Ham.ex D.Don, Prodr. Fl. Nep. 183. 1825; *S.europea* L. C. B. Clarke in Hook.f., Fl. Brit. Ind. 2: 670. 1879; Kanjilal *et al.*, Fl. As. 2: 340. 1938; Balakr., Fl. Jowai, 1: 218. 1981; Singh in Singh *et al.*, Fl. Mizo., 1: 666. 2002; Grierson & Long, Fl. Bhut., 2.2: 446. 1999.

Erect perennial herbs, with creeping rhizomes. Leaves orbicular, palmately 3-5 partite, segments incised or serrate; petioles 3-15 cm long. Umbels irregularly compound, rays few; peduncles upto 4 cm long. Flowers white. Calyx persistent. Petals shorter than calyx teeth. Fruits echinate, laterally compressed, densely covered with bristles.

**Fl. & Fr.:** May-October



**Distribution:** India (throughout), Bangladesh, China, Jawa, Myanmar, Nepal, Pakistan, Philippines, Thailand, Vietnam

**Specimen examined:** Grows in shaded places in forest, on forest slopes. Thevopisu. NLNU 0338. (Pl. 26)

*Hydrocotyle* Tourn.ex L., Sp. Pl. 234. 1753

Prostrate herbs. Stems usually rooting at nodes. Leaves simple, suborbicular in outline, usually lobed and base deeply cordate; petioles small, broadly ovate, stipules membranous. Umbels small and densely clustered, simple; bracts and bracteoles absent or minute. Calyx teeth minute or obsolete. Petals entire, small. Fruits orbicular, laterally compressed, glabrous.

*Hydrocotyle javanica* Thunb., Hydrocotyle: 17. 1798; Clarke in Hook.f., Fl. Brit. Ind. 2: 667. 1879; Kanjilal *et al.*, Fl. As. 2: 339. 1938; Balakr., Fl. Jowai, 1: 218. 1981.

Prostrate, perennial herbs; stems succulent, rooting at nodes. Leaves simple, rotund-cordate, reniform, 2.5 - 7.5 cm across, margin crenate, subentire or 7-8-lobed, glabrous; petioles 12-18 cm long, laxly pubescent; stipules broadly ovate. Umbels many-flowered, simple, terminal or leaf-opposed; bracts minute, scattered along the pedicels, ovate lanceolate; bracteoles numerous. Flowers small. Calyx teeth minute. Petals 5, entire, greenish-white, lanceolate-valvate. Fruits orbicular, broadly ovoid, reticulate-rugose, laterally compressed.

**Fl. & Fr.:** November - April

**Distribution:** India (throughout), Bangladesh, Bhutan, China, Myanmar, Nepal, Pakistan, Philippines, Thailand, Vietnam

**Specimen examined:** Grows in shaded places in forest, on forest slopes. Thevopisu. NLNU 0339.

## ARALIACEAE

Juss., Gen. Pl. 217. 1789

Trees or shrubs, sometimes climbing. Leaves alternate or whorled, long petioled, large, simple or compound. Flowers regular, small, in umbels, paniculate; bracts and bracteoles small or conspicuous. Calyx tube adnate to ovary, limb truncate, obsolete or with small teeth. Petals 5-10-lobed, sometimes coherent and falling together, valvate or imbricate. Stamens as many as petals. Ovary inferior, 2-celled or as many as the stamens; style as many as cells. Fruit a drupe or berry.

1a. Leaves pinnate or decompound

2a. Plants armed; petals imbricate in bud

*Aralia*

2b. Plants unarmed; petals valvate in bud

*Heteropanax*

1b. Leaves simple, pinnate or digitate

3a. Ovary 4-10-celled

4a. Leaves digitately compound

*Schefflera*

4b. Leaves palmately lobed

*Trevesia*

3b. Ovary 2-celled

5a. Unarmed plants; pedicels jointed

*Macropanax*

5b. Armed or prickly plants; pedicels not jointed

*Brassiopsis*

*Aralia* L., Sp. Pl. 273. 1753

Shrub or small tree, prickly or unarmed. Leaves alternate or whorled, digitate pinnate or compound pinnate; leaflets serrate or entire. Flowers in racemes or paniculate solitary

umbels. Calyx truncate or obscurely 5-toothed. Petals 5, imbricate. Styles 5, free or shortly connate. Fruit subglobose.

*Aralia thomsonii* Seem.ex C.B. Clarke in Hook.f., Fl. Brit. Ind. 2: 723. 1879; Kanjilal *et al.*, Fl. As. 2: 345. 1938; Balakr., Fl. Jowai 1: 221. 1981.

Large prickly shrubs, usually unbranched. Leaves large, 1-2 m long, 2-3 pinnate, with a pair of leaflets at each node of rachis; ultimate pinnules 5-9-foliolate; leaflets elliptic-ovate or lanceolate, 6-12 x 2-6 cm, base rounded to subcordate, apex acute to acuminate, margin obscurely serrulate, scabrid above, tomentose beneath. Panicles upto 60 cm; umbels 15-20-flowered. Flowers greenish white. Fruit globose, deeply 5-ribbed.

**Fl. & Fr.:** April-August

**Distribution:** India (throughout), China, Myanmar, Thailand, Vietnam

**Specimen examined:** Grows in primary forest. Tsupfume. NLNU 0085.

*Brassaiopsis* Decne. & Planch., Rev. Hort. Ser.4,3: 106. 1854

Small armed trees with stellate indumentums. Leaves palmately compound or palmately lobed. Flowers bisexual and unisexual, umbels borne in panicles; bisexual flowers usually in terminal umbels of inflorescence branch; male umbels lateral and deciduous. Calyx teeth minute. Petals 5. Stamens 5. Ovary 2-celled; styles 2, connate at apex. Fruit globose, 2-seeded.

1a. Leaves palmately digitate; leaflets 5-7

*B. glomerulata*

1b. Leaves palmately 3-7-lobed

*B. hainla*

*Brassaiopsis glomerulata* (Blume) Regel, Gartenflora 12: 275. 1863; *Aralia glomerulata* Bl. Bijdr. 872. 1826; *B. speciosa* Decainse & Planch. Rev. Hort. Ser.4. 3:106. 1854; Clarke in

Hook.f., Fl. Brit. Ind. 2: 737. 1879; Kanjilal *et al.*, Fl. As. 2: 358. 1938; Balakr., Fl. Jowai 1: 226. 1981.

Shrubs or small trees, 3-10 m tall. Leaves digitate, leaflets 5-7, petioles 30-50 cm, elliptic-oblong to lanceolate, base acute to rounded, apex acute to short acuminate, margin serrulate. Panicles large, terminal, 20-35 cm, umbels racemose; bracts oblong, lanceolate. Flowers white, stellate, tomentose. Fruit globose or subglobose.

**Fl. & Fr.:** August - March

**Distribution:** India (throughout), Bhutan, Cambodia, China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in primary and secondary forest. Tsupfume. NLNU 0086. (**Pl. 26**)

*Brassaiopsis hainla* (Buch.-Ham) Seem., J. Bot. 2: 291. 1864; Clarke in Hook.f., Fl. Brit. Ind. 2: 735. 1879; Grierson & Long Fl. Bhut., 2.1: 343 1991.

Trees, upto 15 m tall. Branches spiny. Leaves simple, 5-7-lobed, ovate or suborbicular, petiole 15-25 cm, glabrescent; stipules small or absent, base cordate, apex acuminate, margin serrate, glabrous or sparsely stellate-pubescent beneath. Inflorescence terminal, densely tomentose, panicles 20 cm. Petals greenish, ovate. Fruit subglobose.

**Fl. & Fr.:** December – June

**Distribution:** India (throughout), China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in primary and secondary forest. Pfutsero. NLNU 0149. (**Pl. 26**)

***Heteropanax*** Seem., Fl. Vit. 114. 1866

Small unarmed tree. Leaves pinnately compound, glabrous; leaflets entire, stipules not prominent. Flowers borne in long umbellate raceme panicles, stellate pubescent; bracts small, ovate, persistent. Calyx teeth obsolete. Petals 5, valvate. Stamens 5, anthers ovoid. Ovary 2-celled; styles 2, free from base. Fruit laterally compressed.

***Heteropanax fragrans*** (Roxb.) Seem., Fl. Vit. 114. 1866; Clarke in Hook.f., Fl. Brit. Ind. 2: 734. 1879; Grierson & Long Fl. Bhut., 2.1: 337. 1991.

Trees, upto 20 m tall. Leaves pinnately compound; leaflets elliptic or ovate, 6-12 x 2.5- 4.5, apex acuminate, base rounded or cuneate, margin entire. Flowers in long panicles of 30-100 cm, stellate tomentose, umbels many-flowered. Petals whitish ovate. Fruit ovoid-globose, laterally compressed.

**Fl. & Fr.:** October - February

**Distribution:** India (throughout), Bhutan, China, Indonesia, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in primary and secondary forest. Pfitsero. NLNU 0151. (**Pl. 26**)

***Macropanax*** Miq., Bonplandia 4: 139. 1856

Small unarmed trees. Leaves palmately 3-5-foliolate; leaflets entire or serrate; stipules intrapetiolar or obsolete. Flowers polygamous, pentamerous, umbels in large panicles, branched; bracts small, deciduous. Calyx 5-toothed. Petals 5, valvate. Stamens 5. Ovary 2-celled; styles united. Persistent. Fruit striated or ribbed.

***Macropanax dispermus*** (Blume) Kuntze, Rev. Gen. 271. 1891; Balakr., Fl. Jowai 1: 226. 1981; *Aralia disperma* Bl. Bijdr. 872. 1826; *M. oreophilus* Miq., Fl. Ind. Bat. 1.1: 763. 1855; Clarke in Hook.f., Fl. Brit. Ind. 2: 738. 1879; Kanjilal *et al.*, Fl. As. 2: 362. 1938.

Trees or large shrubs, 3-10 m tall. Leaves digitately 3-5-foliolate; leaflets oblong or elliptic-lanceolate, 10-15 x 3-4 cm, base rounded to acute, apex acute to acuminate; petioles 10-15 cm. Panicles terminal, rusty stellate tomentose, upto 30 cm long; umbels rounded; bracts small, narrow-lanceolate. Calyx 5-toothed. Petals 5, valvate. Fruit ovoid, crowned by persistent style.

**Fl. & Fr.:** August - March

**Distribution:** India (throughout), China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in primary and secondary forest. Lozaphuhu. NLNU 0518. (Pl. 26)

*Schefflera* J.R.Forst. & G.Forst., Char. Gen. 45.t. 23. 1776

Unarmed trees or climbers. Leaves digitate; leaflets entire, coriaceous; stipules adnate to the petiole. Flowers in umbels borne in panicles. Calyx teeth minute or obsolete. Petals 5, valvate. Stamens as many as petals. Ovary 5-celled; styles connate. Fruit subglobose or ellipsoid.

*Schefflera venulosa* (Wight & Arnott) Harms, Engl. & Prantl, Pflanzen-fam. 3.8: 39. 1894; Balakr., Fl. Jowai 1: 224. 1981; *Heptapleurum venulosum* (W. & A.) Seem., J. Bot. 3: 80. 1865, Clarke in Hook.f., Fl. Brit. Ind. 2: 729. 1879; Kanjilal *et al.*, Fl. As. 2: 353. 1938.

Shrubs, subscandent, often epiphytic. Leaves digitate; leaflets 5-7, elliptic or oblong, 7-15 x 3-10 cm, base attenuate or rounded, apex acute to short acuminate. Panicles terminal, 10-20 cm; umbels racemose on lateral branches. Flowers pale green. Fruit globose, fleshy, crowned by a conical disk.

**Fl. & Fr.:** March - October

**Distribution:** India (throughout), China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in primary and secondary forest. Sakraba. NLNU 0686. (Pl. 27)

*Trevesia* Vis., Giorn. Tosc. Sci. Med. 1: 72. 1840

Small prickly trees with stellate indumentum. Leaves coriaceous, simple, palmately lobed; stipules intrapetiolar. Flowers in umbels borne in large panicles; pedicels not articulated at base of ovary. Calyx lobes 10, small. Petals 10. Stamens 10. Styles 10, connate, short. Capsule subglobose.

*Trevesia palmata* (Roxb.ex Lindl.) Vis. Mem. Reale Accad. Sci. Torino, ser. 2, 4: 262. 1842; Balakr., Fl. Jowai 1: 224. 1981; Clarke in Hook.f., Fl. Brit. Ind. 2: 732. 1879; Kanjilal *et al.*, Fl. As. 2: 363. 1938; *Gastonia palmate* Roxb. Fl. Ind. 2: 407. 1824.

Trees or large shrubs, 3-6m tall. Bark spiny. Leaves palmately 7-9-lobed, lobes ovate-elliptic, base truncate or subcordate, margin serrate; petioles 15-40 cm, sheathing at base. Panicles terminal, up to 45 cm, umbels upto 30-flowered. Petals yellow, narrowly ovate. Fruit subglobose.

**Fl. & Fr.:** October - March

**Distribution:** India (NE India), E Himalaya, China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in primary and secondary forest. Khuza. NLNU 0809.

## HELWINGIACEAE

Decne., Ann. Sci. Nat., Bot. ser. 2. 6: 69. 1836

Shrubs, rarely small trees. Dioecious. Leaves simple, alternate, stipulate. Inflorescence umbels, sessile, borne on midvein of leaf blade. Calyx and petals 3 or 4-5;

floral disk flat, fleshy. Male flowers 3-20 per umbel; stamens equal the number of petals. Female flowers 1-4 per umbel; ovary inferior. Fruit a berry or drupe.

***Helwingia*** Willd., Sp. Pl., ed. 4, 4: 716. 1806

Undershrubs or shrubs. Leaves alternate, serrate, petiolate, stipules a tuft of linear bristles seen only at base of young petioles. Dioecious. Inflorescence a small umbel arising from middle of upper surface of leaf. Male flowers numerous, stamens 3-5. Female flowers 1-4; ovary 3-4-locular; styles 3-4, united at base. Fruit ellipsoid or subglobose.

***Helwingia himalaica*** Hook. f. & Thomson ex C. B. Clarke, Hook.f., Fl. Brit. India 2: 726. 1879; Kanjilal *et al.*, Fl. As. 2: 372. 1938; Grierson & Long, Fl. Bhut. 2. 1: 331.1991.

Shrub, glabrous, upto 2 m tall. Leaves elliptic, oblong-lanceolate, 5-12 x 2.5-5 cm, leaf blade shiny green above, base cuneate, apex acuminate, margin serrate; petiole 1-6 cm long. Male flowers in umbels of 8-20, pedicellate, 4-merous, light green. Female flowers in umbels of 3-4, pedicellate, 4-merous, light green. Fruit subglobose.

**Fl. & Fr.:** April - August

**Distibution:** India (NE India), E Himalaya, Bhutan, China, Myanmar, Thailand, Vietnam

**Specimen examined:** Grows in shady places in forests. Chozuba. NLNU 0340. **(Pl. 27)**

## **CORNACEAE**

Bercht. & J. Presl, Prir. Rostlin 2(23): 91, 92. 1825

Trees or shrubs. Leaves opposite or alternate, simple, entire, lobed or dentate, stipules absent. Inflorescence axillary cymes, panicle or umbel, sometimes with showy bracts. Flowers regular, bisexual or unisexual. Calyx 4-5 lobed, tube adnate to ovary, lobes



valvate or open in bud, persistent. Corolla 4-5, free, sometimes absent. Stamens usually equal the numbers of petals. Ovary inferior, 1-4 celled; style simple, stigma capitate or lobed. Fruit a drupe or berry, seeds 1-4.

1a. Flowers in axillary cymes or fascicle; leaves alternate *Alangium*

1b. Flowers in terminal corymbose or capitate head; leaves opposite *Cornus*

*Alangium* Lamk., Encycl. 1: 174. 1783

Trees or shrubs. Leaves alternate, simple, entire or lobed, petiolate, exstipulate. Flowers in axillary cymes or fascicles, bisexual, regular. Calyx 4-10 lobed, persistent. Petals 4-10, valvate, sometimes connate at base. Stamens equal to or 2-3 times as many as petals, filaments hairy at base, anthers long. Ovary inferior, 1-2 celled, stigma 2-4 lobed. Fruit a drupe, crowned by persistent calyx, usually 2-seeded.

*Alangium chinense* (Lour.) Harms, Ber. Deutsch. Bot. Ges. 15: 24. 1897; *Stylidium chinense* Lour., Fl. Cochinch. 1: 221. 1790; *Marlea begoniaefolia* Roxb. Pl. Corom. 3: 80.t. 283. 1820; C.B. Clarke in Hook.f., Fl. Brit. Ind. 2: 743. 1879; *Alangium begoniaefolia* Roxb. Kanjilal *et al.*, Fl. As. 2: 368. 1938; Haridasan & Rao, For. Fl. Megh. 1: 446. 1985; Singh in Singh *et al.*, Fl. Mizo. 1: 675. 2002.

Small to medium sized tree, with branches spreading horizontally. Leaves orbicular to broadly ovate- orbicular, 7-16 x 6-15 cm, base truncate, apex acuminate, margin entire, irregularly shallowly lobed, glabrescent above, pubescent below, basal nerves 4-7; petioles 2-4 cm long. Flowers white, in axillary, dichotomous branched pedunculate cymes. Calyx minutely toothed, pubescent. Petals 6-8, strap-shaped, puberulous. Stamens equal the number of petals, filaments finely pubescent. Ovary 2-celled. Drupe ovoid, dark purple when riped.

**Fl. & Fr.:** April-September

**Distribution:** India (Himalaya, NE India), Bhutan, China, Myanmar, Nepal

**Specimen examined:** Grows in open secondary forest. Thetsumi, Sakraba. NLNU 0687. (Pl. 27)

*Cornus* L., Sp. Pl. 1: 117. 1753

Trees or shrubs. Leaves opposite, entire, simple. Inflorescence terminal, cymose, dichotomously branched or in involucre heads. Flowers bisexual, regular. Calyx 4, fused, toothed, minute. Petals 4, free, oblong, valvate. Stamens 4, filaments long, filiform anthers oblong. Ovary 2-celled, ovule 1 in each cell, stigma capitate, 2-lobed. Fruit a drupe, globose, ovoid, crowned by a persistent calyx, 2-seeded, oblong, compressed.

1a. Flowers in dense globose head surrounded by large bracts *C. capitata*

1b. Flowers in compound cymes *C. macrophylla*

*Cornus capitata* Wall.ex Roxb., Fl. Ind. 1: 434. 1820; C.B. Clarke in Hook.f., Fl. Brit. Ind. 2: 754. 1879; *Benthamida capitata* (Wall.) Hara, J. Arnold Arbor. 29: 115.t. 4a. 1948; Kanjilal *et al.*, Fl. As. 2: 367. 1938; Singh in Singh *et al.*, Fl. Mizo. 1: 674. 2002.

Small to medium sized tree. Bark brown or blackish gray, young branches pubescent. Leaves elliptic-oblong or oblong-lanceolate, 7-12 x 3-4 cm, leathery, apex acute to acuminate, base cuneate, margin entire; petiole 0.7-1.5 cm. Flowers terminal in closely packed globose heads, surrounded by 4 showy white or creamish obovate, petaloid bracts. Calyx 4 lobes. Petals 4, oblong. Drupe subglobose, compressed, 2-3 cm across, yellow when young, red at maturity.

**Fl. & Fr.:** May-November

**Distribution:** India (Himalaya, NE India), Bhutan, China, Myanmar, Nepal

**Specimen examined:** Grows in primary and secondary forest on hillsides. Kami, Thevopisu. NLNU 0152. (Pl. 27)

*Cornus macrophylla* Wall., Roxb., Fl. Ind. 1:433. 1820; *Swida macrophylla* (Wall.) Sojak, Novit. Bot. & Del. Sem. Hort. Bot. Univ. Carol. Prag. 10. 1960; Balakr., Fl. Jowai 1: 227. 1981; C.B. Clarke in Hook.f., Fl. Brit. Ind. 2: 744. 1879; Kanjilal *et al.*, Fl. As. 2: 366. 1938; Haridasan & Rao, For. Fl. Megh. 1: 450. 1985.

Trees, upto 25 m tall. Bark grayish brown, smooth when young, scaly when old. Leaves opposite, broadly elliptic, ovate or ovate-oblong, 8-16 x 3-8 cm, apex acute to shortly acuminate, base cuneate or rounded, margin entire, dark green above, whitish grey below; petioles 2-4 cm, reddish. Flowers terminal in dense corymbose paniculate cymes, bisexual, regular, fragrant, 4-merous. Calyx lobes minute, toothed. Petals white, oblong, ligulate. Stigma sub-capitate, slightly lobed. Drupe globose, crowned by persistent calyx, black at maturity.

**Fl. & Fr.:** April-August

**Distribution:** India (Himalaya, NE India), Bhutan, China, Myanmar, Nepal

**Specimen examined:** Grows in primary and secondary forest on hillsides. Kami. NLNU 0155. (Pl. 27)

## CAPRIFOLIACEAE

Juss., Gen. Pl. 210. 1789

Herbs, shrubs or small trees. Leaves simple or sometimes pinnately compound, opposite; stipules present or absent. Flowers bisexual, regular or irregular in cymes or panicles. Calyx adnate to ovary, often 5-lobed. Corolla usually 5 lobes, gamopetalous,

funnel-form or tubular, imbricate in bud. Stamens 5, epipetalous, alternating with the lobes. Ovary inferior, stigma capitate. Fruit a drupe or berry.

- 1a. Leaves imparipinnately compound *Sambucus*
- 1b. Leaves simple
  - 2a. Flowers in umbelliform corymbs or panicles *Viburnum*
  - 2b. Flowers in spikes or in pairs
    - 3a. Flowers actinomorphic, ovary 5-8 celled *Leycesteria*
    - 3b. Flowers zygomorphic, ovary 2-3 celled *Lonicera*

***Leycesteria*** Wall., Fl. Ind. 2: 181. 1824

Shrubs, young branches usually hollow. Leaves simple, opposite. Flowers whorled in axillary or terminal spikes, involucre bracts leaflike. Calyx lobes 5. Corolla 5-lobed, funnel-form. Stamens 5. Ovary 5-8 loculed; style long, slender; stigma capitate; ovules numerous. Fruit a berry, many seeded.

***Leycesteria formosa*** Wall., Roxb. Fl. Ind. 2: 182. 1824; C.B. Clarke in Hook.f., Fl. Brit. Ind. 3: 16. 1880; Kanjilal *et al.*, Fl. As. 3: 10. 1939; Grierson & Long, Fl. Bhut. 2.3: 1355. 2001

Shrubs bushy, branching from the base, branch hollow. Leaves opposite, ovate-lanceolate, 5-15 x 2-6 cm, apex long acuminate, base cuneate to subcordate, margin entire or undulate, glabrate or sparsely appressed pubescent; petiole 0.5-1.5 cm long. Flowers in bracteate whorls forming axillary or terminal drooping spikes, purple-red, bracts large, leaflike. Calyx 5-lobed, fused at base, lanceolate, puberulous. Corolla 5-lobed, funnel-form, pubescent outside, pinkish white, lobes ovate-orbicular. Stamens 5, inserted at corolla throat. Ovary 5-celled, style long, stigma capitate. Berry subglobose, dark red, with persistent calyx.

**Fl. & Fr.:** June-September

**Distribution:** India (NE India), E & W Himalaya, Bhutan, China, Myanmar, Nepal, Pakistan

**Specimen examined:** Grows in forest margins, among shrubs, along roadsides. Pfutsero. NLNU 0153. (Pl. 27)

*Lonicera* L., Gen. Pl. ed. 5. 1754

Shrubs, erect or scandent. Leaves simple, opposite, entire, rarely lobed, stipules absent, petiole short or sessile. Flowers axillary or sub-terminal, sessile or sub-sessile, usually paired, bracteate and bracteolate, in panicle heads or clusters subtended by floral leaves. Calyx tube ovoid, 5 toothed. Corolla tubular, tube long or short, 5-lobed, or bilipped, upper lip 4 lobed. Stamens 5, epipetalous. Ovary 2-3 celled, style slender, stigma capitate. Fruit a berry, fleshy, 1- many seeded.

*Lonicera macrantha* (D. Don) Spreng., Syst. Veg. 4.2: 82. 1827; *Caprifolium macranthum* D. Don, Prodr. Fl. Nep. 140. 1825; *Lonicera japonica* L., Sp. Pl. 173.1753; C.B. Clarke in Hook.f. Fl. Brit. Ind. 3: 10. 1880; Kanjilal *et al.*, Fl. As. 3: 8. 1939; Bujarbabu & Singh in Singh *et al.*, Fl. Mizo. 1: 677. 2002; Haridasan & Rao, For. Fl. Megh. 2: 454. 1987; Grierson & Long, Fl. Bhut. 2.3: 1354. 2001.

Shrubs, scandent. Branches dense pubescent. Leaves oblong or oblong-lanceolate, 5-8 x 2-4 cm, apex acuminate, base subcordate or truncate, margin entire, rugose above, villous beneath; petioles 0.3-0.5 cm. Flowers terminal or axillary corymbose, paired, white turning yellow, peduncles densely villous. Bracts linear, bracteoles small. Calyx lobes linear, with long hairs. Corolla tube 4-6 cm long, hairy, bilabiate. Stamens 5, anthers versatile. Style long, slender; stigma capitate. Berry ellipsoid, ovoid.

**Fl. & Fr.:** April-October

**Distribution:** India (E Himalaya, NE India), Bhutan, China, Myanmar, Nepal, Vietnam

**Specimen examined:** Grows in forest margins, slopes. Pfutsero. NLNU 0157. **(Pl. 28)**

*Sambucus* L., Sp. Pl. 1: 269. 1753

Shrubs or woody herbs, or small trees. Leaves imparipinnate; leaflets opposite or alternate, serrate. Flowers in large terminal corymbs, actinomorphic. Bracts absent. Calyx 5-6 lobed. Corolla 5-6 lobed. Stamens 5-7, adnate to base of corolla. Ovary 3-5 celled, with 1 locule each. Fruit a berry, 3-5 seeded; seeds compressed.

*Sambucus javanica* Blume, Bijdr. Fl. Ned. Ind. 657. 1826; C.B. Clarke in Hook.f. Fl. Brit. Ind. 3: 2. 1880; Kanjilal *et al.*, Fl. As. 3: 1. 1939; Balakr., Fl. Jowai 1:228. 1981; Haridasan & Rao, For. Fl. Megh. 2: 455. 1987; Grierson & Long, Fl. Bhut. 2.3: 1360. 2001.

Erect shrubs, few branched. Leaves imparipinnate; leaflets 3-9, oblong-lanceolate, 8-16 x 1.5-4 cm, sessile or subsessile, apex acuminate, base cuneate to subcordate, margin serrate, glabrous above, finely pubescent beneath. Flowers in terminal puberulous corymb, small, white, bracteoles minute. Corolla campanulate, lobes spreading. Stamens 5. Berry globose, black when ripe.

**Fl. & Fr.:** April-November

**Distribution:** India (NE India), Bangladesh, Bhutan, China, Myanmar, Nepal, Philippines, Thailand, Vietnam

**Specimen examined:** Grows in moist shady places. Chozuba. NLNU 0341. **(Pl. 28)**

***Viburnum* L., Sp. Pl. 1: 267. 1753**

Shrubs or small trees. Leaves simple, opposite, entire, toothed or rarely lobed, stipules inconspicuous. Flowers in terminal or sub-terminal corymbs or panicles, bisexual. Calyx tube cylindric or turbinate, 5-lobed. Corolla tubular, campanulate or rotate, 5-lobed. Stamens 5, inserted on corolla tube. Ovary 1-3 celled, stigma 3-lobed. Fruit a drupe fleshy, 1 seeded, red, purplish black when ripened.

- 1a. Leaf triplinerved at base; corolla tube short, lobes spreading *V. foetidum*  
1b. Leaves penninerved; corolla tube long, lobes not spreading *V. coriaceum*

***Viburnum coriaceum*** Blume, Bijdr. Fl. Ned. Ind. 13: 656. 1826; C.B. Clarke in Hook.f. Fl. Brit. Ind. 3: 5. 1880; Balakr., Fl. Jowai 1:228. 1981; Haridasan & Rao, For. Fl. Megh. 2: 457. 1987; Grierson & Long, Fl. Bhut. 2.3: 1358. 2001; *V. cylindricum* (non D.Don) *sensu* Rehder in Sargent, Trees & Shrubs 12: 112. 1908; Kanjilal *et al.*, Fl. As. 3: 4. 1939;.

Shrubs or small trees. Leaves opposite, elliptic-lanceolate, 8-16 x 3-5 cm, apex acuminate, base cuneate to rounded, coriaceous, margin entire, glabrous above, pubescent on nerves beneath, lateral nerves 3-5 pairs; petioles 1.2-2 cm long. Flowers in terminal corymbs, white, lightly pubescent. Calyx puberulous, lobes reduced. Corolla tubular, lobes short. Stamens exserted. Drupes ellipsoid, compressed, bluish black.

**Fl. & Fr.:** August-December

**Distribution:** India (NE India), E Himalaya, Bangladesh, Bhutan, China, Myanmar, Nepal, Sumatra, Vietnam

**Specimen examined:** Grows in primary forest. Thetsumi. NLNU 0771. (Pl. 28)

*Viburnum foetidum* Wall., Pl. Asiat. Rar. 1: 49. 1830; C.B. Clarke in Hook.f. Fl. Brit. Ind. 3: 4. 1880; *Kanjilal et al.*, Fl. As. 3: 3. 1939; Balakr., Fl. Jowai 1:228. 1981; Haridasan & Rao, For. Fl. Megh. 2: 458. 1987; Grierson & Long, Fl. Bhut. 2.3: 1357. 2001.

Shrubs, 2-5 m high, young parts hairy. Leaves rhomboid or elliptic-lanceolate, 3-8 x 1.5-3 cm, apex acute, base cuneate, remotely dentate, lateral nerves 3-4 pairs, glabrous above, hairy on nerves beneath; petioles 0.5-1.5 cm long. Flowers in dense compound corymbs, 4-10 cm across. Corolla white, campanulate, tube short, lobes orbicular, spreading. Stamens 5, anthers black. Drupes ellipsoid, scarlet-red when ripe.

**Fl. & Fr.:** June-December

**Distribution:** India (NE India), E Himalaya, Bangladesh, Bhutan, China, Myanmar, Nepal, Thailand

**Specimen examined:** Grows in primary forest, forest edges. Tsupfume. NLNU 0087. (**Pl. 28**)

## RUBIACEAE

Juss., Gen. Pl. 196. 1789

Herbs, shrubs or trees, sometimes thorny. Leaves simple, opposite or whorled, inter or intrapetiolar stipules present. Inflorescence various, axillary or terminal, usually cymose. Flowers usually regular, bisexual, rarely unisexual. Calyx 4-5, united at base, adnate to ovary. Corolla 4-5, tubular, infundibular, campanulate. Stamens 4-5, inserted to corolla tube, alternating with the lobes. Ovary inferior, usually 2-10 celled; style simple or cleft; stigma various. Fruit a capule, berry or drupe or schizocarp.

1a. Flowers in dense globose heads; shrubs or climbers

2a. Woody climbers

*Uncaria*



- 2b. Shrubs *Morinda*
- 1b. Flowers not in dense globose heads; if heads then undershrubs or herbs
  - 3a. Flowers with few sepal enlarged and petaloid *Mussaenda*
  - 3b. Flowers all uniform, sepals not petaloid
    - 4a. Bracts large, leaf-like or petaloid *Neohymenopogon*
    - 4b. Bracts small or inconspicuous
      - 5a. Ovules many in each cell
        - 6a. Fruit a berry or drupe *Mycetia*
        - 6b. Fruit a capsule
          - 7a. Corolla lobes twisted in buds *Wendlandia*
          - 7b. Corolla lobes valvate *Ophiorrhiza*
      - 5b. Ovules solitary in each cell
        - 8a. Plants foetid
          - 9a. Climbers *Paederia*
          - 9b. Erect shrubs
            - 10a. Ovary 5-celled *Leptodermis*
            - 10b. Ovary 3-9-celled *Lasianthus*
        - 8b. Plants not foetid
  - 11a. Leaves opposite *Spermacoce*
  - 11b. Leaves whorled
    - 12a. Scandent herbs; corolla 4-merous *Galium*
    - 12b. Climbing herbs; corolla 5-merous *Rubia*

***Galium* L., Sp. Pl. 105. 1753**

Erect or scandent herbs, often clinging to other plants by hooks or hairs. Stems 4-angled. Leaves and stipules almost similar, in whorls of 4-8. Flowers minute in axillary and terminal paniculate cymes, sometimes axillary solitary. Calyx tube reduced, lobes small. Corolla rotate or shortly infundibular, usually 4-lobed. Stamens 4. Fruit small, didynamous, tuberculate or covered with hooked hairs.

1a. Leaves in whorls of 4, 3-nerved at base *G. elegans*

1b. Leaves in whorls of 6-8, 1-nerved at base *G. asperifolium*

***Galium asperifolium*** Wall., Roxb., Fl. Ind. 1: 381. 1820; Balakr., Fl. Jowai 1: 252. 1981; Haridasan & Rao, Forest Fl. Megh. 2: 473. 1987; Singh in Singh *et al.*, Fl. Mizo. 1: 687. 2002; *G. mollugo sensu* Hook.f., Fl. Brit. Ind. 3:207, 1881, *non* L., 1753; Kanjilal *et al.*, Fl. As. 3: 95. 1939.

Scandent or rambling herbs. Stems quadrangular, with recurved bristles at angles. Leaves sessile, in whorls of 6-8, elliptic or linear-lanceolate, 1-2 x 0.2-0.4 cm, apex acute with cuspidate tip, margins and midrib bristly, margin recurved. Flowers small, greenish white, in lax panicles or cymes. Fruit glabrous, globose.

**Fl. & Fr.:** June - October

**Distribution:** India (throughout), E&W Himalaya, Bangladesh, China, Myanmar, Nepal, Pakistan, Sumatera, Thailand, Tibet

**Specimen examined:** Grows in mountain slopes, forest edges, open fields. Pfutsero. NLNU 0158.

***Galium elegans*** Wall., Roxb., Fl. Ind. 1: 382. 1820; Haridasan & Rao, Forest Fl. Megh. 2: 473. 1987; Singh in Singh *et al.*, Fl. Mizo. 1: 687. 2002; *G. rotundifolium* sensu Hook.f., Fl. Brit. Ind. 3:204. 1881, *non* L., 1753; Kanjilal *et al.*, Fl. As. 3: 94. 1939.

Prostrate or diffused herbs. Leaves in whorls of 4, sessile or subsessile, ovate-elliptic, oblong-elliptic, 1-2 x 0.4-0.9 cm, apex rounded or acute, base cuneate or attenuate, basal nerves 3, subcoriaceous, margin and nerves hirsute. Flowers small, in paniculate cymes. Corolla greenish white. Stamens on corolla tube. Fruit hispid, recurved or hooked at apex.

**Fl. & Fr.:** June - October

**Distribution:** India (throughout), E&W Himalaya, Bangladesh, China, Myanmar, Nepal, Pakistan, Philippines, Taiwan, Thailand, Tibet

**Specimen examined:** Grows in mountain slopes, forest edges, open fields. Pfutsero. NLNU 0159.

***Lasianthus*** Jack, Trans. Linn. Soc. London 14: 125. 1823

Shrubs, branches slender, hairy. Leaves opposite, entire, shortly petiolate; stipules persistent or deciduous. Flowers in axillary cymes or capitate. Calyx tube short, teeth 3-7. Corolla funnel-shaped or salver-shaped, lobes 3-7, throat woolly. Stamens 4-6, inserted in corolla throat. Ovary 4-9 celled; ovules solitary in each cell. Fruit a drupe, fleshy, globose.

***Lasianthus lucidus*** Blume, Bijdr. Fl. Ned. Ind. 997. 1826; Hook.f., Fl. Brit. Ind. 3: 184. 1880; Kanjilal *et al.*, Fl. As. 3: 91. 1939; Balakr., Fl. Jowai 1: 243. 1981; Haridasan & Rao, Forest Fl. Megh. 2: 484. 1987; Singh in Singh *et al.*, Fl. Mizo. 1: 699. 2002.

Evergreen shrubs, 1-2 m tall. Leaves elliptic-ovate or ovate-lanceolate, 4-9 x 1.5-3 cm, base cuneate, apex acuminate, glabrous and shining green above, strigose along nerves

beneath. Flowers in axillary clusters, sessile. Calyx lobes 5, ovate-lanceolate. Corolla white, densely woolly inside, lobes 5. Style slender, stigma 5 lobes. Fruit globose or ellipsoid.

**Fl. & Fr.:** April - October

**Distribution:** India (NE India), China, Myanmar, Philippines, Thailand, Vietnam

**Specimen examined:** Grows in primary and secondary forest. Sakraba. NLNU 0689.

*Leptodermis* Wall., Roxb., Fl. Ind. 2: 191. 1824

Shrubs, branches terete. Leaves opposite, shortly petiolate; stipules small, persistent. Flowers in terminal or axillary, solitary or fascicled, subsessile; bracteate and bracteolate. Calyx lobes 5, coriaceous, persistent. Corolla funnel-shaped, tube slender, hairy inside, lobes 5. Stamens 5, inserted in corolla throat. Ovary 5-celled, style filiform, stigmas 5. Fruit capsular, cylindric or ovoid, calyx limb persistent.

*Leptodermis griffithii* Hook.f., Fl. Brit. Ind. 3: 198. 1881; Kanjilal *et al.*, Fl. As. 3: 76. 1939; Brandis, Ind. Trees 391. 1906; Balakr., Fl. Jowai 1: 251. 1981; Haridasan & Rao, Forest Fl. Megh. 2: 485. 1987.

Bushy shrubs, 1-2 m tall. Leaves elliptic-lanceolate, 0.9-3 x 0.4-1 cm, base attenuate, cuneate, apex acute, margin entire, subcoriaceous. Flowers in terminal fascicles, almost sessile, with a pair of acuminate bracts. Calyx teeth lanceolate. Corolla white or creamy, funnel-shaped, pubescent outside, hairy within, lobes edges inflexed. Capsule ovoid, brown.

**Fl. & Fr.:** June - December

**Distribution:** India (Manipur, Meghalaya, Nagaland)

**Specimen examined:** Grows in primary and secondary forest. Kapamodzu. NLNU 0300.

(Pl. 28)

***Morinda* L., Sp. Pl. 176. 1753**

Trees, shrubs or woody climbers. Leaves opposite; stipules connate at base. Flowers in axillary or terminal, simple or paniced or umbellate peduncled heads, 4-7-merous. Calyx tube short, lobes entire or obscurely toothed. Corolla lobes 4-7. Stamens 4-7, inserted on the corolla. Ovary 2-4 celled, ovules solitary, stigma bifid. Fruit a drupe, with persistent calyx.

***Morinda angustifolia*** Roxb., Pl. Coromandel 3: 32. 1815; Hook.f., Fl. Brit. Ind. 3: 156. 1880; Kanjilal *et al.*, Fl. As. 3: 79. 1939; Balakr., Fl. Jowai 1: 238. 1981; Haridasan & Rao, Forest Fl. Megh. 2: 488. 1987; Singh in Singh *et al*, Fl. Mizo. 1: 703. 2002.

Shrubs. Leaves oblanceolate, or oblong-lanceolate, 12-20 x 3-7 cm, base attenuate, apex acuminate, margin entire; petioles 0.5-2 cm long. Flowers fragrant, in axillary and terminal on leaf-opposed pedunculate globose heads. Calyx truncate or obscurely toothed. Corolla salver-shaped, tube slender, about 2 cm long, lobes 5. Drupes turbinate.

**Fl. & Fr.:** April - October

**Distribution:** India (NE India), E Himalaya, Bangladesh, China, Myanmar, Nepal, Thailand

**Specimen examined:** Grows in open secondary forest. Chozuba. NLNU 0345. **(Pl. 28)**

***Mussaenda* Burm. ex L., Sp. Pl. 177. 1753**

Shrubs or undershrubs, erect or climbing. Leaves opposite or ternately whorled, stipules solitary or in pairs between the petioles. Flowers in terminal cymes, 5-merous, bracts and bracteoles deciduous. Calyx tube oblong or turbinate, lobes 5, one frequently forming a large petioled white or coloured leaf. Corolla tubular, funnel-shaped above, throat woolly, lobes 5. Stamens 5, adnate to the throat or tube. Ovary 2-celled, stigmas 2, linear. Fruit a berry, fleshy and areolate at the top, many seeded.

- 1a. Calyx lobes persistent *M. roxburghii*
- 1b. Calyx lobes deciduous
- 2a. Lateral nerves 4-7 pairs ; berry glabrous *M. glabra*
- 2b. Lateral nerves 6-10 pairs; berry pilose *M. macrophylla*

***Mussaenda glabra*** Vahl., Symb. Bot. 3: 38. 1794; Hook.f., Fl. Brit. Ind. 3: 90. 1880; Kanjilal *et al.*, Fl. As. 3: 44. 1939; Balakr., Fl. Jowai 1: 237. 1981; Haridasan & Rao, Forest Fl. Megh. 2: 490. 1987; Singh in Singh *et al*, Fl. Mizo. 1: 704. 2002.

Climbing shrubs. Stems almost glabrous, lenticellate. Leaves opposite, elliptic or oblong-lanceolate, 5-15 x 2.5-5 cm, apex acuminate, base cuneate, coriaceous, lateral nerves 4-7 pairs; petioles 0.5-1.5 cm. Flowers in terminal puberulose cymes. Calyx campanulate, lobes deciduous; petaloid segment oblong or elliptic, 6-10 x 4-6 cm, creamy white, with green tinge on veins below, stalked 2-3 cm long. Corolla pubescent, orange yellow, tube upto 2.5 cm long, lobes short. Berry globose, glabrous.

**Fl. & Fr.:** May - October

**Distribution:** India (NE India), E Himalaya, Bangladesh, China, Myanmar, Thailand, Vietnam

**Specimen examined:** Grows in open secondary forest, in forest slopes. Mesulumi. NLNU 0383. (Pl. 29)

***Mussaenda macrophylla*** Wall., Roxb., Fl. Ind. 1: 228. 1824; Hook.f., Fl. Brit. Ind. 3: 89. 1880; Kanjilal *et al.*, Fl. As. 3: 45. 1939; Balakr., Fl. Jowai 1: 237. 1981; Haridasan & Rao, Forest Fl. Megh. 2: 490. 1987; Singh in Singh *et al*, Fl. Mizo. 1: 704. 2002.

Erect or subscandent shrubs. Stem hirsute or villous. Leaves opposite, ovate, elliptic or oblong-lanceolate, 8-18 x 4-9 cm, base cuneate, apex acuminate or caudate-acuminate,

pubescent beneath; petioles 0.8-2 cm, stipules ovate, recurved. Flowers in terminal compact cymes, hirsute. Calyx campanulate, lobes ovate, pubescent, petaloid segments ovate, white, with green nerves. Corolla orange yellow, tube hirsute, lobes orbicular, apiculate, throat villous. Berry globose, hairy.

**Fl. & Fr.:** June - December

**Distribution:** India (NE India), E Himalaya, Bangladesh, China, Myanmar, Nepal, Philippines, Taiwan, Thailand

**Specimen examined:** Grows in open secondary forest. Wazeho. NLNU 0649. **(Pl. 29)**

*Mussaenda roxburghii* Hook.f., Fl. Brit. Ind. 3: 87. 1880; Kanjilal *et al.*, Fl. As. 3: 46. 1939; Balakr., Fl. Jowai 1: 236. 1981; Haridasan & Rao, Forest Fl. Megh. 2: 491. 1987; Singh in Singh *et al*, Fl. Mizo. 1: 706. 2002.

Erect shrubs. Stem pubescent. Leaves opposite, ovate-lanceolate, 7-20 x 5-8 cm, base cuneate, apex acuminate, sparsely setulose above, pale beneath, strigose on nerves beneath; petioles 0.5-2.5 cm, stipules lanceolate. Flowers in terminal corymbose cymes, hairy. Calyx campanulate, teeth filiform, subulate; petaloid segment white, pale green on nerves below, stalked 2-4 cm long. Corolla tube pale green, lobes small, with filiform tip, yellow or orange yellow, pubescent. Berry oblong, ellipsoid, crowned by calyx lobes.

**Fl. & Fr.:** April - November

**Distribution:** India (NE India), E Himalaya, Bangladesh, Myanmar, Nepal

**Specimen examined:** Grows in open secondary forest. Wazeho. NLNU 0648.

*Mycetia* Reinw., Syll. Pl. Nov. 2: 9. 1825

Shrubs, bark soft, often corky. Leaves opposite, stipules persistent. Flowers in terminal, axillary or psuedoaxillary paniculate cymes. Calyx tube short, limb deeply 4-6

lobed. Corolla funnel-shaped, salver-shaped or campanulate, lobes 4-6, glabrous or pubescent inside. Stamens 4-6, inserted in tube or throat. Ovary 2-5 celled, ovules many. Fruit a berry, globose, fleshy or coriaceous, with persistent calyx.

1a. Flowers in terminal or axillary cymes

*M. longifolia*

1b. Flowers in lower leaf axils

*M. mukerjiana*

***Mycetia longifolia*** (Wall.) Kuntze, revis. Gen. Pl. 1: 289. 1891; Kanjilal *et al.*, Fl. As. 3: 49. 1939; Balakr., Fl. Jowai 1: 235. 1981; Haridasan & Rao, Forest Fl. Megh. 2: 491. 1987; Singh in Singh *et al*, Fl. Mizo. 1: 706. 2002; *Adenosacme longifolia* (Wall.) Wall.ex Miq., Fl. Ned. Ind. 2.2: 217. 1857; Hook.f., Fl. Brit. Ind. 3: 95. 1880.

Shrubs or undershrubs. Branchlets pubescent. Leaves elliptic-lanceolate, 8-20 x 2-6 cm, base cuneate, apex long acuminate, pubescent on both surfaces; petioles 0.6-1.5 cm, stipules oblong-lanceolate. Flowers in terminal or axillary trichotomous paniculate cymes. Calyx tube globose, persistent in fruit. Corolla yellow, tubular, pubescent inside, lobes 4-6, triangular. Stamens 4-6. Ovary 2-celled, ovules numerous. Berries globose, white, crowned with calyx.

**Fl. & Fr.:** July - November

**Distribution:** India (NE India), E Himalaya, Bangladesh, China, Myanmar, Nepal, Tibet, Vietnam

**Specimen examined:** Grows in shady places near streams in primary or secondary forest. Mesulumi. NLNU 0385. **(Pl. 29)**

***Mycetia mukerjiana*** Deb & Ratna Dutta, Indian Forester 91: 272. 1965; Singh in Singh *et al*, Fl. Mizo. 1: 707. 2002.



Undershrubs, stems terete, whitish. Leaves opposite, elliptic, oblong-lanceolate, 9-20 x 3-7 cm, base attenuate, apex acuminate, membranous, glabrous; petioles 2-3 cm long, stipules oblong, apex acute. Flowers in lower leaf axils, paniculate cymes, bracteate. Calyx lobes 5, persistent. Corolla yellow, tube about 1.3 cm long, lobes 5, ovate. Stamens 5. Berries cylindric or ovoid, white.

**Fl. & Fr.:** July - November

**Distribution:** India (NE India), Bangladesh

**Specimen examined:** Grows in shady places near streams in primary or secondary forest. Mesulumi. NLNU 0382. **(Pl. 29)**

*Neohymenopogon* Bennet, Indian Forester 107: 436. 1981

Shrubs, usually epiphytic. Leaves simple, opposite, clustered at branch ends; stipules large, persistent. Flowers in terminal corymbs; bracts large, foliaceous. Calyx tube short, lobes long. Corolla tube long, slender, lobes salver-shaped. Stamens 5, inserted near the throat of corolla tube. Ovary 2-celled, ovules many; stigmas 2, linear. Fruit a capsule with persistent calyx.

*Neohymenopogon parasiticus* (Wall.) Bennet, Indian Forester 107: 436. 1981; Grierson & Long, Fl. Bhut. 2: 2: 746. 1999; *Hymenopogon parasiticus* Wall., Roxb. Fl. Ind. 2: 157. 1824; Hook.f., Fl. Brit. Ind. 3:34. 1880; Kanjilal *et al.*, Fl. As. 3: 25. 1939; Haridasan & Rao, Forest Fl. Megh. 2: 478. 1987; Singh in Singh *et al.*, Fl. Mizo. 1: 694. 2002.

Epiphytic shrubs. Leaves elliptic or obovate-lanceolate, 7-19 x 2-8 cm, base cuneate or attenuate, apex acute or shortly acuminate, margin entire, pubescent on both surfaces; petioles 0.5-2 cm; stipules ovate. Flowers in corymbs, 5-10 cm across; bracts whites, stalked.

Calyx tube linear, lobes lanceolate. Corolla white, lobes spreading, hairy within. Capsule 1-2 cm long, oblong-ellipsoid, crowned with persistent calyx.

**Fl. & Fr.:** June - October

**Distribution:** India (NE India), E Himalaya, Bhutan, China, Myanmar, Nepal, Thailand, Tibet, Vietnam

**Specimen examined:** Grows epiphytic on trees in secondary forest. Kapamodzu. NLNU 0298. (Pl. 29)

*Ophiorrhiza* L., Sp. Pl. 150. 1753

Erect or decumbent herbs, rarely undershrubs. Leaves simple, opposite, equal or unequal in each pair; stipules usually deciduous. Flowers in terminal and sometimes axillary, dichotomous cymes, often compact in flower but becoming branched and scorpioid in fruit; bracts and bracteoles various, sometimes absent. Calyx tube short, 5-lobed, small, persistent. Corolla tubular or funnel-shaped, lobes 5, short. Stamens 5, inserted on the tube. Ovary 2-celled. Fruit a compressed capsule, obcordate, girt in the middle by the calyx-tube; many seeded.

1a. Creeping herbs *O. pauciflora*

1b. Erect herbs

2a. Capsule glabrous *O. oppositiflora*

2b. Capsule puberulous *O. succirubra*

*Ophiorrhiza oppositiflora* Hook.f., Fl. Brit. Ind. 3: 80. 1880; Singh in Singh *et al*, Fl. Mizo. 1: 712. 2002.

Erect herbs. Leaves ovate-lanceolate or elliptic-lanceolate, 5-14 x 2-5 cm, base cuneate, apex acuminate; petioles slender, stipules subulate. Flowers in terminal and axillary

pedunculate cymes, many-flowered, cymes opposite; bracteoles small. Calyx lobes lanceolate, dark purple. Corolla white, glabrous, tube 5- angled, lobes ovate. Capsule glabrous.

**Fl. & Fr.:** April - September

**Distribution:** India (NE India), Bangladesh, China, Myanmar

**Specimen examined:** Grows in shady places in primary or secondary forest. Tsupfume. NLNU 0092.

*Ophiorrhiza pauciflora* Hook.f., Fl. Brit. Ind. 3: 84. 1880; Balakr., Fl. Jowai 1: 249. 1981; Singh in Singh *et al*, Fl. Mizo. 1: 712. 2002.

Creeping herbs, rooting at lower nodes. Leaves ovate, 1.5-3.5 x 1-2 cm, base cuneate, apex acute, sparsely pilose above, puberulous beneath. Flowers few in axillary and terminal cymes, bracteoles linear, ciliate, persistent. Calyx teeth linear lanceolate, pubescent. Corolla white, tubular, outside hispid, lobes short, ovate. Capsule compressed, obcordate, puberulous.

**Fl. & Fr.:** April - September

**Distribution:** India (NE India), Bhutan, China, Myanmar, Nepal

**Specimen examined:** Grows in moist shady places in primary or secondary forest. Tsupfume. NLNU 0099.

*Ophiorrhiza succirubra* King ex. Hook.f., Fl. Brit. Ind. 3: 82. 1880; Balakr., Fl. Jowai 1: 248. 1981; Singh in Singh *et al*, Fl. Mizo. 1: 714. 2002.

Erect herbs, glabrous. Leaves opposite, elliptic-lanceolate, 5-10 x 2-5 cm, base cuneate, apex acuminate, margin entire, sometimes slightly wavy; petioles 1-2 cm long, stipules linear. Flowers in compact cymes; bracteoles linear-lanceolate, persistent, glabrous.

Calyx persistent, lobes small, ovate, dark purple. Corolla pinkish-white or white, tubular, swollen at base, glabrous outside, glabrous or pubescent inside, lobes ovate. Capsule puberulous.

**Fl. & Fr.:** April - September

**Distribution:** India (NE India), Bhutan, China, Myanmar, Nepal

**Specimen examined:** Grows in moist shady places in primary or secondary forest. Pfutsero. NLNU 0107.

*Paederia* L., Mant. Pl. 1: 7. 52. 1767

Climbing shrubs, foetid when bruised. Leaves opposite, rarely whorled, entire, petiolate, stipules intrapetiolar. Flowers in terminal or lateral branched paniced cymes, bracteate, 4-5 merous. Calyx tube obscure, lobes minute, persistent. Corolla funnel-shaped or tubular, pubescent, tube villous inside. Stamens 4-5, inserted in the tube. Ovary 2-celled; stigmas 2. Fruit globose or compressed.

*Paederia foetida* L., Mant. Pl. 1: 52. 1767; Hook.f., Fl. Brit. Ind. 3: 195. 1881; Kanjilal *et al.*, Fl. As. 3: 77. 1939; Balakr., Fl. Jowai 1: 251. 1981; Singh in Singh *et al*, Fl. Mizo. 1: 717. 2002.

Slender climbers, foetid when crushed. Leaves elliptic-ovate or ovate-lanceolate, 4-10 x 2-5 cm, base rounded or cordate, apex acuminate, glabrous; petioles 2-4 cm long. Flowers in axillary and terminal paniculate cymes. Calyx lobe small, triangular. Corolla tube grayish purple with reddish purple mouth, funnel-shaped, tube glandular hairy within. Fruit ellipsoid, compressed, reddish, pyrenes winged.

**Fl. & Fr.:** June - October

**Distribution:** India (throughout), E Himalaya, Bangladesh, Bhutan, China, Japan, Korea, Nepal, Southeast Asia

**Specimen examined:** Grows in forest margins, slopes climbing on bushes and small trees. Zhavame. NLNU 0262.

***Rubia* L., Sp. Pl. 109. 1753**

Scrambling or climbing herbs. Stems quadrangular, scabrid or prickly. Leaves in whorls of 4-8, scabrid, sessile or petiolate. Flowers small, in axillary and terminal cymes. Calyx adnate to ovary, lobes absent. Corolla rotate, tube short, lobes 4-5, spreading. Stamens 4-5, inserted on corolla tube. Ovary 2-celled, stigma capitate. Fruit a berry, globose, didynamous, fleshy, glabrous.

1a. Leaves sessile

*R. sikkimensis*

1b. Leaves not sessile

*R. cordifolia*

***Rubia cordifolia* L., Sp. Pl. 397. 1753; Hook.f., Fl. Brit. Ind. 3: 202. 1881; Kanjilal *et al.*, Fl. As. 3: 94. 1939; Balakr., Fl. Jowai 1: 238. 1981; Singh in Singh *et al*, Fl. Mizo. 1: 727. 2002.**

Climbers, scabrid. Leaves 4, whorled, ovate-lanceolate, 1-7 x 0.7-2 cm, base rounded or subcordate, apex acuminate, coriaceous, margin slightly prickly; petioles 2-6 cm long. Flowers in terminal umbellate, paniced cymes. Calyx tube globose, lobes reduced. Corolla greenish-yellow, hispid, tube short, lobes spreading. Stamens adnate to corolla tube. Ovary 2-celled. Berry globose, purplish-black when ripened.

**Fl. & Fr.:** June - December

**Distribution:** India (throughout), Asia, Africa

**Specimen examined:** Grows in forest margins, slopes, roadsides. Khezhakheno. NLNU 0208. (Pl. 29)

***Rubia sikkimensis*** Kurz., J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 43: 188. 1874; Hook.f., Fl. Brit. Ind. 3: 203. 1881; Kanjilal *et al.*, Fl. As. 3: 94. 1939; Singh in Singh *et al*, Fl. Mizo. 1: 728. 2002.

Scabrid, stout, scandent herbs. Stems quadrangular, ribbed, with hooked prickles. Leaves 4 in a whorl, sessile, elliptic to ovate-lanceolate, 6-14 x 2-5 cm, base rounded or cuneate, apex acute or acuminate, scabrid on both surfaces, with recurved prickles on nerves beneath. Flowers in terminal and axillary large paniced cymes. Calyx tube small. Corolla rotate, lobes acute. Fruit globose, black.

**Fl. & Fr.:** June - December

**Distribution:** India (NE India), E Himalaya, Nepal

**Specimen examined:** Grows in forest margins, slopes, roadsides. Khezhakheno. NLNU 0210.

***Spermacoce* L., Sp. Pl. 102. 1753**

Herbs. Stems erect or prostrate. Leaves opposite, sessile or petiolate; stipules connate with petioles forming a broad truncate tube, fimbriate, with marginal bristles. Flowers small, in axillary or terminal, fascicles heads or cymes. Calyx tube reduced, with 2-8 lobes. Corolla funnel or salver-shaped, lobes 4. Stamens 4, included or exserted. Ovary 2-celled. Fruit a 2-valve capsule.

1a. Stem glabrous; capsule glabrous

*S. ocymoides*

1b. Stem hispid; capsule hispid

*S. hispida*

***Spermacoce ocymoides*** Burm.f., Fl. Ind. 34. t. 13. f. 1. 1768; Hook.f., Fl. Brit. Ind. 3: 200. 1881; Singh in Singh *et al*, Fl. Mizo. 1: 729. 2002; *Borreria ocymoides* (Burm .f.) DC., Prodr. 4: 544. 1830.

Erect herbs. Stems 4-angled, often ciliate at angles. Leaves ovate or elliptic, 2-5 x 0.8-1.2 cm, apex acute or acuminate, glabrous or scabrid above, margins scabrid nerves pubescent beneath; petioles 0.1-0.2 cm long; stipules bristly. Flowers in bracteate heads; bracteoles filiform. Calyx lobes 4, unequal. Corolla white, tube dilated above, throat pubescent, lobes 4. Stamens 4. Ovary 2-celled; ovule 1 in each cell. Capsule glabrous.

**Fl. & Fr.:** June – September

**Distribution:** India (throughout), E & W Himalaya, Bangladesh, China, Indonesia, Malaysia, Nepal, Philippines, Sri Lanka, Vietnam; Australia

**Specimen examined:** Grows in open areas, wastelands, roadsides. Khezhakhen. NLNU 0213.

*Spermacoce hispida* L., Sp. Pl. 102. 1753; Hook.f., Fl. Brit. Ind. 3: 203. 1881; Deb & Dutta in J. Econ. Tax. Bot. 10(1): 41. 1987; Singh in Singh *et al*, Fl. Mizo. 1: 729. 2002; *Spermacoce articularis* L.f., Suppl. 119. 1781; *Borreria hispida* (L.) K. Schum in Engler & Prantl., Pflanzenfam. 4(4): 144. 1891, *non* Spruce ex K. Schum, 1888; Kanjilal *et al*., Fl. As. 3: 93. 1939.

Procumbent herbs; stems hispid. Leaves sessile, obovate, elliptic or oblong, 1.3-3.5 x 1-1.5 cm, apex acute, coriaceous, scabrid above; stipules cupular, bristly hispid. Flowers whorled; bracteoles filiform. Calyx tube short, lobes linear-lanceolate. Corolla white, tube dilated upwards; lobes 4. Stamens 4. Ovary 2-celled. Capsules hispid; seeds brown glossy.

**Fl. & Fr.:** July - December

**Distribution:** India (throughout), E & W Himalaya, Bangladesh, China, Indonesia, Malaysia, Nepal, Philippines, Sri Lanka, Vietnam; Australia

**Specimen examined:** Grows in open areas, wastelands, roadsides. Khezhakhen. NLNU 0218.

*Uncaria* Schreber, Gen. Pl., ed. 8[a], 1: 125. 1789

Woody climbers, stems terete to quadrangular. Lateral vegetative shoots modified as hooks. Leaves opposite, shortly petiolate, sometimes with domatia in axils of veins. Stipules entire or bifid. Flowers axillary and sometimes terminal, 5-merous, in capitate heads, subsessile with bracteoles, or pedicellate without bracteoles. Calyx tube short. Corolla funnelform or infundibular, lobes ovate to oblong-elliptic. Stamens 5, inserted in corolla tube near throat. Ovary 2-locular; style slender; stigma capitate. Fruit free, dry, septicidally 2-valved, with persistent calyx. Seeds numerous, small, winged.

*Uncaria macrophylla* Wall. in Roxb., Fl. Ind. 2: 132. 1824; Hook.f., Fl. Brit. Ind. 3: 32. 1880; Kanjilal *et al.*, Fl. Assam 3: 23. 1939; Deb & Dutta in J. Econ. Tax. Bot. 10(1); 41. 1987; Singh in Singh *et al.*, Fl. Mizo. 1: 731. 2002.

Woody climbers. Stem sparsely pubescent when young. Leaves ovate or broadly elliptic, 9-17 x 4-7.5cm, base subcordate, rounded, apex acute; lateral nerves 6-8 pairs; petioles 0.2-0.7 cm long. Flowers in axillary and terminal, pedunculate, bracteate heads. Calyx lobes linear. Corolla white, hirsute outside, lobes oblong. Capsules spindle-shaped, stalked.

**Fl. & Fr.:** May - October

**Distribution:** India (NE India), E Himalaya, Bangladesh, China, Nepal, Thailand, Vietnam

**Specimen examined:** Grows climbing on trees in forest. Sakraba. NLNU 0698. (Pl. 30)



***Wendlandia*** Bartling ex Candolle, Prodr. 4: 411. 1830

Shrubs or small trees. Leaves opposite or sometimes whorled; stipules entire or bifid. Flowers in terminal panicles composed of small compact cymes of white, fragrant flowers, bracteate. Calyx small, teeth 4-5, persistent, similar in length to tube. Corolla small, tubular or funnelform, often widened upwards with 4-5 spreading or reflexed lobes, usually hirsute inside tube. Stamens inserted in upper part of corolla tube between lobes; filaments absent or short; anthers exserted. Ovary 2-celled; style filiform; stigma bifid or clavate. Fruit a capsule, small, globose. Seeds many.

- 1a. Corolla tube short, less than twice the length of the lobes *W. wallichii*
- 1b. Corolla tube twice the length of lobes or longer
  - 2a. Calyx glabrous *W. glabrata*
  - 2b. Calyx hairy
    - 3a. Leaves scabrous above and pubescent beneath *W. paniculata*
    - 3b. Leaves glabrous above and glabrescent beneath
      - 4a. Calyx lobes ovate *W. budleioides*
      - 4b. Calyx lobes oblong *W. tinctoria*

***Wendlandia budleioides*** Wall. ex Wight & Arn., Prodr. Fl. Ind. Orient. 1: 402. 1834; *W. grandis* (Hook.f.) Cowan in Notes Roy. Bot. Gard. Edin. 16: 261. 1932; C.E.C. Fischer in Rec. Bot. Surv. Ind.12(2): 103. 1938; Kanjilal *et al.*, Fl. Assam 3: 36. 1939; Singh in Singh *et al*, Fl. Mizo. 1: 734. 2002; *W. tinctoria* (Roxb.) DC. var. *grandis* Hook.f., Fl. Brit. Ind.3: 38. 1880.

Small trees. Leaves ovate-elliptic, 6-12 x 3-5 cm, base cuneate, apex acuminate, glabrous above, pubescent beneath; lateral nerves 8-10 pairs; stipules with flattened

appendages, triangular, interpetioler. Flowers in fascicles, sessile. Calyx puberulose, lobes triangular, apex acute. Corolla white, tube funnel-shaped, throat hairy; lobes 5, ovate. Stamens 5. Style glabrous; stigma 2-lobed. Capsule globose.

**Fl. & Fr.:** February - May

**Distribution:** India (NE India), E Himalaya, Bangladesh, China, Myanmar, Nepal

**Specimen examined:** Grows in open secondary forest. Chozuba. NLNU 0380. **(Pl. 30)**

*Wendlandia glabrata* DC., Prodr. 4: 411. 1830; Hook.f., Fl. Brit. Ind.3: 39. 1880; Kanjilal *et al.*, Fl. Assam 3: 34. 1939; Haridasan & Rao, Forest Fl. Megh. 2: 509. 1987.

Small tree; branches spreading. Leaves 9-17 x 2-6 cm, elliptic-lanceolate, subcoriaceous, apex acuminate, base cuneate, glabrous above, reddish-brown underneath; stipules broader than long, shortly cuspidate. Flowers yellowish, subsessile, in terminal pyramidal panicles upto 25 cm long. Calyx glabrous; teeth minute, triangular. Corolla tube cylindrical or trumpet-shaped; limb reflexed. Capsules globose.

**Fl. & Fr.:** February - June

**Distribution:** India (NE India), Bangladesh, Cambodia, Malaya, Sumatera, Vietnam

**Specimen examined:** Grows in open secondary forest. Zelome. NLNU 0181.

*Wendlandia paniculata* (Roxb.)DC., Prodr. 4: 411. 1830; Hook.f., Fl. Brit. Ind.3: 39. 1880; Kanjilal *et al.*, Fl. Assam 3: 34. 1939; Haridasan & Rao, Forest Fl. Megh. 2: 509. 1987.

Small tree, branches tomentose. Leaves elliptic, ovate or oblanceolate, 5-15 x 3-6 cm, apex acute, base cuneate, margin entire, scabrous above, pubescent beneath, stipules ovate, recurved. Flowers white, sessile in villous spreading panicles. Calyx hairy, teeth obtuse, shorter than the tube. Corolla funnel-shaped; lobes reflexed, half the length of tube or less. Capsule globose.

**Fl. & Fr.:** April - July

**Distribution:** India (NE India), Bangladesh, Thailand, Vietnam

**Specimen examined:** Grows in open secondary forest. Tsupfume. NLNU 0061.

*Wendlandia tinctoria* (Roxb.) DC. Prodr. 4: 411. 1830; Hook.f., Fl. Brit. Ind.3: 38. 1880; Kanjilal *et al.*, Fl. Assam 3: 33. 1939; Haridasan & Rao, Forest Fl. Megh. 2: 511. 1987.

Shrubs or small trees. Branches spreading, pubescent. Leaves elliptic, ovate-elliptic, lanceolate or oblanceolate, 7-12 x 3.5-6 cm, apex acute, base cuneate, margin entire, pubescent beneath; stipules ovate triangular, cuspidate. Flowers sessile, white in pubescent pyramidal panicles. Calyx hairy, teeth oblong. Corolla glabrous, lobes shorter than the tube. Stamens shortly exerted. Capsule globose.

**Fl. & Fr.:** March - June

**Distribution:** India (NE India), E Himalaya, Bangladesh, China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in open secondary forest. Chizami. NLNU 0545.

*Wendlandia wallichii* Wight & Arn., Prodr. Fl. Ind. Orient. 1: 402. 1834 Hook.f., Fl. Brit. Ind.3: 38. 1880; Kanjilal *et al.*, Fl. Assam 3: 33. 1939; Haridasan & Rao, Forest Fl. Megh. 2: 511. 1987; Singh in Singh *et al.*, Fl. Mizo. 1: 735. 2002.

Shrub or small trees. Leaves elliptic-lanceolate, 7-16 x 2-6 cm, apex acute, base cuneate, coriaceous, glabrous; lateral nerves 10-12 pairs; stipules ovate, apex acute, caducous. Flowers fragrant, in pubescent pedicelled panicles. Calyx lobes deltoid, apex acute, glabrous. Corolla white, tube much longer than calyx, lobes reflexed. Stamens sessile; anthers near throat. Capsules globose.

**Fl. & Fr.:** September - February

**Distribution:** India (NE India), E Himalaya, Bangladesh

**Specimen examined:** Grows in open secondary forest. Thetsumi. NLNU 0738. (Pl. 30)

## VALERIANACEAE

Batsch., Jab. Aff. Reg. Veg. 227. 1802

Annual or perennial herbs, often with strong smelling rhizome. Leaves opposite or in basal rosette, simple or compound. Flowers in corymbose cymes that may be paniculate or capitate, sometimes polygamous or dioecious. Calyx small in flower, often enlarged in fruit. Corolla 3-5-lobed, often unequal or spurred at base. Stamens 1-4, inserted on corolla and alternating with the lobes. Ovary inferior, 1-3-celled. Fruit an achene, crowned by calyx.

*Valeriana* L., Sp. Pl. 31. 1753

Herbs. Leaves simple or compound, sometimes grouped at base, opposite. Flowers in dense corymbose cymes becoming lax at maturity, bracts persistent. Calyx adnate to ovary, often forming pappus in fruit. Corolla lobes 3-5, imbricate. Stamens 3. Ovary 3-celled, functionally 1-celled; stigma 2-3-lobed. Fruit indehiscent.

*Valeriana jatamansii* Jones, Asiat. Res. 2: 416. 1790 et 4: 451. 1795; Balakr., Fl. Jowai 1: 253. 1981; Grierson & Long, Fl. Bhut. 2.3: 1366. 2001; *V. wallichii* DC. Prodr. 4: 634. 1830 et Mem. Valer. 15. T. 4. 1832; Clarke in Hook.f., Fl. Brit. Ind. 3: 213. 1881; Kanjilal *et al.*, Fl. As. 3: 97. 1939.

Erect herbs, pubescent, rootstock thick. Radical leaves persistent, ovate-cordate, 3-9 x 2-7 cm, petioles 3-9 cm long; cauline leaves few, entire or pinnatifid, 2-4 x 2-3 cm. Inflorescence a dense-flowered panicle. Flowers white or pinkish tinged. Fruit an achene, ovoid, puberulous.

**Fl. & Fr.:** April - September

**Distibution:** India (NE India), E & W Himalaya, Bhutan, China, Myanmar, Nepal

**Specimen examined:** Grows in grassy slopes, shaded damp areas. Kapamodzu. NLNU 0254. (Pl. 30)

## ASTERACEAE

Bercht. & J. Presl, Prir. Rostlin 254. 1820

Herbs or shrubs, rarely trees. Leaves alternate, rarely opposite, simple or compound, exstipulate. Flowers sessile, in a dense head on common receptacle enclosed in an involucre of whorled calyx-like bracts. Flowers all tubular or the outer or all ligulate, all bisexual or the inner bisexual or male, the outer female or neuter, sometimes monoecious or dioecious. Calyx present in the form of pappus. Corolla tubular or labiate and ligulate; lobes usually 5, valvate. Stamens usually 5, epipetalous; filaments short, free. Ovary unilocular; style simple, forking at end into 2 stigmas; ovules solitary, erect. Fruit an achene, dry, indehiscent.

1a. Leaves with spines

*Cirsium*

1b. Leaves without spines

2a. Plants with milky fluids; florets ligulate

3a. Leaves pinnate to undivided; florets 70-300

*Sonchus*

3b. Leaves lyrate-pinnate or undivided; florets 3-40

*Melanoseris*

2b. Plants without milky fluids; florets not ligulate

4a. Heads with true rays

5a. Disc florets bilabiate

6a. Heads homogamous; bracts many-seriate

*Ainsliaea*

6b. Heads heterogamous; bracts 2-seriate

*Piloselloides*

5b. Disc florets tubular	
7a. Plants aromatic	<i>Artemisia</i>
7b. Plants not aromatic	
8a. Receptacles paleaceous	
9a. Leaves opposite	
10a. Leaves pinnatifid	
11a. Achenes beaked	<i>Cosmos</i>
11b. Achenes not beaked	<i>Bidens</i>
10b. Leaves simple or pinnately compound	
12a. Achenes dorsally compressed or angular	
13a. Achenes 2-winged	<i>Synedrella</i>
13b. Achenes many fimbriate	<i>Galingsoga</i>
12b. Achenes rounded or laterally compressed	
14a. Inner bracts enclosing the achenes	<i>Siegesbeckia</i>
14b. Inner bracts not enclosing the achenes	
15a. Involucral bracts 2-5 seriate	<i>Tithonia</i>
15b. Involucral bracts 1-2 seriate	<i>Acmella</i>
9b. Leaves alternate	
16a. Ray florets absent	
17a. Receptacles conical	<i>Cyathocline</i>
17b. Receptacles flat	<i>Dichrocephala</i>
16b. Ray florets present	
18a. Pappus present	<i>Microglossa</i>
18b. Pappus absent	<i>Myriactis</i>

- 8b. Receptacles naked
  - 19a. Involucral bracts 1-3-seriate
    - 20a. Leaves simple *Rhynchospermum*
    - 20b. Leaves simple or pinnately divided *Senecio*
  - 19b. Involucral bracts many-seriate
    - 21a. Heads radiate *Inula*
    - 21b. Heads disciform
      - 22a. Anther sagittate or 2-lobed *Laggera*
      - 22b. Anther always sagittate
        - 23a. Involucral bracts green, herbaceous *Blumea*
        - 23b. Involucral bracts scarious, white or translucent
          - 24a. Bisexual flowers sterile *Anaphalis*
          - 24b. Bisexual flowers fertile *Psuedognaphalium*
  - 4b. Heads without true rays
    - 25a. Involucral bracts multi-seriate *Vernonia*
    - 25b. Involucral bracts 1-seriate
      - 26a. Twiners; involucral bracts 3-5 *Mikania*
      - 26b. Erect herbs or shrubs; involucral bracts more than 5
        - 27a. Pappus 5; basally connate *Ageratum*
        - 27b. Pappus many; uniseriate
          - 28a. Phyllaries 2-3-seriate *Ageratina*
          - 28b. Phyllaries 4-6-seriate *Chromolaena*

*Acmella* Rich. ex Pers., Syn. Pl. 2: 472. 1807.

Annual or perennial herbs. Stems 1-several from base, erect or decumbent. Leaves ovate or elliptic, opposite, petiolate. Capitula solitary or few on axillary or terminal peduncles. Involucres 1-2-seriate; phyllaries narrowly ovate. Receptacles conical to elongate. Ray flowers few or absent, female; ligules slightly longer than phyllaries, yellow or orange. Disc flowers bisexual; corollas yellow, tubular-campanulate, 4-5-lobed; style branches obtuse. Achenes obovoid, compressed. Pappus absent or of 2 weak scabridulous bristles.

1a. Pappus absent

*A. calva*

1b. Pappus present

*A. paniculata*

*Acmella calva* (DC.) R.K. Jansen, Syst. Bot. Monog. 8: 41. 1985; *Spilanthes calva* DC. Wight, Contrib. Bot. Ind. 19. 1834; H.J. Chowdhery in Hajra *et al.*, Fl. Ind. 12: 409. 1995; *Spilanthes acmella sensu* Hook.f., Fl. Brit. Ind. 3: 307. 1881, *non* (L.) Murray, 1774. *Spilanthes acmella* var. *calva* (DC.) C.B. Clarke, Comp. Ind. 138. 1876.

Erect or decumbent herbs; stem terete, densely pubescent. Leaves opposite, elliptic or ovate-lanceolate, acute to obtuse at apex, irregularly serrate at margin, attenuate at base, pubescent beneath; petioles up to 1.5 cm long. Heads solitary, axillary or terminal, peduncles 5-8 cm long; involucre bracts 1-seriate, ovate, spreading, obliquely lanceolate, pubescent; flowers yellow, ray flowers 1-seriate, female flowers many, corollas 4-5 toothed at apex. Achenes glabrous. Pappus absent.

**Fl. & Fr.:** August-December.

**Distribution:** India (NE India), China, Nepal, Myanmar

**Specimen examined:** Common throughout waste and fallow lands. Chozuba. NLNU 0379.



*Acmella paniculata* (Wall. Ex Dc) R.K. Jansen, Syst. Bot. Monogr. 8: 67. 1985; *Spilanthes paniculata* Wall. ex DC., Prodr. 5: 625. 1836; *Spilanthes acmella* var. *paniculata* (Wall. ex DC.) C.B. Clarke, Comp. Ind. 138.1876; Hook.f., Fl. Brit. Ind. 3: 307. 1881.

Erect herbs. Leaves broadly ovate, apex acute or obtuse, margins undulate, attenuate at base, pubescent. Heads 7-9 mm broad, few in axillary or terminal panicles; involucre bracts 2-seriate, elliptic, acute to obtuse at apex, sparsely pubescent; flowers all bisexual, corolla, 5 lobes, densely pilose within. Achenes black, sparsely puberulous near apex. Pappus present.

**Fl. & Fr.:** December-June.

**Distribution:** India (NE India), China, Nepal, Myanmar

**Specimen examined:** Common in fallow lands, roadsides. Chozuba. NLNU 0378.

*Ageratina* Spach, Hist. Nat. Veg. 10: 286. 1841

Herbs, shrubs or subshrubs. Leaves opposite, simple, subentire to coarsely serrate. Heads in corymbs, discoid. Involucres cylindric to campanulate. Corolla tubular-campanulate. Style linear, exserted. Achenes oblong, 5-ribbed; pappus simple, white.

1a. Leaves lanceolate or elliptic; achenes hairy *A. riparia*

1b. Leaves ovate, rhomboid; achenes glabrous *A. adenophora*

*Ageratina adenophora* (Spreng.) R. M. King & H. Rob., Phytologia 19: 211. 1970; *Eupatorium adenophorum* Spreng., Syst. Veg. ed. 16, 3:420. 1826; Haridasan & Rao, For. Fl. Megh. 2: 522. 1987; Singh in Singh *et al.*, Fl. Mizo. 1: 770. 2002.

Herbs or undershrubs, much branched, up to 2 m tall. Stems puberulous. Leaves opposite, subsessile, ovate-triangular, or rhomboid, 2-8 x 0.5-4 cm, base cuneate, narrowed,

apex acute-acuminate, margins dentate, pubescent on both the surfaces. Heads in dense axillary and terminal corymbs. Involucral bracts 3-seriate, outer oblong spatulate, with glandular hairs, inner oblong-lanceolate, or ovate. Flowers white. Achenes conspicuously 5-angled, black; pappus dull white.

**Fl. & Fr.:** February - June

**Distribution:** Native of Central America, common throughout India

**Specimen examined:** Grows commonly in shady places. Pfutsero. NLNU 0110.

*Ageratina riparia* (Regel) R. M. King & H. Rob, Phytologia 19: 216. 1970; *Eupatorium riparium* Regel, Gartenflora 15: 324. 1866; Haridasan & Rao, For. Fl. Megh. 2: 523. 1987.

Perennial herbs; much branched from base, young parts pubescent. Leaves simple, elliptic-lanceolate, apex acuminate, base attenuate, margin dentate-serrate, glabrescent. Heads in dense corymbs; in leafy panicles. Florets white. Achenes minute; pappus white.

**Fl. & Fr.:** March - June

**Distribution:** Native of Central America, common throughout India

**Specimen examined:** Grows commonly in shady places, along stremsides. Mesulumi. NLNU 0386.

*Ageratum* L. Sp. Pl. 839. 1753

Erect herbs, hairy. Leaves opposite, simple, toothed, petiolate. Capitula in small clusters towards branch ends, sometimes grouped into terminal corymbs, discoid. Receptacle naked. Corollas tubular, campanulate, 5-toothed. Style branches exserted, slender, clavate. Achenes narrowly oblong, black, 5-ribbed; pappus usually of 5 small scales, each usually bearing a longer bristle.

*Ageratum conyzoides* L., Sp. Pl. 839. 1753; Hook.f., Fl. Brit. Ind. 3: 243. 1881; Haridasan & Rao, For. Fl. Megh. 2: 516. 1987; Singh in Singh *et al.*, Fl. Mizo. 1: 743. 2002.

Annual herbs, aromatic. Leaves opposite, or alternate above, petioled, ovate or ovate-rhomboid, 1.5-7 x 0.5-5 cm, apex subacute-obtuse, base subtruncate or acute, margins crenate-serrate; pilose above, glandular punctate beneath. Heads clustered in axillary and terminal corymbose panicles. Corolla bluish or white. Achenes blackish, pappus awned.

**Fl. & Fr.:** Throughout the year

**Distribution:** Native of Tropical America, common throughout India

**Specimen examined:** Grows commonly in open areas. Mesulumi. NLNU 0389.

*Ainsliaea* DC.Prodr. 7.1: 13. 1838

Erect, subscapigerous, perennial herbs. Leaves simple, alternate mostly radical. Head small, sessile or peduncled, solitary fascicled racemed, paniced or spicate, on a slender flowering stem, white or light purplish. Flowers bisexual. Corolla deeply 5-lobed. Achenes oblanceolate, subcompressed.

*Ainsliaea latifolia* (D. Don) Sch.-Bip. in Pollichia 18. 19: 190. 1861; Rao in Hajra *et al.*, Fl. Ind. 13: 167. 1995; Balakr., Fl. Jowai 1: 264. 1981; *Liatris latifolia* D. Don, Prodr. Fl. Nepal. 189. 1825; *Ainsliaea pteropoda* DC., Prodr. 7: 14. 1838; Hook.f., Fl. Brit. Ind. 3: 388. 1881.

Scapigerous, perennial herbs; stems erect. Leaves radical, alternate, cordate-ovate 3-8 x 2-5 cm, petioled or sessile, petiole winged, base narrowed, margins sparsely serrate, white tomentose beneath. Heads up to 1.5 cm across, fascicled in a spike or racemed panicles. Involucral bracts multi-seriate, linear-lanceolate, acute, reddish green. Florets pale blue. Achenes oblanceolate, 10-ribbed, silky; pappus pale-brown.

**Fl. & Fr.:** March - December

**Distribution:** India (NE India), E & W Himalaya, Bhutan, China, South East Asia

**Specimen examined:** Grows in shaded forest areas, grasslands. Tsupfume. NLNU 0062.

**(Pl. 30)**

*Anaphalis* DC., Prodr. 6: 271. 1838

Erect, perennial herbs; wooly or cottony. Leaves simple, alternate, entire. Head small, many in terminal corymbs. Flowers unisexual. Involucres broadly campanulate; phyllaries many seriate, scarious, inner petaloid white or yellowish. Achenes oblong; pappus slender, scabrid, hairs deciduous.

1a. Leaves glabracent above, lateral veins 2 or 4

*A. margaritacea*

1b. Leaves thinly tomentose above; lateral veins absent or 2

*A. griffithii*

*Anaphalis griffithii* Hook. f., Fl. Brit. Ind. 3: 280. 1881; Balakr., Fl. Jowai 1: 276. 1981.

Erect herbs, 30-80 cm tall. Leaves densely covered with wooly hairs, linear-lanceolate, 3-8 x 0.4-0.8 cm, apex acuminate, base semiamplexicaul. Heads subglobose, in terminal corymbs. Involucre ovate or elliptic-obovate, white.

**Fl. & Fr.:** October - February

**Distribution:** India (NE India), E Himalaya, Myanmar, Nepal

**Specimen examined:** Grows in grasslands, forest edges. Tsupfume. NLNU 0064. **(Pl. 30)**

*Anaphalis margaritacea* (L.) Benth. & Hook. f., Gen. Pl. 2: 303. 1873; Grierson & Long, Fl. Bhut. 2.3:1517. 2001.

Erect herbs, 30-80 cm tall. Stem tomentose. Leaves elliptic or lanceolate, 0.5-12 x 0.2-1.8 cm, apex acuminate, base narrow, sessile, tomentose or glabrescent above, grayish or

brownish beneath. Heads in dense clusters of corymbs. Involucres 8-10-seriate; phyllaries white, brownish at base. Achenes papillose.

**Fl. & Fr.:** July - December

**Distribution:** India (throughout), Bhutan, Japan, Korea, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in grasslands, forest edges. Pfutsero. NLNU 0120. (**Pl. 31**)

*Artemisia* L., Sp. Pl. 2: 845. 1753.

Herbs or shrubs, aromatic. Leaves alternate, pinnate, rarely palmately divided or entire. Capitula usually many, often secund, usually small, shortly pedunculate to sessile. Involucral bracts 2-3 seriate, globose, ovoid, or ellipsoid. Ray florets female. Disk florets many in 2 or more series, male or bisexual. Achenes obovoid, ovoid, or oblong.

*Artemisia nilagirica* (C.B. Clarke) Pamp., Nuovo. Giorn. Bot. Ital. n.s. 33: 452. 1926; Balakr., Fl. Jowai 1: 261. 1981; Naithani in Hajra *et al.*, Fl. Ind. 12: 36. 1995; *A. vulgaris* var. *nilagirica* C.B. Clarke, Comp. Ind. 162. 1876; *A. vulgaris* (*non* L.) Hook.f, Fl. Brit. Ind. 3: 325. 1881; Kanjilal *et al.*, Fl. As. 3: 119. 1939.

Erect aromatic shrubs, 1-2 m tall. Leaves sessile, lobed or deeply pinnatifid with stipule-like lobes at base, densely white woolly beneath, glabrous above. Heads ovoid or subglobose, yellowish white in paniculate racemes. Involucral bracts oblong. Achenes minute, oblong.

**Fl. & Fr.:** August - February

**Distribution:** India (throughout), Bhutan, Indo - Malaya

**Specimen examined:** Grows in open or shaded places, in grasslands and forest edges. Pfutsero. NLNU 0123.

***Bidens* L. Sp. Pl. 831. 1753**

Annual or perennial herbs or undershrubs. Leaves usually cauline, opposite, petiolate or sessile, simple, compound or 1-3-pinnate. Heads radiate. Involucral bracts many seriate, outer smaller. Ray florets usually neuter, sometimes female and sterile; petals yellow or white. Disk florets bisexual, fertile; petals usually yellow. Achenes compressed or 3 or 4 angled.

1a. Leaves bipinnate or biternate

*B. biternata*

1b. Leaves trifoliolate or pinnate

2a. Leaves 3-lobed, 3-partite

*B. tripartita*

2b. Leaves trifoliolate or pinnate

*B. pilosa*

***Bidens biternata*** (Lour.) Merr. & Sherff, Bot. Gaz. 88: 293. 1929; Grierson & Long, Fl. Bhut. 2.3:1517. 2001.

Erect undershrub; stems glabrous, sparsely pilose at nodes. Leaves usually bipinnate, petiolate; primary leaflets usually 5, ovate or triangular in outline, sparsely pilose on both surfaces. Capitula radiate. Outer phyllaries oblong, spathulate, ciliate; inner phyllaries broadly oblong. Corolla yellow. Ray flowers 3-5, ligules elliptic to obovate, entire to 3-dentate. Achenes linear, sparsely setose above.

**Fl. & Fr.:** August - November

**Distribution:** India (throughout), cosmopolitan

**Specimen examined:** Grows in open areas, roadsides. Kikruma. NLNU 0456.

***Bidens pilosa*** L. var. ***minor*** (Bl.) Sherff. In Field Mus. Nat. Hist. (Chicago) Bot. ser. 16: 421. 1937; Balakr., Fl. Jowai 1: 257. 1981; Chowdhery in Hajra *et al.*, Fl. Ind. 12: 372. 1995; Haridasan & Rao, For. Fl. Megh. 2: 519. 1987.

Erect, glabrous-pubescent annual herbs or undershrubs. Stems 15-100 cm, with finely striate, angulate branches. Leaves opposite, petioled, trifoliate, lobes broadly ovate-lanceolate or elliptic, 1.5- 7.5 x 0.5-2 cm, apex acute, base obtuse, margins crenate, surface glabrous or puberulous. Heads solitary, on long, unequal peduncles. Involucral bracts 1-seriate, ligulate-spathulate. Ray florets white. Disc-florets yellowish brown. Achenes linear; pappus stout, with recurved hooks.

**Fl. & Fr.:** August - December

**Distribution:** India (throughout), cosmopolitan

**Specimen examined:** Grows in open areas, roadsides, wastelands. Kikruma. NLNU 0458.

***Bidens tripartita*** L. Sp. Pl. 2: 831. 1753; Hook.f, Fl. Brit. Ind. 3: 309. 1881; Grierson & Long, Fl. Bhut. 2.3:1619. 2001.

Erect, glabrous annual plant, 10-100 cm tall. Leaves sessile or petiolate, 3-lobed, 3-partite or pinnatifid, segments lanceolate, toothed; petiole narrowly winged. Head solitary or few, discoid or radiate. Outer phyllaries 5-9, leafy, oblanceolate or spathulate, 0.7-4 cm; inner phyllaries ovate to oblong, brownish. Achenes narrowly obovoid or obcuneate; pappus awned.

**Fl. & Fr.:** August - December

**Distribution:** India (throughout), cosmopolitan

**Specimen examined:** Grows in open areas, roadsides, wastelands. Mesulumi. NLNU 0390.

(Pl. 31)

***Blumea* DC., Guillemin, Arch. Bot. 2: 514. 1833**

Annual, biennial or perennial herbs, shrubs or small trees, mostly strong-smelling. Leaves alternate, simple or pinnately or lyrate lobed, denticulate to biserrate. Capitula disciform, in terminal and sometimes axillary panicles. Involucres cylindrical to hemispheric, multiseriate; phyllaries ovate to linear. Receptacle flat or convex, glabrous or pilose. Flowers numerous, marginal ones female, central ones bisexual. Corollas usually yellow, rarely purple. Achenes usually oblong, minutely 5-ribbed, pubescent. Pappus of 1 series of simple white or reddish bristles.

***Blumea laciniata* (Roxb.) DC., Prodr. 5: 436. 1836; Hook.f, Fl. Brit. Ind. 3: 264.1881; Kumar in Hajra *et al.*, Fl. Ind. 13: 128. 1995; Singh in Singh *et al.*, Fl. Mizo. 1: 752. 2002.**

Erect herbs, pubescent or laxly tomentose. Leaves radical and cauline, 3.5-25 x 1-12 cm; lower leaves petioled, elliptical oblong, narrowed into petiole, incised-pinnatifid or lyrate; upper ones sessile, oblong-ovate, obtuse or acute, margins distantly dentate, attenuate at base, villous or pubescent on both the surface. Heads fascicled in large, dense terminal panicles. Involucral bracts linear lanceolate, acuminate, purplish, dorsally villous. Florets yellow. Achenes elongate, 8-10-ribbed, silky; pappus white.

**Fl. & Fr.:** March - August

**Distribution:** India (throughout), South East Asia

**Specimen examined:** Grows in open areas, roadsides, wastelands. Zelome. NLNU 0182.

***Chromolaena* DC., Prodr. 5: 133. 1836**

Perennial herbs or shrub, pubescent, and glandular. Leaves opposite, ovate-triangular, toothed, 3- veined near base, petiolate. Capitula discoid, many flowered,



cylindrical-campanulate, numerous in compact corymbs. Involucres 4-5-seriate; phyllaries imbricate. Corolla white or mauve. Style branches linear, exserted, obtuse. Achenes linear-oblong, blackish, with 5 pubescent ribs; pappus of 1 series.

***Chromolaena odorata*** (L.) R. M. King & H. Rob., Phytologia 20: 204. 1970; Grierson & Long, Fl. Bhut. 2.3:1628. 2001; *Eupatorium odoratum* L., Syst. Nat. ed. 10.1205.1759; Hook.f., Fl. Brit. Ind. 3: 244. 1881; Uniyal in Hajra *et al.*, Fl. Ind. 12: 354. 1995; Singh in Singh *et al.*, Fl. Mizo. 1: 773. 2002.

Erect or straggling, aromatic undershrubs, 1.5-3 m tall. Stems pubescent, with angulate branches. Leaves opposite, petioled, triangulate-ovate, deltoid, or ovate-lanceolate, 3.5-12 x 2-6 cm, apex acute to long acuminate, cuneate at base, margins irregularly dentate serrate or sometimes entire, pubescent beneath. Heads in terminal, trichotomous corymbs. Involucral bracts multi-seriate. Florets whitish purple, odorous. Achenes small; pappus stiff, white.

**Fl. & Fr.:** September - March

**Distribution:** India (throughout), Native of South America

**Specimen examined:** Grows in open areas, roadsides, wastelands. Chozuba. NLNU 0376.

***Circium*** Mill., Gard. Dict. Abr., ed. 4.s.p. 1754

Perennial herbs, stem erect. Leaves pinnatifid or pinnatisect, spiny at margins. Capitula discoid, solitary to several in subcorymbose terminal and axillary heads. Involucres narrowly to broadly campanulate; phyllaries several imbricate, appressed or spreading or recurved. Receptacle flat or convex, bearing long bristles. Flowers bisexual or rarely unisexual, corollas tubular-campanulate. Achenes oblong or obovoid, glabrous, truncate at apex. Pappus plumose.

*Circium interpositum* Petrak, Feddes Rep. 43:283. 1838; Hajra in Hajra *et al.*, Fl. Ind. 12: 170 1995; Singh in Singh *et al.*, Fl. Mizo. 1: 757. 2002; *Cnicus griffithii* Hook.f., Fl.Brit. Ind. 3: 363. 1881.

Erect, robust thistles; stems cottony. Cauline leaves sessile, pinnatifid; lobes lanceolate, acute, spinescent, setulose above, white tomentose below. Heads large, up to 5 cm across, fascicled, glabrous. Involucral bracts imbricate, glabrous; outermost bracts shorter with acicular apices. inner wavy, acuminate or aristate. Florets purplish, up to 3 cm long. Achenes oblong, compressed, up to 5 mm long; pappus up to 2.5 cm long.

**Fl. & Fr.:** September - March

**Distribution:** India (NE India), China, Japan, Korea, Thailand, Vietnam

**Specimen examined:** Grows in open hill slopes, roadsides. Kapamodzu. NLNU 0264. **(Pl. 31)**

*Cosmos* Cav., Icon.1: 9. 1791

Erect annual herbs. Leaves opposite, pinnatisect to bipinnate. Capitula solitary on long peduncles, radiate, paleate. Involucre broadly campanulate, 2 -3- seriate; phyllaries connate at base, outer series herbaceous, inner series scarious. Ray flowers 1-seriate, ligulate, neuter. Disc flowers bisexual; corolla tubular-campanulate, 5-toothed. Achenes linear.

*Cosmos bipinnatus* Cav., Icon. 1: 10. 1791; Sinha in Sinha *et al.*, Fl. Mizo. 1:757. 2001.

Annual herbs; stems glabrous or pubescent, slender, angulate. Leaves opposite, petioled, 2-8 x 1.5-5 cm, bipinnately dissected, lobes elliptic, linear-lanceolate or filiform, margin entire. Heads terminal on branched stalks. Involucral bracts 1-seriate, subulate, ligulate-lanceolate, acute-acuminate. Ray florets pinkish purple. Disc florets yellowish white. Achenes linear, with an abrupt beak, glabrescent; pappus 2-4, retrorsely barbed.

**Fl. & Fr.:** November - March

**Distribution:** India (throughout), Native of Mexico

**Specimen examined:** Grows in open hill slopes, roadsides. Zelome. NLNU 0184.

*Cyathocline* Cass., Ann. Sci. Nat. 17: 419. 1829

Erect annual herbs, aromatic. Leaves irregularly bipinnatisect, alternate, sessile. Capitula in terminal corymbs, disciform. Involucres broadly campanulate; phyllaries narrowly elliptic to oblanceolate. Receptacle cup-shaped at centre. Corollas purplish. Female flowers numerous, mostly borne outside receptacular cup. Inner flowers male, fewer, borne within cup; corolla tubular-campanulate, irregularly 4-5-toothed, eglandular hairy above; anthers white, style undivided. Achenes minute; pappus absent.

*Cyathocline purpurea* (D. Don) Kuntze, Rev. Gen. Pl. 1: 333. 1891; Hajra in Hajra *et al.*, Fl. Ind. 12: 111. 1995; Singh in Singh *et al.*, Fl. Mizo. 1:764. 2002; *Tanacetum purpureum* Buch.-Ham. ex D. Don, Prodr. Fl. Nepal. 181.1825; *Cyathocline lyrata* Cass, in Ann. Sci. Nat. Ser. 1. 17. 420. 1829; Hook.f, Fl. Brit. Ind. 3: 246. 1881; *Dicrocephala minutiflora* Vaniot., Bull. Acad. Internat. Geogr. Bot. 12: 242. 1903; C.E.C. Fischer in Rec. Bot. Surv. India 12: 104. 1938.

Annual herbs, erect or procumbent, aromatic; stems up to 60 cm high, scabrous or pubescent, slender, often reddish-purple tinged. Leaves alternate, sessile; lower obovate-lanceolate; upper lyrate-pinnatisect, serrate-dentate or lobed, glandular-pubescent. Heads globose-subglobose, in terminal, rounded corymbose panicles. Involucral bracts 2- seriate, linear-lanceolate, pilose margins. Florets rosepurple. Achenes minute, oblong, smooth, brownish; pappus absent.

**Fl. & Fr.:** September – February

**Distribution:** India (throughout), Bhutan, China, Nepal, Myanmar, Thailand, Vietnam

**Specimen examined:** Grows in cultivated fields. Tsupfume. NLNU 0017. (Pl. 31)

*Dichrocephala* L' Her .ex DC., Arch. Bot. 2: 517. 1833

Erect or spreading annual herbs. Leaves alternate, simple or pinnatifid. Capitula small, globose, disciform. Involucre 2-seriate; phyllaries subequal. Receptacle subglobose to clavate. Outer flowers numerous, in several series, female; corolla tubular. Central flowers fewer, bisexual; corolla tubular-campanulate. Achenes laterally compressed, ribbed at margin. Pappus absent or in 2 minute bristles.

*Dichrocephala benthamii* Clarke, Compos. Ind. 36. 1876; Hook.f, Fl. Brit. Ind. 3: 246. 1881; Grierson & Long, Fl. Bhut. 2.3:1526. 2001.

Suberect herbs, with ascending branches, pubescent. Leaves obovate, sinuately lobed or spatulate. Capitula in small terminal cymes. Receptacle semi globose. Female corolla white, minutely 3-toothed. Bisexual corolla greenish, tubular-campanulate. Achenes obovoid, yellowish. Pappus absent.

**Fl. & Fr.:** May - August

**Distribution:** India (NE India), Bhutan, Cambodia, China, Nepal, Myanmar, Vietnam

**Specimen examined:** Grows in open areas, along roadsides, wastelands. Tsupfume. NLNU 0019. (Pl. 31)

*Galinsoga* Ruiz. & Pav., Fl. Peruv. Prodr. 110. 1794

Annual herbs. Stems erect. Leaves opposite, entire or toothed. Heads small, radiate or discoid, in cymose clusters on peduncles. Ray florets female. Disc florets bisexual. Achenes angled; pappus few scarious, entire, awned or fimbriate.

***Galinsoga parviflora*** Cav., Ic. Descr. Pl. 3: 41. t. 281. 1795; Hook.f, Fl. Brit. Ind. 3: 311.

1881; Balakr., Fl. Jowai 1: 258. 1981; Singh in Singh *et al.*, Fl. Mizo. 1:772. 2002.

Weak, erect, annual herbs. Leaves opposite, petiolate, oblong-ovate, or ovate-lanceolate, 2-5 x 1-4 cm, apex acute to obtuse, base acute or cuneate, margins more or less entire or sub-serrate, membranous. Heads solitary, axillary and terminal. Involucral bracts ovate-elliptic, subacute, striate. Ray florets white; disk florets yellow. Achenes ovate, dorsally compressed; pappus scales long.

**Fl. & Fr.:** April - October

**Distribution:** India (throughout), Bhutan, China, Nepal, Myanmar, Thailand, Vietnam

**Specimen examined:** Grows in open areas. Lozaphuhu. NLNU 0530. **(Pl. 31)**

***Piloselloides*** (Less.) C. Jeffrey, Kew Bull. 21: 214. 1967

Scapose perennial herbs, rootstock creeping. Leaves rosulate; leaf blade obovate to oblong, entire. Capitula solitary, radiate or discoid. Involucres campanulate. Florets all fertile. Corolla bilabiate. Disc flowers bisexual. Achenes ovoid or elliptic. Pappus fine bristles.

***Piloselloides hirsuta*** (Forssk.) C. Jeffrey in Kew Bull. 21: 218. 1967; Rao in Hajra *et al.*, Fl. Ind. 13: 184. 1995; *Arnica hirsuta* Forssk., Fl. Aegypt. Arab. 151. 1775. *Gerbera piloselloides* (L.) Cass., Diet. Sci. Nat. 18: 461. 1820; Hook.f, Fl. Brit. Ind. 3: 389. 1881; Singh in Singh *et al.*, Fl. Mizo. 1:764. 2002.

Acaulescent, annual herbs, silky villose rootstock. Leaves radical, short petioled, obovate-elliptic, or oblong-obovate, 5-13 x 2.5-5 cm, apex obtuse-emarginate, base narrowed, margin entire, glabrous or sparsely hairy above, white pubescent beneath. Heads

solitary up to 3 cm, on long, ebracteate, villous scape. Involucral bracts 2-seriate, cottony. Florets mauve-white. Achenes narrow-elongate; pappus reddish.

**Fl. & Fr.:** February - June

**Distribution:** India (throughout), Bhutan, China, Nepal, Myanmar, Thailand, Vietnam, Africa, Australia

**Specimen examined:** Grows grassy open areas, forest margins. Chozuba. NLNU 0308.

*Inula* L., Sp. Pl. 2: 881. 1753

Perennial or annual herbs. Leaves simple, alternate, margin finely toothed, sometimes entire. Capitula few in terminal corymb, sometimes also borne singly on long axillary peduncles, radiate. Involucres broadly campanulate, many-seriate, phyllaries linear, recurved, villous. Receptacle naked, convex. Ray flowers 2-3-seriate, female, ligules long, linear, yellow. Disc flowers bisexual, yellow, tubular-campanulate, 5-toothed at apex. Achenes angular, oblong, glabrous; pappus bristles 1-seriate.

*Inula cappa* (Buch.-Ham. ex D. Don) DC, Prodr. 5: 469. 1836; Hook.f., Fl. Brit. Ind. 3: 295. 1881; Kumar in Hajra *et al.*, Fl. Ind. 13: 13. 1995; Singh in Singh *et al.*, Fl. Mizo. 1:764. 2002; *Conyza cappa* Buch.-Ham. ex D. Don, Prodr. Fl. Nepal. 176. 1825.

Shrubs or undershrubs, stout, woolly. Leaves alternate, oblong, narrowly elliptic or elliptic-lanceolate, 5-15 x 1.5-5 cm, acute-subacute, base acute or rounded, margins distantly cuspidate-serrate, upper surface pubescent with adpressed hairs, undersurface silky villous or woolly. Heads up to 1 cm across, in much branched, terminal and axillary corymbs. Involucral bracts multi-seriate, linear-lanceolate. Florets deep yellow. Achenes minute, ribbed, silky; pappus dull white, plumose.

**Fl. & Fr.:** August - February

**Distribution:** India (throughout), E & W Himalaya, China, Nepal, Myanmar, Thailand, Vietnam

**Specimen examined:** Grows in shady places along forest margins. Mesulumi. NLNU 0398.

*Laggera* Sch. Bip. ex Benth., Gen. Pl. 2: 290. 1873

Annual or perennial herbs. Stems erect, with entire or deeply incised wings. Leaves dentate, long decurrent, hairy, sessile or petiolate. Capitula few to many, terminal in large leafy panicles. Involucre campanulate; phyllaries imbricate. Receptacle naked. Marginal florets female; disk florets bisexual, few, tubular. Corolla pink or mauve. Achenes oblong-ellipsoid. Pappus of white capillary bristles.

*Laggera crispata* (Vahl) Hepper & J.R.I Wood, Kew Bull. 38: 83. 1983; Kumar in Hajra *et al.*, Fl. Ind. 13: 151. 1995; Singh in Singh *et al.*, Fl. Mizo. 1:781. 2002; *Conyza crispata* Vahl., Symb. Bot. 1: 71. 1790; *Laggera pterodonta* (DC.) Sch.-Bip. ex Oliver in Trans. Linn. Soc. 29: 94. 1873; Hook.f., Fl. Brit. Ind. 3: 271. 1881.

Slender, much branched, glabrous or puberulous herbs, upto 1.5 m tall; stems with deeply lobed or dissected wings. Leaves alternate, sessile, oblanceolate, 6-19.5 x 1-5.5 cm, lyrate, base decurrent, surface glabrous or puberulous. Heads in axillary leafy panicles. Involucral bracts multiseriate, glabrous, rigid. Florets purplish. Achenes cylindrical, pilose; pappus white.

**Fl. & Fr.:** December - May

**Distribution:** India (throughout), E Himalaya, Bhutan, China, Nepal, Myanmar, Thailand, Vietnam, Tropical Africa

**Specimen examined:** Grows in shady places along forest margins. Chozuba. NLNU 0306.

***Melanoseris*** Decne. Jacq., Voy. Inde 4: 101. 1843

Annual, biennial or perennial herbs, glabrous, glandular hairy or hispid. Stems solitary or several, usually leafy. Leaves pinnate, lyrate pinnate, or undivided; lower leaves sessile or petiolate; upper leaves sessile, auriculate or sagittate. Capitula often nodding, with 3–40 florets. Involucre narrowly cylindric to broadly campanulate. Achene ellipsoid and strongly compressed. Pappus hair slender.

***Melanoseris cyanea*** Edgew., Trans. Linn. Soc. London 20: 81. 1846; *Lactuca hastata* DC., Prodr. 7. 1: 139. 1838; *M. paniculata* Edgew., Trans. Linn. Soc. London 20: 80. 1846; Hook.f., Fl. Brit. Ind. 3: 408. 1881.

Herbs; stem glabrous or densely hairy, paniculately branched above. Leaves usually pinnatifid or pinnate with a hastate, deltoid or ovate coarsely toothed, petiole slender and simple or dilated at the base or winged, lobulate and auricled. Capitula often with 20-30 florets; florets blue to purplish. Achenes ellipsoid compressed. Pappus double.

**Fl. & Fr.:** September - November

**Distribution:** India (NE India), China, Nepal, Myanmar

**Specimen examined:** Grows in shady places along forest margins, grassy slopes, wastelands. Pfutsero. NLNU 0127.

***Microglossa*** DC., Prodr. 5: 320. 1836

Shrubs, often scandent. Leaves alternate, ovate, minutely and remotely serrulate, petiolate. Capitula in 1-several small rounded heads arranged in a terminal corymb, disciform. Involucre campanulate, many seriate, imbricate; phyllaries linear-lanceolate. Receptacle flat. Outer flowers many, female. Inner flowers few, bisexual; corolla tubular



below. Achenes oblong-obovoid, pubescent; pappus simple, reddish-brown, of filiform bristles.

***Microglossa pyrifolia*** (Lam.) Kuntze, Revis. Gen. Pl. 1: 353. 1891; Hajra in Hajra *et al.*, Fl. Ind. 12: 133. 1995; Singh in Singh *et al.*, Fl. Mizo. 1:782. 2002; *Microglossa volubilis* DC., Prodr. 5: 320. 1836; Hook.f., Fl. Brit. Ind. 3: 257. 1881.

Rambling shrubs, stems glabrescent. Leaves alternate, petiolate, elliptic-ovate, 5-8 x 2-4 cm, apex acuminate, margin quite entire or obscurely serrate, glabrous above, finely pubescent beneath. Involucral bracts multi-seriate, lanceolate, unequal. . Florets yellow-whitish. Achenes 4-angled, slightly compressed; pappus reddish, soft, fine, silky.

**Fl. & Fr.:** September - December

**Distribution:** India (NE India), Bangladesh, China, Nepal, Myanmar, Malaysia. Thailand, Vietnam; Africa

**Specimen examined:** Grows in shady places along forest margins, grassy slopes, wastelands. Pfutsero. NLNU 0138. **(Pl. 32)**

***Mikania*** Willd., Sp. Pl. 3: 1481, 1742. 1803

Scandent twining annual or short-lived perennial herb. Leaves opposite, simple, 3-veined, petiolate. Capitula small, 4-flowered, discoid, in axillary corymbs. Involucre of 4 subequal phyllaries, with a smaller additional bract at base. Receptacle naked. Corollas tubular-campanulate, 5-toothed. Achenes oblong, 4-angled. Pappus of 1 series of bristles.

***Mikania micrantha*** Kunth, Nov. Gen.Sp., 4 ed. Fol., 4: 105. 1818; Balakr., Fl. Jowai 1: 257. 1981; Haridasan & Rao, For. Fl. Megh. 2: 524. 1987; Uniyal in Hajra *et al.*, Fl. Ind. 12: 357. 1995.

Twining; branches slender, hairy. Leaves ovate-lanceolate, ovate-orbicular, ovate, acuminate, entire or dentate, sparsely pubescent, 4-5 nerved at base. Heads in terminal and upper axillary, dense compound corymbs. Involucral bracts linear-lanceolate, acute; florets white or creamy white. Achenes compressed, 5-angled, blackish brown; pappus bristly, white.

**Fl. & Fr.:** October-March.

**Distribution:** India (NE India), China, Nepal, Myanmar

**Specimen examined:** Throughout the district, commonly grows on weed along road sides. Chizami. NLNU 0539.

*Myriactis* Lessing, Linnaea 6: 127. 1831

Erect annual herbs. Leaves simple, alternate. Inflorescence of rather few capitula, usually in an open leafy panicle. Capitula radiate. Involucre globose or hemispherical; phyllaries 2-4-seriate. Ray flowers 2- to many-seriate, female; corolla tube obsolete. Disc flowers bisexual, tubular-campanulate, 5-toothed; style branches with short lanceolate appendages. Receptacle naked. Achenes obovate, compressed. Pappus absent.

*Myriactis nepalensis* Less., Linnaea 6: 128, t. 2. 1831; Hook.f., Fl. Brit. Ind. 3: 247. 1881; Hajra in Hajra *et al.*, Fl. Ind. 12: 134. 1995.

Erect herbs, stem villous or hispid, 30-50 cm high. Leaves ovate-lanceolate or oblong-obovate, acute, attenuate at base, coarsely serrate at margins, glabrous or villous. Heads globose or subglobose, up to 1 cm across, in leafy panicles. Involucral bracts 8-10-seriate, acute, reflexed at length. Flowers yellow. Achenes compressed; pappus absent.

**Fl. & Fr.:** December-June.

**Distribution:** India (NE India), China, Nepal, Myanmar

**Specimen examined:** Scattered in open forests and moist places. Mesulumi. NLNU 0391.

*Pseudognaphalium* Kirp., Trudy Bot. Inst. Akad. Nauk S.S.S.R.,

Ser. 1, Fl. Sist. Vyssh. Rast. 9: 33. 1950

Annual herbs. Leaves simple, alternate, entire. Capitula in corymbs, disciform. Involucres campanulate; phyllaries several-seriate, scarious, yellow, glossy. Receptacle flat, naked. Marginal flowers female, numerous, filiform. Inner flowers bisexual, few; corollas narrowly tubular-campanulate, 5-toothed. Corollas yellow. Achenes oblong, papillose; pappus simple, bristles slender, free or partly coherent at base, deciduous.

*Pseudognaphalium affine* (D. Don) Anderb., Opera Bot. 104: 146. 1991; Grierson & Long, Fl. Bhut., 2.3: 1522. 2001; *Gnaphalium affine* D. Don, Prodr. Fl. Nepal. 173. 1825; *G. luteoalbum* var. *multiceps* (DC.) Hook.f., Fl. Brit. Ind. 3: 288. 1881.

Herbs, stems white tomentose. Leaves oblong-spatulate, attenuate at base, entire, obtuse at apex, woolly on both surfaces, sessile. Head clustered in dense terminal corymbs, discoid, bright golden-yellow, peduncles woolly pubescent, involucral bracts many-seriate, shining yellow, elliptic-lanceolate. Ray florets female, filiform. Disc florets bisexual. Achenes linear, pappus hairy, shorter than the involucral bracts.

**Fl. & Fr.:** March-September.

**Distribution:** India (NE India), China, Nepal, Myanmar

**Specimen examined:** Abundant in moist sandy areas and on open sunny slopes. Tsupfume. NLNU 0031.

*Rhynchospermum* Reinw., Syll. Pl. Nov. 2(1): 7. 1825

Erect perennial herb; stems stiffly branched above. Leaves alternate, simple petiolate. Capitula racemosely arranged on upper branches, radiate. Involucre campanulate; phyllaries

3-seriate; receptacle naked. Ray flowers 2-seriate, female; ligules elliptic, minutely 3-toothed. Disc flowers bisexual, few, tubular-campanulate; style branches flattened, with obtuse tips. Achenes compressed, beaked.

***Rhynchospermum verticillatum*** Reinw.ex Blume, Bijdr. Fl. Ned. Ind. 902. 1826; Hook.f., Fl. Brit. Ind. 3: 248. 1881; Hajra in Hajra *et al.*, Fl. Ind. 12: 140. 1995; Karthik. *et al.*, Fl. Pl. India-Dicot. 1: 263. 2009.

Slender annual herbs, up to 80 cm high; branches long, spreading. Leaves cauline, gradually reduced upward, lanceolate or obovate, base cuneate, margin crenate-serrate, petioles slightly winged. Heads small, axillary, white. Achenes beaked, compressed. Pappus bristly, caducous.

**Fl. & Fr.:** June-October.

**Distribution:** India (NE India), China, Nepal, Myanmar

**Specimen examined:** Found in moist and shady areas, secondary forests. Tsupfume. NLNU 0033. (Pl. 32)

***Senecio*** L., Sp. Pl. 2: 866. 1753

Erect or scrambling, rarely decumbent, perennial or annual herbs; stems usually leafy. Leaves alternate, simple or lyrate, pinnately or palmately divided. Capitula few to numerous, in simple or compound corymbs. Receptacle flat, naked. Ray flowers up to 20, ligules yellow. Disc flowers few to many, yellow, tubular-campanulate; corollas 4-5-toothed. Achenes oblong, ribbed, glabrous or pubescent. Pappus sometimes with apically hooked hairs.

*Senecio scandens* Buch.-Ham. ex D. Don, Prodr. Fl. Nepal. 178. 1825; Hook.f., Fl. Brit. Ind. 3: 352. 1881; Karthik *et al.*, Fl. Pl. India-Dicot. 1: 273. 2009. *S. wightianus* DC. ex Wight, Contrib. Bot. Ind. 22. 1834; Mathur in Hajra *et al.*, Fl. Ind. 13: 280. 1995.

Large climber, younger parts pubescent, otherwise glabrous. Leaves ovate-hastate or lanceolate, acute at base, crenate-dentate at margin, acuminate, sparsely oppressed villous on both surfaces; petioles auricled. Heads oblong, in dense axillary corymbs, pale yellow; involucral bracts 10-12, linear-oblong. Achenes 4-angled or ribbed, pubescent. Pappus white.

**Fl. & Fr.:** November-April.

**Distribution:** India (NE India), China, Nepal, Myanmar

**Specimen examined:** Scattered in open forests and waste places. Tsupfume. NLNU 0035.

**(Pl. 32)**

*Sigesbeckia* L., Sp. Pl. 2: 900. 1753.

Herbs, annual. Leaves opposite, petiolate, densely pubescent. Synflorescence of small terminal and axillary usually manyheaded corymbs. Capitula pedunculate; involucre 2-seriate, campanulate; outer phyllaries 5, longer than inner, linear-spatulate, divaricate, with thick glandular hairs; receptacle flat. Corollas yellow, marginal florets uniseriate, shortly limbed, female; disk florets tubular, bisexual. Achenes elongate-obovate, 4-angled, apex truncate; pappus absent.

*Sigesbeckia orientalis* L., Sp. Pl. 900. 1753; Hook.f., Fl. Brit. Ind. 3: 304. 1881. H.J. Chowdhery in Hajra *et al.*, Fl. Ind. 12: 407. 1995; Karthik. *et al.*, Fl. Pl. India-Dicot. 1: 275. 2009.

Herbs. Leaves ovate, acute-apiculate at apex, cuneate at base, serrate dentate at margin, pubescent on both sides, glandular beneath; petioles 1-5 cm long. Heads on lax panicles, involucre bracts 2-seriate, pubescent beneath, glandular hairy above. Flowers yellow, reddish beneath. Achenes oblique, 4-angled, small white pubescent or glabrous.

**Fl. & Fr.:** October-January.

**Distribution:** India (NE India), China, Nepal, Myanmar

**Specimen examined:** Common along open waste fields. Mesulumi. NLNU 0394. **(Pl. 32)**

*Sonchus* L., Sp. Pl. 2: 793. 1753.

Annual, biennial or perennial herbs. Leaves alternate, simple or pinnatifid, auricled at base. Inflorescence terminal in corymbose heads of few capitula. Involucre campanulate. Florets yellow. Achenes obovoid to ellipsoid. Pappus white.

*Sonchus wightianus* DC., Prodr. 7: 187. 1838; Mamgain & Rao in Hajra *et al.*, Fl. Ind. 12: 322. 1995; Singh in Singh *et al.*, Fl. Mizo. 1: 789. 2002; *S. arvensis* L.; Hook.f., Fl. Brit. Ind. 3: 414. 1881; Kanjilal *et al.*, Fl. As. 3: 126. 1939.

Perennial herbs, stem glandularly hairy. Leaves alternate, sessile, lanceolate-runcinate, 5-25 x 1-4 cm, apex acute, base auricled-cordate, glabrous on both surfaces. Heads solitary in terminal racemed or corymbose panicles. Florets yellow. Achenes narrow, slightly compressed. Pappus white, multi-seriate.

**Fl. & Fr.:** April - December

**Distribution:** India (throughout), Bhutan, China, Myanmar, Nepal, Pakistan

**Specimen examined:** Common along open waste fields. Mesulumi. NLNU 0398.

***Synedrella*** Gaertner, Fruct. Sem. Pl. 2: 456. 1791.

Herbs, annual. Stems erect or ascending. Leaves opposite, petiolate. Capitula radiate, sessile or subsessile. Ray florets 2-seriate, female, fertile; corollas yellowish. Disk florets bisexual, fertile; corollas yellowish, 4-lobed. Achenes dimorphic, compressed or flattened, narrowly oval and winged or linear-cuneate and wingless; pappus of 2 stiff awns.

***Synedrella nodiflora*** (L.) Gaertn., Fruct. Sem. Pl. 2: 456, t. 171. 1791; Hook.f., Fl. Brit. Ind. 3: 308. 1881; Singh in Singh *et al.*, Fl. Mizo. 1: 793. 2002; *Verbesina nodiflora* Cent. Pl. 1: 28. 1755.

Erect dichotomously branched herbs. Leaves opposite, elliptic or ovate, narrowed at base, acute apex, crenate-serrate, hispid. Heads solitary, axillary, sessile, 10-20 flowered; involucre tubular; bracts 2-seriate, narrowly oblong; ligules yellow.

**Fl. & Fr.:** May-December.

**Distribution:** India (NE India), China, Nepal, Myanmar

**Specimen examined:** Grows in wastelands, fields and roadsides. Chizami. NLNU 0552. (**Pl. 32**)

***Tithonia*** Desf. ex Juss., Gen. Pl. 189. 1789

Annual or herbaceous perennial. Leaves simple or palmately 3-5-lobed, alternate or sometimes opposite at base, subentire to serrate. Capitula mostly solitary on thick hollow peduncles, radiate, paleate. Involucres campanulate, 2-4-seriate. Receptacle convex. Ray flowers neuter; ligule conspicuous. Disc flowers bisexual; corolla tubular-campanulate, 5-lobed. Achenes oblong, subcompressed, weakly 4-angled; pappus 1-few.

***Tithonia diversifolia*** (Hemsl.) A.Gray, Proc. Amer. Acad. Arts 19: 5. 1883; Balakr., Fl. Jowai 1: 262. 1981; Haridasan & Rao, For. Fl. Megh. 2: 526. 1987.

Shrubs or undershrubs, perennials; 2-3 m tall. Leaves ovate, 3-5 lobed, apex acute, base narrowed to petiole, margin crenate or subentire. Heads terminal, solitary. Flowers yellow. Achenes oblong, hairy, brown.

**Fl. & Fr.:** September - February.

**Distribution:** Native of Mexico; naturalized in India.

**Specimen examined:** Grows along roadsides, open slopes. Kikrumba. NLNU 0453.

*Vernonia* Schreber, Gen. Pl. 541. 1791

Herbs, shrubs, or small trees. Leaves alternate, simple. Capitula in terminal panicles, often corymbose, discoid. Involucres oblong or campanulate; phyllaries linear or narrowly ovate in several series. Corollas equal, tubular-campanulate, 5-toothed. Style branches subulate. Receptacle flat, naked or with a few short hairs. Achenes oblong, 5-10(-15)-ribbed, terete, tapered at base; pappus deciduous.

*Vernonia volkameriifolia* DC., Prodr. 5: 32. 1836; Hook.f., Fl. Brit. Ind. 3: 240. 1881; Haridasan & Rao, For. Fl. Megh. 2: 526. 1987; Uniyal in Hajra *et al.*, Fl. Ind. 13: 393. 1995; Singh in Singh *et al.*, Fl. Mizo. 1: 804. 2002.

Shrubs or small trees. Leaves broadly ovate-lanceolate, base cuneate or narrowed, margin serrate, apex acute, pubescent on both surfaces. Heads solitary, in terminal corymbs. Involucres bract 2-seriate; outer ovate, whitish. Achenes ovoid or ellipsoid, pale green covered with hooked-bristle and divergent beaks.

**Fl. & Fr.:** February-November.

**Distribution:** India (NE India), China, Nepal, Myanmar

**Specimen examined:** Common in waste and fallow fields. Zelome. NLNU 0185. (Pl. 32)



## CAMPANULACEAE

Juss., Gen. Pl. 163. 1789

Herbs or shrubs, erect or climbing, often with latex. Leaves simple, alternate or opposite, stipules absent. Flowers bisexual, actinomorphic or zygomorphic, 5-merous, axillary or terminal, solitary, racemose or paniculate. Bracts small. Calyx 4-5 lobed, fused to ovary, persistent. Corolla tubular or campanulate, 4-5 lobed, lobes valvate in bud. Stamens 5, filaments free, anthers free or connate. Ovary usually inferior, 2-5 locular. Fruit a capsule or a fleshy berry.

- |   |                     |
|---|---------------------|
| 1a. Flowers zygomorphic, anthers fused during anthesis              | <i>Lobelia</i>      |
| 1b. Flowers actinomorphic, anthers free during anthesis             |                     |
| 2a. Capsules dehiscing laterally                                    | <i>Campanula</i>    |
| 2b. Capsule dehiscing apically                                      |                     |
| 3a. Erect herbs; leaves oblanceolate, stigmas linear                | <i>Wahlenbergia</i> |
| 3b. Stem often climbing or twining; leaves ovate, stigmas orbicular | <i>Codonopsis</i>   |

### *Campanula* L., Sp. Pl. 1: 163. 1753

Annual or perennial, erect or decumbent herbs. Leaves alternate, simple. Flowers solitary and terminal, or in few flowered raceme, panicle. Calyx adnate to ovary, lobes 5. Corolla campanulate, or funnelform, lobes 5. Stamens 5, free, filaments coherent at base. Ovary inferior, 3-5 locular. Capsule dehiscing at sides below the calyx lobes.

*Campanula pallida* Wall., Asiat. Res. 13: 375. 1820; Grierson & Long, Fl. Bhut. 2.3:1378. 2001; Giri *et al.*, Mater. Fl. Ar. Pradesh 2: 54. 2008; *C. colorata* Wall. in Roxb., Fl. Ind. 2: 101. 1824; C. B. Clarke in Hook.f., Fl. Brit. Ind. 3: 440. 1881.

Herbs, upto 60 cm tall. Stem terete, hairy. Leaves sessile, alternate, elliptic, rhombic-elliptic, lanceolate, base cuneate or attenuate, apex acute, margin crenate or denticulate. Flowers terminal, 1-2 flowered. Calyx lobes triangular, 0.4-0.8cm, margin entire or dentate with bristles. Corolla purple or blue-purple, campanulate to tubular-campanulate, 0.4-1.5 cm, lobes ovate-oblong. Capsule obconic or globose.

**Fl. & Fr.:** May – November

**Distribution:** India (throughout), Bhutan, Myanmar, China, Nepal, Thailand, Vietnam, Bangladesh, Pakistan, Afghanistan

**Specimen examined:** Grows in grassy slopes, rocky outcrops and forest edges. Pfitsero.

NLNU 0137. (Pl. 33)

*Codonopsis* Wall. in Roxburgh, Fl. Ind. 2: 103. 1824

Perennial shrubs, often with tubers, usually foul smelling. Stems erect or twining. Leaves alternate or opposite. Flowers solitary, terminal or axillary. Calyx tube adnate to ovary, 4-6 lobed. Corolla 4-6 lobed, tubular or campanulate. Stamens 5, often broadened at base. Ovary 3 locular, stigma 3-fid. Fruit with persistent calyx. Capsule dehiscent by 3 valves.

1a. Leaves glabrous, cordate; flowers campanulate

*C. javanica*

1b. Leaves pilose, ovate; flowers tubular

*C. gracilis*

*Codonopsis gracilis* Hook.f. & Thomson, Ill. Himal. Pl. t. 16 A. 1855; *Leptocodon gracilis* (Hook.f. & Th.) Lem. in Ill. Hort. 3(Misc.): 49. 1856; C. B. Clarke in Hook.f., Fl. Brit. Ind. 3: 430. 1881; Grierson & Long, Fl. Bhut. 2.3:1388. 2001; Giri *et al.*, Mater. Fl. Ar. Pradesh 2: 56. 2008.

Twining, slender, sparsely pilose herbs. Leaves alternate and opposite, long petioled, ovate to broad ovate, 0.5-2 x 0.4-2 cm, base truncate or rounded, apex obtuse-acute, margin undulate, crenate. Flowers solitary, terminal, leaf opposed, pendent, pedicel 1-5 cm long. Calyx 5 lobes, oblong-lanceolate, base adnate to ovary, margin crenate. Corolla tubular, 2.8-3.5 cm long, blue or violet, white towards base, 5 lobed, triangular. Capsule obconic, broad ovoid with beak.

**Fl. & Fr.:** May – November

**Distribution:** India (N.E India), E. Himalaya, Bhutan, Myanmar, China, Nepal

**Specimen examined:** Grows in forest thickets, on hedges forming a network. Tsupfume, Sakraba. NLNU 0671. (Pl. 33)

*Codonopsis javanica* (Blume) Hook. f. & Thomson, Ill. Himal. Pl. t. 16B. 1855; Balakr. Fl. Jowai 1: 279. 1981; Haridasan & Rao, Forest Fl. Megh. 2:532. 1987; Giri *et al.*, Mater. Fl. Ar. Pradesh 2: 55. 2008; *Campanumoea javanica* Bl., Bijdr. Fl. Ned. Ind.: 726. 1826; C. B. Clarke in Hook.f., Fl. Brit. Ind. 3: 435. 1881.

Twining shrub. Leaves opposite, ovate to oblong-ovate, 4-8 x 2-5 cm, base cordate, apex obtuse to acute, margin shallowly crenate, glabrous, petioles 3-6 cm long. Flowers solitary, on axils of leaves, peduncle 1-5 cm long. Calyx lobes oblong-lanceolate, adnate only to base of ovary. Corolla greenish-white-yellowish with purple streaks, campanulate, lobes ovate, triangular, 2-2.5 cm long. Stamens 5, free, filaments long. Ovary truncate. Capsule subglobose, purple black at maturity.

**Fl. & Fr.:** May – November

**Distribution:** India (N.E India), E. Himalaya, Bangladesh, Bhutan, Myanmar, China, Thailand, Vietnam, Japan, Taiwan

**Specimen examined:** Grows in forest edges, in bushy shady places. Pfutsero. NLNU 0161.

(Pl. 33)

***Lobelia*** Plum. ex L., Sp. Pl. 2: 929. 1753

Herbs or shrubs. Leaves alternate, toothed. Flowers zygomorphic, axillary. Calyx 5 lobed, adnate to ovary. Corolla 2-lipped, upper lip 2-lobed, lower lip 3-lobed. Stamens 5, anthers fused. Ovary inferior, 2 locular. Fruit a capsule or a berry.

1a. Erect undershrub, leaves sessile, lanceolate *L. seguinii*

1b. Creeping herb, leaves petiolate, cordate *L. nummularia*

***Lobelia nummularia*** Lam., Encycl. 3: 589. 1792; *Pratia nummularia* (Lam.) A. Braun & Asch. Index Sem. Hort. Berol. Append. 6. 1861; Giri *et al.*, Mater. Fl. Ar. Pradesh 2: 57. 2008; *Pratia begonifolia* (Wall.) Lindl. in Bot. Reg. 16: t. 1373. 1830; C. B. Clarke in Hook.f., Fl. Brit. Ind. 3: 422. 1881; Grierson & Long, Fl. Bhut. 2 .3:1395. 2001.

Small, creeping, pubescent herbs, rooting at nodes. Leaves ovate to suborbicular, 0.4-1.5 x 0.6-2 cm, base truncate to cordate, apex rounded or obtuse-acute, margin crenate-dentate. Flowers solitary. Calyx tubular, lobes linear upto 0.5 cm long, margin with few denticles. Corolla pale purple with yellow white patch; limb 2 lipped, upper 2 lobes linear, lower 3 lobes lanceolate. Stamens connate above middle. Fruit a berry, ellipsoid, globose, dark purple.

**Fl. & Fr.:** August-October

**Distribution:** India (throughout), Bhutan, Myanmar, China, Nepal, Thailand, Vietnam, Malaya

**Specimen examined:** Grows in damp, marshy ground in fields and open places. Chizami. NLNU 0553. (Pl. 33)

***Lobelia seguinii*** H. Lev. & Vaniot, Repert. Spec. Nov. Regni Veg. 12: 186. 1913; Grierson & Long, Fl. Bhut. 2.3:1396. 2001.

Shrubs, upto 1.5 m tall. Stem erect, glabrous. Leaves alternate or spirally arranged, sessile, lanceolate to linear-lanceolate, 5-14 x 1-4 cm, apex acuminate, base cuneate, margin serrulate. Flowers in terminal, sometimes branched raceme, spreading or somewhat deflexed, sometimes resupinate. Calyx lobes linear, denticulate. Corolla purple-blue, glabrous, densely villous below throat, upper lobes 2, linear, spreading; lower lobes 3, spreading, lanceolate. Stamens connate into tube.

**Fl. & Fr.:** August-November

**Distribution:** India (NE India), Bhutan, China, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in grassy slopes, along forest margins, roadsides. Tsupfume.

NLNU 0037. (Pl. 33)

***Wahlenbergia*** Roth, Nov. Pl. Sp. 399. 1821

Annual or perennial herbs. Leaves alternate, sessile. Flowers terminal or axillary, sessile or pedicellate. Calyx lobes 5. Corolla segments 5, campanulate or funnelform, actinomorphic. Stamens free. Stigma 3 lobed. Capsule loculicidal.

***Wahlenbergia marginata*** (Thunb.) A. DC., Monogr. Campan.: 143. 1830; Balakr. Fl. Jowai 1: 279. 1981; C. B. Clarke in Hook.f., Fl. Brit. Ind. 3: 429. 1881; Grierson & Long, Fl. Bhut. 2.3:1392. 2001.

Stems erect or decumbent, 10-60 cm, simple or branched at base, glabrous or sparsely hairy. Leaves oblanceolate, spatulate or linear, 1-4 x 0.2-0.5 cm, margin sinuate, dentate, sparsely hairy. Pedicels erect upto 10 cm. Calyx lobes linear, triangular. Corolla

campanulate, 0.4-1.2 cm, blue, lobes ovate, oblong. Capsule obconical, 0.5-0.7 cm. Seeds ellipsoid, smooth.

**Fl. & Fr.:** May – November

**Distribution:** India (N.E. India), Himalaya, Bhutan, Myanmar, China, Nepal, Africa

**Specimen examined:** Grows in open grassland and forest edges. Tsupfume. NLNU 0038.

(Pl. 33)

## ERICACEAE

Durande, Notins Elem. Bot. 270. 1782

Trees, shrubs or herbs, sometimes lacking chlorophyll. Leaves simple, alternate, often whorled at the end of branches, entire or serrate, exstipulate. Inflorescence racemose, corymbose, fascicled or paniculate, axillary or terminal, clustered or solitary, bractaeate. Flowers bisexual, regular. Calyx 3-7, usually 5, free, imbricate. Corolla 3-7, usually 5, united at base or almost to apex; campanulate, urn shaped or funnel shaped. Stamens usually 10, free. Ovary superior or inferior, 4-5 to many celled, ovules many per cell; style slender. Fruit a capsule or berry or a drupe.

1a. Ovary superior; corolla campanulate, funnelform, urnceolate,  
fruit a capsule

2a. Flowers in simple axillary or terminal racemes; corolla urn-shaped,  
capsule globose

*Lyonia*

2b. Flowers in condensed racemes or corymbs; corolla funnelform,  
campanulate, capsule cylindric

*Rhododendron*

1b. Ovary inferior; corolla tubular, cylindric, urceolate, fruit a berry

3a. Corolla long-tubular, more than 1.5 cm long

*Agapetes*

3b. Corolla short, urceolate, upto 1 cm

*Vaccinium*

*Agapetes* D.Don ex G. Don, Gen. Hist. 3: 862. 1834

Shrubs, evergreen, sometimes epiphytic; stems often swollen at base. Leaves alternate, sometimes pseudo-whorled, margin entire or toothed. Flowers in axillary corymbs, or solitary or fascicled; pedicles often articulate. Sepals 5, borne around top of ovary. Petals 5, united, often with transverse markings, tubular, 5-angled, shortly lobed. Stamens 10, free. Ovary inferior, 5-angled or winged, 5-celled. Fruit a 5-lobed, globose berry, many seeded.

*Agapetes odontocera* (Wight) Benth. & Hook. f., Gen. Pl. 2: 571. 1876; Balakr., Fl. Jowai 1: 284. 1981; *Vaccinium odontoceram* Wt. J. Nat. Hist. 8: 173. 1847.

Epiphytic glabrous shrubs. Branches bluntly angled. Leaves pseudo-verticillate, elliptic-lanceolate, 7-14 x 1.5-2.5 cm, cuneate at base, apex sub-acuminate, margin subentire or distantly shallowly crenate, subsessile. Flowers in fasciculate corymbs, on leafless branches; peduncles 0.2-0.4 cm; pedicels upto 1.3 cm. Calyx lobes 0.2-0.3 cm, acute, vermillion. Corolla tubular, upto 2 cm long, light pink with wavy purple lines; lobes subulate.

**Fl. & Fr.:** March-October

**Distribution:** North East India, Myanmar

**Specimen examined:** Grows on tree branches in primary and secondary forest. Chozuba.

NLNU 0309.

*Lyonia* Nutt., Gen. N. Amer. Pl. 1: 266. 1818, nom. cons., not Rafinesque (1808)

Deciduous or evergreen shrubs or trees. Leaves simple, alternate, entire. Racemes axillary or terminal, paniced at the end of branches. Flowers bracteate and bracteolate.

Calyx 5 lobed, united at base. Corolla tubular or urn-like, lobes 5, short, recurved, pubescent. Stamens 10, inserted at base of corolla. Ovary 5-celled, superior. Capsule globose, loculicidal, 5-valved. Seeds many.

***Lyonia ovalifolia*** (Wall.) Drude in Engler & Prantl, Nat. Pflanzenfam. 4.1: 44. 1889; Haridasan & Rao, For. Fl. Megh. 2: 536. 1985; Grierson & Long, Fl. Bhut. 2.1: 395. 1991; *Andromeda ovalifolia* Wall., Asiat. Res. 13: 391. 1820; *Pieris ovalifolia* (Wall.) D. Don, Edinburg New Philos J. 17: 159. 1834; C.B. Clarke in Hook.f. Fl. Brit. Ind. 3: 460. 1882; Brandis, Ind. Trees 409. 1906; Kanjilal *et al.*, Fl. As. 3: 150. 1939.

Small deciduous trees or shrubs 1-10 m tall; bark reticulately fissured, reddish-brown. Leaves ovate, oblong-ovate to elliptic, 5-16 x 3-10 cm, apex acute to short acuminate, base subacute or rounded; petioles 0.5-1.5 cm. Flowers drooping in axillary or terminal racemes, 5-16 cm long; pedicels 0.3-0.9 cm. Calyx lobes triangular, pubescent. Corolla tubular, recurved at apex, white sometimes pale pink, pubescent. Filaments hairy at base with 2 horned at apex. Ovary globose, style as long as the corolla. Capsule globose, seeds many.

**Fl. & Fr.:** May-October

**Distribution:** India (NE India), E Himalaya Bangladesh, Bhutan, China, Laos, Myanmar, Nepal, Pakistan, Thailand, Tibet, Vietnam

**Specimen examined:** Grows in open and partially shaded slopes in secondary forest. Zelome. NLNU 0186. **(Pl. 34)**

***Rhododendron*** L., Sp. Pl. 1: 392. 1753

Shrubs or trees, terrestrial or epiphytic, often aromatic, usually with large winter buds covered in scales. Leaves alternate or clustered at branch ends, coriaceous, margin



entire, rarely crenulate. Flowers in terminal condensed racemes, few to many flowered, regular or weakly zygomorphic. Calyx persistent, 5-8 lobed, often reduced to a shallow cup. Corolla campanulate, funnelform, tubular, 5-10 lobes. Stamens usually 10, sometimes 5-18, inserted at base of corolla. Ovary 5-20 celled, style long or short, stigma capitate. Capsule cylindrical, 5-20 valved, septicidal. Seeds many, fusiform.

1a. Trees; leaves without glandular scales; corolla scarlet *R. arboretum*

1b. Shrubs; leaves glandular scaly beneath; corolla white *R. formosum*

***Rhododendron arboreum*** Sm. Exot. Bot. 1: 9. 1805; C.B. Clarke in Hook.f. Fl. Brit. Ind. 3: 465. 1882; Kanjilal *et al.*, Fl. As. 3: 152. 1939; Grierson & Long, Fl. Bhut. 2.1: 372. 1991; Haridasan & Rao, For. Fl. Megh. 2: 537. 1987.

Medium sized evergreen tree. Bark corky, reddish brown, peeling off in small flakes. Leaves crowded at the end of branches, oblong-lanceolate or narrow elliptic, 5-16 x 2-5 cm, obtuse at base, apex acute, margins recurved, coriaceous, hard, glabrous above, lower surface densely matted white or silvery tomentose. Flowers terminal in dense corymbose fascicles, bracts membranous, silky. Calyx 5 lobed, small, triangular. Corolla tubular-campanulate, 4-5 cm, 5-lobed, scarlet with 5 black patches at base. Stamens 10, filaments red, anthers black. Ovary white, tomentose. Capsule oblong-cylindric. Seeds numerous.

**Fl. & Fr.:** March - October

**Distribution:** Indo-Myanmar, Bhutan, Nepal

**Specimen examined:** Grows in primary and secondary forest in sparsely wooded slopes. Tsupfume. NLNU 0051. (Pl. 34)

***Rhododendron formosum*** var. ***inaequale*** (Hutch.) Cullen, Notes Roy. Bot. Gard. Edinburgh 36.1 : 108. 1978; C.B. Clarke in Hook.f., Fl. Brit. Ind. 3: 473. 1882; Kanjilal *et al.*, Fl. As. 3: 153. 1939; Haridasan & Rao, For. Fl. Megh. 2: 538. 1987

Bushy shrubs, epiphytic. Young shoots bristly. Leaves oblanceolate, elliptic, 4-10 x 1.5-4 cm, apex acute or sub acute, base cuneate, coriaceous, glabrate above, scaly beneath, ciliated, petioles bristly. Flowers terminal, corymbs 2-6 flowered, aromatic; covered with scales in buds, scales brown, sub orbicular, broad-ovate, minutely ciliated. Calyx lobes small, obtuse, ciliate. Corolla broadly campanulate, 4-7 cm long, 5-lobed, white, with yellow blotch inside. Stamens 10, unequal. Ovary scaly; style far exceeding stamens, stigma dilated. Capsule 1.5-2 cm long, rugose.

**Fl. & Fr.:** March - September

**Distribution:** North East India, Myanmar

**Specimen examined:** Grows in primary and secondary forest. Thevopisu. NLNU 0382.

***Vaccinium*** L., Sp. Pl. 1: 349. 1753

Shrubs or small trees, sometimes epiphytic. Leaves alternate, or falsely whorled, margin entire or serrulate. Flowers usually small in terminal or axillary racemes, fasciculate, or solitary, rachis with bracts, pedicel bracteolate. Calyx 5-lobed, small, toothed. Corolla 5-lobed, urceolate, or tubular, lobes short, recurved. Stamens 10. Ovary inferior, 5-10-celled. Fruit a globose berry, with persistent calyx. Seeds many, ellipsoid.

1a. Terrestrial; leaves scattered

*V. exaristatum*

1b. Epiphytic; leaves pseudo-verticillate

*V. vacciniaceum*

***Vaccinium exaristatum*** Kurz., J. Asiat. Soc. Bengal 42. 2: 86. 1873.

Shrubs or small trees, upto 4 m tall. Leaves elliptic, oblong-lanceolate, yellowish green on both sides, apex acute or acuminate, base cuneate, margin serrate, coriaceous, not clustered. Inflorescence in terminal or axillary racemes, many flowered. Calyx lobes triangular, acute. Corolla pink, tubular, lobes short, recurved. Berry globose, dark purple when ripe.

**Fl. & Fr.:** March - July

**Distribution:** North East India, Myanmar, Thailand, Vietnam

**Specimen examined:** Grows in sparse forest in shrubby slopes. Chozuba. NLNU 0384. (**Pl. 34**)

***Vaccinium vacciniaceum*** (Roxb.) Sleumer, Bot. Jahrb. Syst. 71:479. 1941; Balakr., Fl. Jowai 1: 285. 1981; Haridasan & Rao, For. Fl. Megh. 2: 547. 1987; *Ceratostemma vacciniaceum* Roxb., Fl. Ind. 2: 412. 1832; *Vaccinium serratum* (G.Don) Wight, Cal. J. Nat. Hist. 8:171. 1847; C.B. Clarke in Hook.f. Fl. Brit. Ind. 3: 452. 1882; Kanjilal *et al.*, Fl. As. 3: 141. 1939.

Epiphytic shrubs, often straggling with lenticellate branches. Leaves clustered at ends of branches, lanceolate, oblong-elliptic, 3-10 x 1-2 cm, apex acute, base cuneate, margin serrate, coriaceous. Inflorescence in terminal or subterminal racemes, upto 9 cm long, many flowered. Calyx lobes triangular, acute. Corolla greenish white, ovoid-oblong, cylindrical, lobes short, recurved. Berry globose.

**Fl. & Fr.:** April - August

**Distribution:** North East India, Bhutan, Myanmar, Nepal

**Specimen examined:** Grows in primary forest, epiphytic, on tree trunks. Pfutsero, Tsupfume. NLNU 0054. (**Pl. 34**)

## MONOTROPACEAE

Nutt., Gen. N. Amer. Pl. 1: 272. 1818

Glabrous herb, perennial, lacking chlorophyll. Leaves reduced to scales. Flowers solitary, nodding. Sepals 4-5. Petals 5-6, oblong. Stamens 10-12, anthers dehiscing by transverse slits. Ovary 5-celled, ovules many. Capsule globose, loculicidally dehiscent, 5-valved. Seeds many, spindle-shaped.

*Monotropa* L., Sp. Pl. 1: 387. 1753

Description same as the family.

*Monotropa uniflora* L. Sp. Pl. 1: 387. 1753; C.B. Clarke in Hook.f. Fl. Brit. Ind. 3: 476. 1882; Kanjilal *et al.*, Fl. As. 3: 535. 1939; Grierson & Long, Fl. Bhut. 2.1: 356. 1991.

Saprophytic herbs, whitish or brownish, stem glabrous, 15-30 cm. Leaves reduced to scales, ovate-lanceolate. Flowers solitary, terminal, nodding, subtended by leaf-like bracts, bisexual, whitish, tubular. Sepals 3-5, oblanceolate. Petals 4-5, obovate, entire, glabrous outside, pubescent inside. Stamens usually 10, anthers yellow. Capsule globose, grooved.

**Fl. & Fr.:** May-November

**Distribution:** India (NE India), Bhutan, China, Japan, Myanmar, Nepal; North, Central and N South America.

**Specimen examined:** Grows in damp deciduous or mixed forest. Tsupfume. NLNU 1002.

(Pl. 34)

## PRIMULACEAE

Batsch ex Borkh., Syn. Univ. Anal. Gen. Pl. 2: 395. 1794

Herbs or shrubs, stems erect. Leaves simple, alternate or opposite, stipules absent. Flowers regular, bisexual or unisexual in cymes, 4-5-merous, racemes or umbels, panicles,

solitary or in heads, umbels or in whorls, sometimes aggregated into racemes or spikes, inflorescences often on peduncles. Calyx connate at base. Corolla united at base, rotate or tubular. Stamens as many as corolla lobes. Ovary superior or semi-inferior; style simple, stigma capitate. Fruit a drupe or capsule.

1a. Leaves forming a rosette, all radical *Primula*

1b. Leaves radical and cauline *Lysimachia*

***Lysimachia*** Tourn. ex L., Sp. Pl. 146. 1753

Annual or perennial herbs, erect or decumbent. Leaves simple, entire, alternate or opposite. Flowers solitary in leaf axils, or in racemes or terminal clusters, 4-6-merous. Calyx deeply lobed. Corolla rotate or funnel-shaped, lobes united at base. Stamens attached to base of corolla lobes. Capsule subglobose or ovoid.

1a. Flowers crowded in terminal racemes or sometimes axillary

2a. Leaves lanceolate or narrowly elliptic; plant glabrous *L. lobelioides*

2b. Leaves ovate; plant densely puberulous *L. congestiflora*

1b. Flowers axillary not crowded into racemes or clusters

3a. Leaves elliptic-lanceolate; plant glabrous *L. laxa*

3b. Leaves ovate; plant pubescent *L. debilis*

***Lysimachia congestiflora*** Hemsl., J. Linn. Soc. Bot. 26: 50. 1889; Singh in Singh *et al.*, Fl. Mizo. 2: 23. 2012; Grierson & Long, Fl. Bhut. 2. 2: 568. 1999; *L. japonica sensu* Hook.f., Fl. Brit Ind. 3: 505. 1882.

Herbs, perennial, about 35 cm tall. Stems densely puberulous, rooting at nodes. Leaves opposite, ovate-cordate, sometimes orbicular, 1-3.5 x 1-2.5 cm, base rounded or cuneate to attenuate, apex acute to obtuse, with appressed hairs on upper surface, densely

hairy on lower surface margin glandular punctate. Flowers yellow, crowded at tips of branches. Calyx lanceolate, ciliate. Corolla lobes 6, yellow, red at base ovate, acute. Filaments connate into a tube at base. Ovary pubescent. Style glabrous. Capsule subglobose.

**Fl. & Fr.:** May - June

**Distribution:** India (NE India), E Himalaya Bhutan, China, Myanmar, Nepal, Taiwan, Thailand, Vietnam

**Specimen examined:** Grows in shady places in forest. Khezhakhen. NLNU 0223. **(Pl. 34)**

*Lysimachia debilis* Wall., Roxb. Fl. Ind. 2: 25. 1824; Hook.f., Fl. Brit Ind. 3: 505. 1882.

Herbs, up to 30 cm tall. Stem branching from base. Leaves opposite, ovate, 1.5-3 x 1-1.5 cm, base cuneate, apex acute; petiole narrowly winged. Flowers axillary, solitary. Pedicels pubescent. Calyx lobes lanceolate, pubescent. Corolla yellow, lobes ovate-oblong. Filaments connate at base. Ovary pubescent. Capsule subglobose.

**Fl. & Fr.:** May - October

**Distribution:** India (NE India), E & W Himalaya, China, Myanmar, Nepal, Pakistan, Thailand

**Specimen examined:** Grows in grasslands, roadsides, shaded places. Zelome. NLNU 0191. **(Pl. 35)**

*Lysimachia lobelioides* Wall., Roxb. Fl. Ind. 2: 29. 1824; Hook.f., Fl. Brit Ind. 3: 502. 1882; Kanjilal *et al.*, Fl. As. 3: 536. 1939; Grierson & Long, Fl. Bhut. 2: 2: 566. 1999.

Decumbent or ascending herbs, glabrous. Leaves opposite or alternate, elliptic, lanceolate, 0.6-2 x 0.4-1 cm, base attenuate, apex acute, petiole winged, glabrous, with glandular spots near margins. Flowers in slender racemes. Calyx glandular, teeth lanceolate. Corolla lobes oblanceolate, white. Capsule subglobose, 5-valved.

**Fl. & Fr.:** May - October

**Distribution:** India (NE India), E Himalaya, Bhutan, China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in grasslands, roadsides, shaded places. Zelome. NLNU 0192.

**(Pl. 35)**

*Lysimachia laxa* Baudo, Ann. Sci. Nat. Bot. ser. 2. 20: 347. 1843; *L. ramosa* Wall. ex Duby, Prodr. 8: 65. 1844; Hook.f., Fl. Brit Ind. 3: 503. 1882; Kanjilal *et al.*, Fl. As. 3: 160. 1939; Balakr., Fl. Jowai 1:286, 1981.

Perennial herbs, upto 50 cm, erect or decumbent, branches winged. Leaves lanceolate, acute at apex, base cuneate, finely pubescent above, glabrous beneath. Flowers axillary, solitary. Calyx teeth ovate. Corolla lobes oblong, yellow. Capsule globose.

**Fl. & Fr.:** May - October

**Distribution:** India (NE India), E Himalaya, China, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam

**Specimen examined:** Grows in grasslands, roadsides, shaded places. Zelome. NLNU 0193.

*Primula* L., Sp. Pl. 142. 1753

Perennial herbs, glabrous or pubescent, often farinose. Leaves simple, all radical, often obovate, spatulate. Flowers on peduncles, solitary or few, or in heads, umbels or whorls. Calyx campanulate or cylindric. 5-toothed. Corolla tube cylindric, limb 5-lobed, spreading or campanulate. Stamens inserted on corolla tube. Ovary superior. Capsule globose or ovoid, 5-valved.

***Primula filipes*** G. Watt, J. Linn. Soc. Bot. 20: 5. 1882; Hook.f., Fl. Brit Ind. 3: 485. 1882; Grierson & Long, Fl. Bhut. 2. 2: 527. 1999.

Rhizomatous clump-forming herb, not farinose. Leaves often broadly ovate, 1-5 x 1-4.5 cm, base rounded, truncate or cordate, margin undulate or shallowly lobed, denticulate, pinnately veined to base, reddish pubescent beneath; petiole 1-5 cm, pubescent; peduncle 1.5-4.5(-10) cm, bearing a single umbel of 4-10 flowers; pedicels 2 cm. Calyx 0.4-0.7 cm. Corolla white to pale mauve with yellow eye, tube 2-3 times the length of calyx, limb 1-1.2 cm. Capsule globose.

**Fl. & Fr.:** February - April

**Distribution:** India (NE India), E Himalaya, China, Myanmar, Nepal

**Specimen examined:** Grows in shady cliffs and rocky slopes. Tsupfume. NLNU 1008 (**Pl. 35**)

## MYRSINACEAE

R. Br., Prodr. 532. 1810 (*Myrsineaea*)

Trees, shrubs or undershrubs. Leaves alternate, simple. Inflorescences racemes or panicles. Flowers unisexual or bisexual. Sepals 4-6. Petals 4-6 lobed. Stamens as many as petals and opposite to them. Ovary 1-celled. Fruit a drupe or berry.

- |  |                |
|--|----------------|
| 1a. Calyx fleshy; fruits enclosed by calyx         | <i>Maesa</i>   |
| 1b. Calyx membranous; fruits not enclosed by calyx |                |
| 2a. Corolla lobes imbricate in bud                 | <i>Embelia</i> |
| 2b. Corolla lobes twisted in bud                   | <i>Ardisia</i> |



*Ardisia* Sw., Prodr. Veg. Ind. Occ. 3: 48. 1788

Shrubs. Leaves entire or crenate, usually gland dotted. Flowers bisexual in terminal or axillary panicles or peduncled umbels. Bracts small, caducous. Calyx segments 5, persistent, enlarged in fruit. Corolla lobes 5, shortly united at base, apex not emarginated. Filaments short, anther free. Ovary superior. Fruit a drupe.

1a. Leaves more than 4 cm wide; not gland dotted near lower margin *A. virens*

1b. Leaves less than 4 cm wide; gland dotted near lower margin *A. macrocarpa*

*Ardesia macrocarpa* Wall., Roxb., Fl. Ind. 2: 277. 1824; C. B. Clarke in Hook.f., Fl. Brit Ind. 3: 524. 1882; Grierson & Long, Fl. Bhut. 2: 2: 513. 1999; Sinha in Singh *et al.*, Fl. Mizo. 2: 28. 2012.

Shrubs, upto 1.5 m tall. Stem single, branching near apex. Leaves elliptic or narrowly oblanceolate, 7-16 x 1.3-3.5 cm, base attenuate, apex acute, margins undulate, with gland dots at margins, coriaceous; petioles 0.8 cm long. Flowers in terminal and in upper axils of leaves, umbellate, peduncles short, 2-5-flowered. Calyx oblong, spatulate, gland dotted outside. Petals pinkish white, lanceolate, gland dotted. Fruit globose, scarlet red.

**Fl. & Fr.:** July - February

**Distribution:** India (NE India), China, Myanmar, Philippines, Thailand, Vietnam

**Specimen examined:** Grows in primary or secondary forests. Tsupfume. NLNU 1010. (Pl. 35)

*Ardesia virens* Kurz, Forest Fl. Burma 2: 575. 1877; C. B. Clarke in Hook.f., Fl. Brit Ind. 3: 524. 1882; Kanjilal *et al.*, Fl. As. 3: 183. 1939; Balakr., Fl. Jowai 1: 291. 1981; Sinha in Singh *et al.*, Fl. Mizo. 2: 32. 2012.

Shrubs or small trees, branches slender, glabrous, subterete. Leaves oblong-lanceolate, 8-17 x 3-5 cm, base cuneate, apex acuminate, margin crenulate, glabrous, lateral nerves 12-14 pairs; petioles upto 0.8 cm long. Flowers pale pink, in terminal or subterminal pedicels, simple umbellate. Calyx lobes elliptic-oblong, gland dotted. Corolla lobes ovate, minute black gland dotted. Stamens 5. Berry globose, purplish black.

**Fl. & Fr.:** May - October

**Distribution:** India (NE India), China, Myanmar, Philippines, Thailand, Vietnam

**Specimen examined:** Grows in primary or secondary forests. Lozaphuhu. NLNU 0520. (Pl. 35)

*Embelia* Burm. f., Fl. Ind. 62. 1768

Small trees or shrubs, usually climbing. Leaves alternate, entire or toothed, usually gland dotted. Flowers small, dioecious in axillary or terminal racemes, bracts small. Sepals 4-5, free or united at base, persistent. Petals free or slightly united at base, 4-5 lobed. Stamens 4-5, filaments adnate to base of the petals. Ovary superior; style short; stigma capitate. Fruit a drupe, subtended by persistent calyx.

1a. Leaves gland dotted beneath near margins; petals twisted in bud *E. floribunda*

1b. Leaves not gland dotted beneath; petals imbricate in bud *E. ribes*

*Embelia floribunda* Wall., Roxb. Fl. Ind. 2:291. 1824; C. B. Clarke in Hook.f., Fl. Brit Ind. 3: 514. 1882; Kanjilal *et al.*, Fl. As. 3: 171. 1939; Balakr., Fl. Jowai 1:289. 1981; Singh in Singh *et al.*, Fl. Mizo. 2: 33. 2012.

Large scandent shrubs. Stems and branches glabrous, zig-zag, ridged. Leaves oblong-elliptic or elliptic-lanceolate, 5-10 x 1.5-3 cm, base rounded or obtuse, apex acuminate, margin entire with a line of reddish gland dotted along the border; petioles 1.2 cm long,

glandular and ridged. Flowers 5-merous, minute, greenish-white, in axillary puberulous paniculate racemes. Calyx lobes triangular, puberulous. Corolla lobes lanceolate, pubescent inside. Stamens 5. Drupe globose, greenish to pinkish black.

**Fl. & Fr.:** October - February

**Distribution:** India (NE India), E & W Himalaya, Bhutan, China, Myanmar, Nepal

**Specimen examined:** Grows in forest slopes, along roadsides. Pfutsero. NLNU 0164. **(Pl. 35)**

*Embelia ribes* Burm.f., Fl. Ind. 62. 1768; C. B. Clarke in Hook.f., Fl. Brit Ind. 3: 513. 1882; Kanjilal *et al.*, Fl. As. 3: 169. 1939; Balakr., Fl. Jowai 1:289. 1981; Singh in Singh *et al.*, Fl. Mizo. 2: 34. 2012.

Large scandent shrubs. Branchlets ridged and warty, rusty tomentose. Leaves elliptic to oblong-lanceolate, 3-10 x 2-4 cm, base cuneate, apex obtuse-acuminate, margins recurved, surface with minute sunken glands, glaucous beneath; petioles 1.5 cm long. Flowers axillary or terminal, greenish-white, racemes paniculate puberulous, pedicels 0.2 cm long. Calyx united at base, teeth triangular, puberulous. Petals ovate, pubescent inside and outside. Stamens 5, adnate to petals. Drupe globose, fleshy, purplish black.

**Fl. & Fr.:** February - April

**Distribution:** India (throughout), E Himalaya, Bangladesh, Bhutan, China, Myanmar, Sri Lanka, Sumatera, Thailand, Vietnam

**Specimen examined:** Grows in forest slopes, along roadsides. Pfutsero. NLNU 0171. **(Pl. 36)**

*Maesa* Forssk., Fl. Aegypt.-Arab. 66. 1775

Evergreen shrubs or small trees, sometimes straggling. Leaves entire or serrate or dentate. Flowers small, unisexual or dioecious, in axillary or terminal racemes or panicles.

Bracts small. Calyx adnate to ovary. Petals tubular at base. Stamens 5, inserted on the corolla tube. Ovary semi-inferior; style simple, short with capitate or lobed stigma. Fruit a berry with persistent style at apex.

1a. Leaves membranous, glabrous

*M. indica*

1b. Leaves coriaceous; rugose above

*M. rugosa*

***Maesa indica*** (Roxb.) A. DC., Trans. Linn. Soc. London 17. 1: 134. 1834; C. B. Clarke in Hook. f., Fl. Brit. Ind. 3: 509. 1882; Kanjilal *et al.*, Fl. As. 3: 163. 1939; Balakr., Fl. Jowai 1: 287. 1981; *Baeobotrya indica* Roxb., Fl. Ind. 1: 557. 1832.

Shrubs or small trees. Bark dark grey or blacish brown. Leaves ovate-lanceolate or elliptic-lanceolate, 3-19 x 3-8 cm, base cuneate or rounded, apex acuminate, glabrous, obtusely or remotely dentate; petioles 0.5-2 cm long. Flowers white in axillary paniculate cy,es, shorter than the leaves. Calyx minute, 5-toothed; lobes ovate, ciliate margin. Petals obovate. Berry creamish or brown, globose.

**Fl. & Fr.:** February - June

**Distribution:** India (throughout), Tropical Asia

**Specimen examined:** Grows in open forests. Chizami. NLNU 0548. (Pl. 36)

***Maesa rugosa*** C. B. Clarke in Hook.f., Fl. Brit Ind. 3: 508. 1882; Grierson & Long, Fl. Bhut. 2. 2: 506. 1999.

Stout shrub or small tree, branchlets and leaves scaly brown, glabrescent. Leaves thick and rigid, broadly obovate, 7-19 x 3-9 cm, base cuneate or rounded, apex truncate, obtuse, cuspidate-acuminate, leathery, rugose, margin subentire or serrulate; petioles upto 3.5 cm, thick. Flowers creamy yellow, in axillary, paniculate racemes, glabrous or puberulent Sepals ovate. Corolla campanulate. Fruit globose or ovoid, about 0.3 cm across.

**Fl. & Fr.:** November - March

**Distribution:** India (NE India), E Himalaya, Bhutan, China, Myanmar

**Specimen examined:** Grows in open forests. Chizami. NLNU 0550. **(Pl. 36)**

## **EBENACEAE**

Vent., Tab. Regne. Veget. 2: 443. 1799

Shrubs or trees. Leaves alternate, rarely opposite, entire, coriaceous, exstipulate. Flowers axillary, solitary or in cymes, regular, 3-7 merous, usually dioecious, bracteate. Calyx united, persistent, often accrescent in fruit. Corolla tubular at base. Male flowers with stamens 2-3 times as many as corolla lobes, filaments free or united in pairs. Female flowers with staminodes or absent. Ovary superior, 2-16 locular, 1-2 ovules in per locule; styles 2-8, free or united below. Fruit a fleshy berry, many seeded, with persistent calyx.

***Diospyros*** L., Sp. Pl. 1057. 1753

Trees or shrubs; terminal buds absent. Branchlets apex sometimes forming spines. Leaves alternate, usually minutely gland dotted. Flowers dioecious or polygamous, 4-5 merous. Male flowers in axillary cymes, rarely solitary. Stamens 4 to many, often in pairs forming 2 series; ovary rudimentary. Female flowers usually solitary, axillary, staminodes 0-16; stigma 2-fid. Calyx usually 3-5 lobed, sometimes truncate. Corolla urceolate, or tubular, 3-5 lobed, caduceous. Berry fleshy, globose, usually with an enlarged persistent calyx. Seeds many, often laterally compressed.

1a. Corolla of male flowers glabrous; berries 4 cm or more

*D. kaki*

1b. Corolla of male flowers pubescent; berries less than 3.5 cm

*D. stricta*

***Diospyros kaki*** Thunb., Nova Acta. Reg. S. Sci. Upsal. 3: 208. 1780; C.B. Clarke in Hook.f., Fl. Brit. Ind. 3: 555. 1882; Kanjilal *et al.*, Fl. As. 3: 200. 1939; Balakr., Fl. As. 1: 295. 1981; Haridasan & Rao, For. Fl. Megh. 2: 571. 1987.

Trees upto 15 m tall. Branchlets tomentose when young, with reddish brown lenticels. Leaves elliptic-ovate or elliptic-lanceolate, 4-15 x 2-6 cm, apex acute to acuminate, base cuneate, subtruncate, margin entire, pubescent beneath, especially on veins; petioles 1-2 cm, tomentose. Male flowers in 3-5 flowered cymes; calyx hairy, 4-lobed; corolla campanulate, 4-lobed, hairy; stamens 16 in slightly unequal pairs. Female flowers solitary. Fruit a berry, globose to ovoid, flattened, orange-yellow.

**Fl. & Fr.:** May-December

**Distribution:** India (NE India), Himalaya, Bhutan, China, Japan

**Specimen examined:** Grows in primary and secondary forest. Thetsumi. NLNU 0759. (**Pl. 36**)

***Diospyros stricta*** Roxb., Fl. Ind. 2: 539. 1832; C.B. Clarke in Hook.f., Fl. Brit. Ind. 3: 563. 1882; Kanjilal *et al.*, Fl. As. 3: 199. 1939; Balakr., Fl. As. 1: 296. 1981; Haridasan & Rao, For. Fl. Megh. 2: 573. 1987.

Trees upto 15 m. Bark blackish brown, plain, young parts softly tomentose. Leaves ovate, ovate-lanceolate, 3-9 x 1-3 cm, apex acuminate, base cuneate or rounded, margin entire, pubescent; petioles 1-1.5 cm, hairy. Male flowers clustered in axillary short cymes. Female flowers solitary. Calyx 4-lobed, ovate. Corolla 4-lobed, hairy outside. Berry ovoid, orange-red.

**Fl. & Fr.:** October-May

**Distribution:** India (NE India), Bangladesh

**Specimen examined:** Grows in primary and secondary forest. Khezhakhen. NLNU 0225.

**(Pl. 36)**

## STYRACACEAE

DC. & Spreng., Elem. Philos. Pl. 140. 1821

Trees or shrubs. Leaves simple, alternate, stipules absent. Flowers in terminal racemes or axillary fascicles, regular, bisexual. Calyx 4-5-lobed, campanulate. Corolla 4-7-lobed, free or united into a tube at base. Stamens 8-10 or many, adnate to the petals, filaments free or united. Ovary superior or inferior; 3-5-celled; stigma small or capitate. Fruit a capsule with persistent calyx.

*Styrax* L., Sp. Pl. 444. 1753

Trees and shrubs. Leaves alternate, elliptic-lanceolate. Flowers in lax axillary and terminal racemes, or subsolitary axillary. Calyx 5-toothed, campanulate, free or adnate to the base of ovary. Corolla 5-lobes, elliptic-oblong. Stamens 10, filaments short. Fruit globose or ellipsoid.

*Styrax serrulatus* Roxb., Fl. Ind., ed. 2, 2: 415. 1832; *Styrax serrulatum* Roxb., C.B. Clarke in Hook.f., Fl. Brit. Ind. 3: 588. 1882; Kanjilal *et al.*, Fl. As. 3: 219. 1939; Balakr., Fl. Jowai 1: 300. 1981; Sinha in Sinha *et al.*, Fl. Mizo. 2: 44. 2012.

Trees, upto 15 m tall. Leaves alternate, ovate to elliptic-lanceolate, 3-11 x 2-5 cm, apex acuminate, base rounded, margin serrulate, glabrous above, pubescent along nerves beneath. Flowers in axillary peduncled fascicles, short racemes or panicles. Calyx 5-toothed. Corolla lobes 5, pubescent outside, glabrous inside. Stamens 10. Capsule ellipsoid or ovoid, with persistent copular calyx.

**Fl. & Fr.:** March - September

**Distibution:** India (throughout), Bhutan, China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in forest edges and in primary forest. Chozuba. NLNU 0386.

## OLEACEAE

Hoffmanns. & Link, Fl. Portug. 1: 62. 1809

Trees or erect or scandent shrubs. Leaves opposite, rarely alternate, simple, trifoliate or pinnate, stipules usually absent. Flowers bisexual, actinomorphic, in axillary or terminal cymes or panicle. Calyx 4-lobed, sometimes 5 or 9, rarely absent. Petals united in to a tube usually 4, occasionally 6-12, imbricate in bud. Stamens epipetalous, 2-4. Ovary superior, 2 loculed, stigma bifid or capitate. Fruit a berry, drupe, capsule or samara.

1a. Scandent shrubs

*Jasminum*

1b. Bushy shrub or small trees

*Chrysojasminum*

### *Chrysojasminum* Banfi,

Atti Soc. Ital. Sci. Nat. Mus. Civico Storia Nat. Milano 1. 1: 4. 2014

Scandent or erect shrubs. Leaves simple, 3-foliate or pinnate, usually opposite or alternate. Inflorescence cymes, umbels or panicles; bracts linear, small or ovate. Flowers usually fragrant. Calyx 4-9-lobed, funnel-shaped tube. Corolla salverform or funnellform, imbricate in bud. Stamens 2 inserted in corolla tube. Stigma capitate or bifid. Fruit a berry.

*Chrysojasminum subhumile* (W.W. Sm.) Banfi & Galasso, Atti Soc. Ital. Sci. Nat. Mus. Civico Storia Nat. Milano 1. 1: 5. 2014; *Jasminum subhumile* W.W. Sm., Notes Roy. Bot. Gard. Edinburg 8: 127. 1913; Grierson & Long, Fl. Bhut. 2.2:593. 1999

Bushy shrub or small tree, 1-5 m tall. Young branches angular, petiole, pedicel glabrous or pubescent. Leaves alternate, simple or compound, ovate or suborbicular to lanceolate; petioles 1-5 cm long; leaflets 1-3, sessile or petiolule, ovate to ovate-lanceolate, 3-10 x 1-5 cm, base rounded or cuneate, apex acute to acuminate, glabrous above, sparsely



pilose beneath. Inflorescence terminal, many-flowered, paniculate cymes. Flowers fragrant, yellow. Calyx 5-toothed, minute. Corolla funnelform, tube 1 cm long, lobes 5, oblong. Fruit ovoid, black when ripe.

**Fl. & Fr.:** March - August

**Distribution:** India (NE India), Bhutan, China, Myanmar, Nepal

**Specimen examined:** Grows in secondary open forest. Tsupfume. NLNU 0055. (PI. 36)

*Jasminum* L., Sp. Pl. 1: 7. 1753

Scandent or erect shrubs. Leaves simple, 3-foliate or pinnate, usually opposite or alternate. Inflorescence cymes, umbels or panicles; bracts linear, small or ovate. Flowers usually fragrant. Calyx 4-9-lobed, funnel-shaped tube. Corolla salverform or funnelform, imbricate in bud. Stamens 2 inserted in corolla tube. Stigma capitate or bifid. Fruit a berry.

1a. Leaves compound

2a. Leaves 3-5-foliate; terminal leaflets almost same size as

lateral leaflets

*J. lanceolaria*

2b. Leaves always 3-foliate; terminal leaflet larger than

lateral leaflets

*J. dispersum*

1a. Leaves simple

3a. Inflorescence on long peduncles

*J. laurifolium*

3b. Inflorescence capitate

*J. elongatum*

*Jasminum dispersum* Wall., Roxb. Fl. Ind. 1:99.1820; C.B. Clarke in Hook.f., Fl. Brit. Ind. 3:602.1882; Kanjilal *et al.*, Fl. As. 3: 232. 1939; Balakr., Fl. Jowai 1: 302. 1981; Sinha in Singh *et al.*, Fl. Mizo. 2: 63. 2012.

Scandent shrubs. Leaves opposite, pinnate with 3-5 leaflets, ovate to ovate-lanceolate, apex acute or acuminate, base rounded or truncate, terminal leaflet larger than lateral leaflets. Inflorescence axillary cyme, few flowered, pedicels 5-8 mm. Flower sweet scented, white with a pink tube, pink in bud. Calyx glabrous, teeth minute; corolla tube 10-15mm, lobes elliptic or ovate. Fruit globose, purplish black.

**Fl. & Fr.:** April - January

**Distribution:** India (throughout), E&W Himalaya, China, Myanmar, Nepal, Pakistan, Thailand,

**Specimen examined:** Grows in open on trees. Tsupfume. NLNU 0057. (Pl. 37)

*Jasminum elongatum* (P.J.Bergius) Willd., Sp. Pl. ed. 4. 1: 37. 1797; Sinha in Singh *et al.*, Fl. Mizo. 2: 65. 2012; *J. undulatum* Ker Gawl., Bot. Reg. 6: t. 436. 1820; C.B. Clarke in Hook.f., Fl. Brit. Ind. 3:592. 1882; Kanjilal *et al.*, Fl. As. 3: 225. 1939; Grierson & Long, Fl. Bhut. 2.2:590. 1999.

Scandent climbing shrubs. Young stems covered in dense pubescence. Leaves opposite, simple, ovate-lanceolate, 3-6 x 1.5-2.5, base subcordate or rounded, apex acute or acuminate, margins entire, glabrescent except pubescent midrib; petioles 0.3-0.6 cm. Inflorescence axillary, in capitate, hairy cymes. Flowers white, fragrant. Calyx lobes filiform, hairy. Corolla tube 1-2.5 cm long, 5-lobed, ovate, 1-1.5 cm. Fruit globose or ellipsoid, usually paired.

**Fl. & Fr.:** June - November

**Distribution:** India (NE India), E Himalaya, Bhutan, China, Myanmar, Nepal, Thailand, Vietnam; W Australia

**Specimen examined:** Grows on forests slopes, thickets. Khuza. NLNU 0810. (Pl. 37)

*Jasminum lanceolaria* Roxb., Fl. Ind. 1: 98. 1820; C.B. Clarke in Hook.f., Fl. Brit. Ind. 3:601.1882; Kanjilal *et al.*, Fl. As. 3: 232. 1939; Balakr., Fl. Jowai. 2: 301. 1983; Grierson & Long, Fl. Bhut. 2.2: 591.1999.

Scandent shrubs. Branches glabrous, stem obscurely ribbed. Leaves opposite, 3-foliolate, elliptic to ovate, apex obtuse to caudate, base rounded or cuneate, entire, coriaceous; terminal leaflet 7-13 x 3-5 cm, lateral leaflet 4.5-9 x 3-4.5 cm, petiole 2-3.5 cm, curved. Inflorescence terminal or axillary cyme often paniculate, many flowered, bracts linear. Calyx teeth triangular or subtruncate. Corolla white, tube 1.5-3cm, lobes oblong. Fruit a berry, ellipsoid.

**Fl. & Fr.:** April - October

**Distribution:** India (NE India), E Himalaya, Bangladesh, China, Myanmar, Taiwan, Thailand, Vietnam

**Specimen examined:** Grows on forests slopes, thickets. Tsupfume. NLNU 0058. **(Pl. 37)**

*Jasminum laurifolium* Roxb.ex Hornem., Hort. Bot. Hafn. 112. 1819; C.B. Clarke in Hook.f., Fl. Brit. Ind. 3:597. 1882; Kanjilal *et al.*, Fl. As. 3: 229. 1939; Grierson & Long, Fl. Bhut. 2.2:587. 1999; Sinha in Singh *et al.*, Fl. Mizo. 2: 66. 2012.

Scandent shrubs. Stem terete, glabrous. Leaves simple, opposite, elliptic-lanceolate, 3-12 x 1.5-2.5 cm, apex acuminate, base obtuse to attenuate, 3-nerved. Inflorescence terminal or axillary on long peduncle 3-5 flowered lax cymes. Flowers white with red tube, buds dark red. Calyx 5-7 toothed, linear or filiform, 0.2-0.4 cm. Corolla tube 1.5-1.8cm, lobes 9-12, linear lanceolate. Berry globose, black.

**Fl. & Fr.:** March - July

**Distribution:** India (NE India), E Himalaya, Bangladesh, Bhutan, China, Myanmar, Nepal, Taiwan, Thailand

**Specimen examined:** Grows on forests slopes, thickets. Tsupfume. NLNU 0063. (Pl. 37)

## APOCYNACEAE

Juss., Gen. Pl. 143. 1789

Trees, shrubs or climbers, rarely perennial herbs; sap milky latex. Leaves opposite or whorled, simple, entire, exstipulate. Inflorescence cymose, axillary or terminal, bracteolate. Flowers bisexual, actinomorphic, often large, showy and fragrant. Calyx 5 lobes, rarely 4, imbricate. Corolla 5 or rarely 4 lobes, contorted and twisted in buds, spreading, funnel-shaped or salverform. Disc ring or cup shaped, lobed or sometimes absent. Stamens 5 or 4, filaments short. Ovary superior, rarely half-inferior. Fruit a pair of cylindrical follicles, dry or fleshy drupe or berry. Seeds often winged or with terminal long silky hairs.

- |   |                    |
|---|--------------------|
| 1a. Erect shrubs or trees, leaves whorled or opposite                     | <i>Alstonia</i>    |
| 1b. Climbers, leaves opposite   |                    |
| 2a. Corolla tube less than 2 cm, sepals longer than corolla tube          | <i>Aganosma</i>    |
| 2b. Corolla tube more than 2 cm, sepals much shorter than<br>corolla tube | <i>Chonemorpha</i> |

*Aganosma* (Blume) G. Don, Gen. Hist. 4: 77. 1837

Evergreen woody climbers. Leaves opposite. Inflorescence terminal or axillary in tomentose cymes. Flowers salverform, corolla lobes overlapping to right. Calyx segments 5, divided nearly to base, lanceolate, with subulate glands at the base. Corolla tube cylindric, lobes linear-lanceolate. Stamens at the base of the throat, inserted; anthers sagittate, adnate

to the stigma. Disc 5 lobed, cup shaped. Carpels 2, ovules numerous; style short. Fruit a pair of cylindrical follicles, long and slender. Seeds flattened with apical coma.

*Aganosma cymosa* (Roxb.) G. Don, Gen. Hist. 4: 77. 1837; Hook.f., Fl. Brit. Ind. 3: 665. 1882; Kanjilal *et al.*, Fl. As. 3: 269. 1939.

Climbing shrubs, glabrous, young parts tomentose. Leaves ovate, oblong-lanceolate, 5-10 x 3.5-7.5 cm, base rounded or obtuse, apex acute or acuminate, margin entire, leaves yellow tomentose beneath; petiole 1-1.5 cm long. Inflorescence terminal, cymes, densely tomentose; bracts and bracteoles linear-elliptic. Calyx long, pubescent. Corolla white, tomentose outside, glabrous inside, tube shorter than sepals, lobes ovate-lanceolate. Follicles 2, cylindric, pubescent. Seeds oblong with coma.

**Fl. & Fr.:** May- November

**Distribution:** India (throughout), Bangladesh, Cambodia, China, Laos, Sri Lanka, Thailand, Vietnam

**Specimen examined:** Grows in secondary forest, forest margins. Akhwego. NLNU 0602.

**(Pl. 37)**

*Alstonia* R. Br., Mem. Wern. Nat. Hist. Soc. 1: 75. 1811

Trees or shrubs. Leaves in whorls of 3-5, rarely opposite, lateral veins numerous and parallel. Inflorescence terminal, cymes, thyse or compound umbel. Flowers actinomorphic, 5-merous. Calyx short. Corolla tube cylindric, wide around anthers, lobes spreading, pubescent inside. Stamens inserted near top of corolla tube, free from stigma. Style long, filiform. Carpels 2, ovules numerous. Fruits of two follicles, slender, many seeded. Seeds oblong or linear, ciliated at both ends.

*Alstonia sebusi* (Van Heurck & Mull. Arg.) Monach., Pacific Sci. 3: 157. 1949; Grierson & Long, Fl. Bhut., 2.2: 674. 1999; *A. henryi* Tsiang Sunyatsenia 6: 112. 1941; *Blaberopus sebusi* Van Heurck & Mull. Arg., Observ. Bot. 2: 188. 1871.

Shrub upto 3 m tall; branchlets lenticellate. Leaves 3-4 in whorls, lanceolate, obovate-lanceolate, 6-12 x 1.5-3 cm, base cuneate, apex acute to acuminate, margin entire, lateral nerves parallel, numerous. Inflorescence thyrses, panicle cymes, pubescent. Calyx lobes small, ciliate. Corolla tube about 1 cm long, widened above middle, lobes short, ovate, hairy outside. Disc lobes as long as ovary. Fruit 2 follicles, slender, many seeded.

**Fl. & Fr.:** June- August

**Distribution:** India (NE India), E. Himalaya, Bhutan, China, Myanmar

**Specimen examined:** Grows in primary forest, forest margins. Wazeho. NLNU 0605.

*Chonemorpha* G. Don, Gen. Hist. 4: 76. 1837

Woody climbers, bark with raised lenticels. Leaves opposite. Inflorescence terminal or sub-axillary, lax paniculate cymes. Flowers large, salver-shaped, fragrant. Calyx tubular, deeply lobed, glandular within. Corolla tube cylindric, hairy within, lobes large, overlapping to right. Stamens inserted near base of corolla tube, subsessile. Disc ring-like or cup-shape. Ovaries 2, free, ovules numerous. Fruit a pair of woody follicles. Seeds flattened with a long coma.

1a. Leaves large, calyx shortly 5-toothed *C. fragrans*

1b. Leaves smaller, calyx lobes divided to middle or near base *C. griffithii*

*Chonemorpha fragrans* Alston, Ann. R. Bot. Gard. Perad. 11: 203. 1929; Balakr., Fl. Jowai 2: 308. 1983; *Echites fragrans* Moon, Cat. Pl. Ceylon 20. 1824; *E. macrophylla* Roxb., Fl.

Ind. 2: 13. 1832 *C. macrophylla* (Roxb.) G. Don, Gen. Hist. 4: 76. 1837; Hook.f., Fl. Brit Ind. 3: 661. 1882; Kanjilal *et al.*, Fl.As. 3: 265. 1939; Giri *et al.*, Mater. Fl. Aruna. Pradesh 2:152. 2008.

Large stout woody climbers, bark lenticellate. Leaves large, 11-25 x 7-18 cm, obovate, obovate-elliptic, base rounded or sub-cordate, apex cuspidate-acuminate, entire; petiole 1-3 cm long. Inflorescence terminal cymes. Flowers large, white, throat yellow, fragrant. Calyx tubular, about 1 cm long, lobes ovate-triangular, apex acute. Corolla tube 3-4.5 cm long, limb 5-6 cm across, glabrous outside, throat hairy, lobes obliquely obovate. Filaments short. Follicles paired, 25-40 cm, cylindric. Seeds oblong, coma white, about 5 cm long.

**Fl. & Fr.:** June- February

**Distribution:** India (throughout), Bangladesh, Bhutan, China, Malaya, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam

**Specimen examined:** Grows in primary forest, clinging on trees. Wazeho. NLNU 0647.

*Chonemorpha griffithii* Hook.f., Fl. Brit. Ind. 3: 662. 1882; Kanjilal *et al.*, Fl. As. 3: 265. 1939; Grierson & Long, Fl. Bhut. 2.2: 683. 1999; Giri *et al.*, Mater. Fl. Aruna. Pradesh 2:154. 2008.

Woody climber, branches pubescent. Leaves elliptic, ovate-elliptic, 5.5-15 x 3-7 cm, base rounded to broadly cuneate, apex acute or cuspidate, glabrous above, pubescent on both surfaces; petiole 1-3 cm long, pubescent. Inflorescence terminal, cymes paniculate. Flowers white, throat pale yellow. Calyx divided to base, lobes ovate-lanceolate, about 1.2 cm long, pubescent. Corolla tube cylindric, about 2 cm long, pubescent inside, lobes obovate.

Stamens inserted at middle of corolla tube. Disc ringlike. Follicles cylindric, glabrous, 30 cm long.

**Fl. & Fr.:** May- September

**Distribution:** India (throughout), Bhutan, China, Myanmar, Nepal, Thailand

**Specimen examined:** Grows in primary and secondary forest, trailing on trees. Zelome.

NLNU 0194. (Pl. 37)

## ASCLEPIADACEAE

R. Br. on the Asclepiadeae 19. 1810

Climbers, shrubs or herbs, with milky latex. Leaves opposite or whorled. Flowers bisexual, regular, in cymes. Calyx 5, divided almost to base. Petals 5, corona present. Stamens 5. Fruit of 2 follicles. Seeds with silky white hairs.

### 1a. Erect shrubs

2a. Flowers erect, corolla red, corona yellow; follicles fusiform *Asclepias*

2b. Flowers pendent, corolla white, corona pale purple; follicles inflated with soft bristles *Gomphocarpus*

### 1b. Twining shrubs

3a. Epiphytes, leaves succulent *Hoya*

### 3b. Terrestrial, leaves coriaceous

4a. Corolla lobes ovate, urceolate *Gongronema*

4b. Corolla lobes oblong, linear, overlapping to the right or left

### 5a. Corona lobes linear, filiform

6a. Leaves broadly ovate, petioles upto 4 cm long *Myriopteron*

6b. Leaves lanceolate, petioles subsessile *Periploca*



5b. Corona lobes short or dorsally compressed

7a. Flowers axillary fascicled, corolla overlapping

to the right

*Decalepis*

7b. Flowers dichotomous axillary cymes, corolla

overlapping to the left

*Toxocarpus*

***Asclepias* L., Sp. Pl. 1: 214. 1753**

Perennial herbs or undershrubs, woody at base. Leaves opposite or whorled. Inflorescence terminal and axillary, cymes, umbel-like. Calyx lobes 5, linear to narrowly lanceolate, acute, glandular within. Corolla lobes 5, divided almost to base, rotate, reflexed. Coronal scales 5, erect and spoon shaped. Stamens inserted at base of corolla tube, filaments fused into a tube, pollen in pendulous waxy pollinia. Stigma 5 angled, depressed. Follicles beaked and glabrous. Seed sflat with a long coma.

*Asclepias curassavica* L., Sp. Pl. 215. 1753; Hook.f., Fl. Brit Ind. 4: 18. 1883; Kanjilal *et al.*, Fl. As. 3: 284. 1939; Balakr., Fl. Jowai 2: 314. 1983; Giri *et al.*, Mater. Fl. Aruna. Pradesh 2:163. 2008.

Perennial, erect herbs or shrubs. Leaves lanceolate to oblong-lanceolate, apex acute, base cuneate, glabrous; petiole short. Inflorescence axillary or terminal, umbellate cyme. Flowers orange-red. Corolla deeply 5 lobed, rotate, reflexed. Coronal lobes orange. Follicles beaked, smooth. Seeds flat, with a silky coma.

**Fl. & Fr.:** June- August

**Distribution:** India, America, almost throughout the regions of the world.

**Specimen examined:** Grows in open places, near human habitation. Wazeho. NLNU 0603.

***Decalepis*** Wight & Arn., Contr. Bot. India: 64. 1834

Twining shrubs. Leaves opposite. Flowers in short axillary pedunculate cymes. Calyx 5, with glands within. Corolla tube short, subcampanulate, lobes overlapping to the right. Corona scales absent. Stamens inserted at base of corolla, filaments free; anthers oblong, adnate below to the stigma. Pollen mass paired in each cell. Stigma 5-angled, capitate. Follicles divaricate.

***Decalepis khasiana*** (Kurz) Ionta ex Kambale, Taxon 65: 876. 2016; *Pentanura khasiana* Kurz, Forest Fl. Burma 2: 196. 1877; Hook.f., Fl. Brit. Ind. 4: 4. 1883; Kanjilal *et al.*, Fl. As. 3: 276. 1939; Balakr., Fl. Jowai 2: 315. 1983 Giri *et al.*, Mat. Fl. Aruna. Pradesh 2:172. 2008; *Stelmocrypton khasianum* (Kurz) Baill., Bull. Mens. Soc. Linn. Paris 2: 812. 1889.

Slender twining shrubs. Leaves elliptic-lanceolate, 5-11 x 2-4 cm, cuneate at base, acuminate apex; petioles 2 cm long. Flowers in short axillary fascicles, purplish pink, peduncles short. Corolla subcampanulate, lobes ovate. Corona absent. Follicles oblong-elliptic, glabrous, divaricate.

**Fl. & Fr.:** May- October

**Distribution:** India (NE India), E Himalaya, Bangladesh, China, Myanmar

**Specimen examined:** Grows in open spaces, along roadsides, climbing on trees and bushes.

Khuza. NLNU 0811. **(Pl. 38)**

***Gomphocarpus*** R. Br., Mem. Wern. Nat. Hist. Soc. 1: 37. 1810

Shrubs. Leaves opposite or whorled. Inflorescence axillary, cymes, umbel-like, pendent, many flowered. Calyx 5 lobed. Corolla deeply lobed, rotate, reflexed. Corona 5 lobes, inserted on gynostegium. Filaments fused into a tube; anther appendages incurved. Pollinia pendulous. Stigma depressed. Follicles ovoid, inflated, with soft bristles.

***Gomphocarpus physocarpus*** E. Mey., Comm. Pl. afr. Austr. 202. 1838; Jagtap & Singh, Fasc. Fl. Ind. 24: 27. 1999.

Erect shrubs. Leaves linear-lanceolate, 5-10 x 0.8-1.4 cm, acute at both ends; petioles 0.5 cm long. Flowers axillary or terminal, in umbels, white. Calyx 5-lobed, lanceolate. Corolla deeply 5-lobed, reflexed. Corona 5 lobes white, cup-shaped, laterally compressed, fleshy. Pollinia 5, pollen masses solitary in each cell. Follicles solitary, ball-like, beakless, echinate.

**Fl. & Fr.:** May- November

**Distribution:** India, Africa, widely distributed in the regions of the world.

**Specimen examined:** Grows near human habitation. Tsupfume. NLNU 0007. **(Pl. 38)**

***Gongronema*** (Endl.) Decne., Prodr. 8: 624. 1844

Twining shrubs. Leaves opposite. Flowers axillary, umbel-like or raceme like. Calyx 5 lobed. Corolla campanulate, lobes 5, twisted to right. Corona lobes 5. Filaments fused into a tube, anthers membranous, pollinia oblong, erect. Styles short, stigma conical or convex. Follicles oblong-lanceolate, slender, glabrous.

***Gongronema napalense*** (Wall.) Decne., DC. Prodr. 8: 624. 1844; Hook.f., Fl. Brit. Ind. 4:33. 1883; Kanjilal *et al.*, Fl. As. 3: 292. 1939; Balakr., Fl. Jowai 2: 318. 1983; Haridasan & Rao, For. Fl. Megh. 2:618. 1987; Giri *et al.*, Mater. Fl. Aruna. Pradesh 2: 166. 2008; *Gymnema napalense* Wall., Tent. Fl. Napal. 49. 1826.

Large twining shrubs. Leaves oblong-ovate, 7-15 x 3-7 cm, base rounded or subcordate, apex acuminate, glabrous; petioles upto 5 cm long. Inflorescence cymes umbellate, many flowered, peduncles upto 15 cm long, branching into 3 arms. Calyx lobes ovate. Corolla yellow, lobes ovate. Corona lobes semicircular. Follicles 5-8 cm long.

**Fl. & Fr.:** July-December

**Distribution:** India (throughout), Bhutan, China, Myanmar, Nepal, Vietnam

**Specimen examined:** Grows among bushes and shrubs in open spaces, along roadsides.

Wazeho. NLNU 0607. (**Pl. 38**)

*Hoya* R. Br., Prodr. 459. 1810

Twining, pendulous or rambling shrubs, rooting at nodes. Leaves opposite, thick and fleshy or coriaceous. Flowers in terminal, axillary, simple umbels. Calyx small, 5-partite. Corolla tube widely campanulate to flattened or reflexed; lobes 5, fleshy or waxy, spreading or reflexed. Gynostegium large and showy; corona lobes 5, fleshy, fused to the staminal column. Pollinia erect, waxy, one per anther locule. Follicles 1 or 2, slender. Seeds very small, with a long coma.

*Hoya longifolia* Wall. ex Wight, Contr. Bot. Ind. 36. 1834; Hook.f., Fl. Brit. Ind. 4: 56. 1883; Kanjilal *et al.*, Fl. As. 3: 304. 1939; Giri *et al.*, Mater. Fl. Aruna. Pradesh 2:168. 2008.

Pendulous climbing shrubs. Leaves opposite, narrowly oblanceolate, 4-14 x 1.2-2.4 cm, apex acute or acuminate, base rounded to cuneate, fleshy, glabrous; petiole upto 1.4 cm long. Flowers 2 cm across, axillary, umbel, peduncle upto 5 cm long, white with pink tinge. Calyx apex acute. Corolla lobes ovate, spreading, margin densely wooly. Coronal process stellate, spreading. Follicles slender, straight, glabrous.

**Fl. & Fr.:** May-December

**Distribution:** India (throughout), China, Myanmar, Nepal, Thailand

**Specimen examined:** Grows on trunks and branches of trees. Tsupfume. NLNU 0011. (**Pl. 38**)

***Myriopteron*** Griff., Calcutta J. Nat. Hist. 4: 385. 1844

Twining shrubs, glabrous or pubescent. Leaves opposite. Inflorescence axillary, paniculate cymes, branched. Calyx 5-lobed, glandular within. Corolla rotate, lobes overlapping to right. Corona lobes 5, linear. Stamens inserted at base of corolla, filaments connate to a ring, anthers connate at tips, pollen tetrads in masses. Stigma head convex. Follicles often paired, short, straight.

***Myriopteron extensum*** (Wight) K. Schum., Engl. & Prantl. Nat. Pflanzenfam. 4.2: 215. 1895; *M. paniculatum* Griff. Calcutta J. Nat. Hist. 4: 385. 1844; Hook.f., Fl. Brit. Ind. 4: 11. 1883; Kanjilal *et al.*, Fl. As. 3: 279. 1939; Haridasan & Rao, For. Fl. Megh. 2: 621. 1987; Giri *et al.*, Mater. Fl. Aruna. Pradesh 2:172. 2008.

Climbing shrub, branches slender. Leaves suborbicular-oblong, ovate-orbicular, apex abruptly acuminate, base rounded or broadly cuneate, glabrous above, pubescent beneath; petioles upto 4 cm long. Inflorescence a paniculate cymes. Flowers small, white. Calyx small, ovate, 5-lobed. Corolla lobes lanceolate, glabrous, rotate. Corona lobes glabrous. Follicles straight with longitudinal wings.

**Fl. & Fr.:** July-December

**Distribution:** India (throughout), China, Myanmar, Thailand, Vietnam

**Specimen examined:** Grows in thickets, among bushes, along roadsides. Wazeho. NLNU 0614. (Pl. 38)

***Periploca*** Tourn. ex L., Sp. Pl. 1: 211. 1753

Twining shrubs, branches slender, glabrous. Leaves opposite, coriaceous, shiny green on both sides, margin undulate. Inflorescence axillary, in lax dichotomous cymes. Calyx lobes ovate-obtuse. Corolla tube short, rotate; lobes obtuse, overlapping to the right. Corona inserted at base of corolla; lobes 3, central lobe threadlike, inflexed, lateral segments short.

Staminal column short, anthers fused to stigma head. Follicles paired, straight or slightly curved. Seeds oblong, coma long.

***Periploca calophylla*** (Wight) Falc., Proc. Linn. Soc. London 1: 115. 1841; Hook.f., Fl. Brit. Ind. 4: 12. 1883; *Streptocaulon calophyllum* Wight, Contr. Bot. Ind. 65. 1834; Kanjilal *et al.*, Fl. As. 3: 280. 1939; Grierson & Long, Fl. Bhut. 2.2: 695. 1999; Giri *et al.*, Mater. Fl. Aruna. Pradesh 2:173. 2008.

Twining wiry shrubs, glabrous. Leaves lanceolate, ovate-lanceolate, apex long acuminate, caudate, base, cuneate, attenuate, margin entire, shiny dark green above, leathery; petiole short. Flowers in axillary cymes, brown or yellow-green, faintly scented. Calyx lobes ovate, ciliated. Corolla lobes oblong, glabrous outside, pilose inside, margins recurved. Corona lobes pilose. Stamens free, anthers bearded on the back. Follicles cylindric, smooth. Seeds linear, coma 3-4 cm long.

**Fl. & Fr.:** October-April

**Distribution:** India (throughout), China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in thickets, often completely masking the supporting trees .  
Tsupfume. NLNU 1013. **(Pl. 38)**

***Toxocarpus*** Wight & Arn., Contr. Bot. India 61. 1834

Slender twining shrubs, rusty tomentose. Leaves opposite. Inflorescence axillary cymes, branches densely red-brown pubescent. Calyx lobes ovate-lanceolate, acute, pubescent. Corolla tube short; lobes narrow and twisting to left, white pubescent inside the tube. Corona 5 lobes, inserted at base of gynostegium. Staminal column short, pollinia 4 on each pollinarium. Follicles 2, divaricate, hairy. Seeds oblong, flat, with a silky coma at tip.

*Toxocarpus himalensis* Falc. ex Hook.f., Fl. Brit. Ind. 4: 13. 1883; Haridasan & Rao, For. Fl. Megh. 2: 623. 1987; Grierson & Long, Fl. Bhut. 2.2: 696. 1999; Giri *et al.*, Mater. Fl. Aruna. Pradesh 2:174. 2008.

Twining climbers, young parts rusty tomentose. Leaves elliptic-lanceolate, elliptic-obovate, 5-12 x 2.5-6 cm, apex acuminate, base rounded or cuneate, glabrous above, pilose beneath; petiole 1 cm long. Cymes rusty pubescent, axillary. Calyx ovate, acute, rusty pubescent. Corolla yellow purplish, oblong, twisted to the left, lobes glabrous, throat densely villous. Follicles rusty pubescent, divaricately paired, linear. Seeds ovate, beaked, coma upto 5 cm long.

**Fl. & Fr.:** April-July

**Distribution:** India (NE India), E Himalaya, China, Myanmar

**Specimen examined:** Grows in primary forest, in shaded areas. Sakraba. NLNU 0673. (Pl. 39)

## BUDDLEJACEAE

Bartling Ord. Nat. Pl. 172. 1830 (Buddaceae) Wilhelm Samenpfl. 90. 1910

Shrubs or small trees, often with stellate hairs. Leaves simple, opposite, stipules interpetiolar, leafy, sometimes linear or absent, margin entire, dentate or crenate. Flowers in axillary and terminal dense spike like panicles, 4-merous, bisexual, actinomorphic. Calyx campanulate, shortly lobed. Corolla campanulate or tubular, tube usually longer than lobes, lobes spreading. Stamens 4, included within corolla tube. Ovary superior, 2 celled, ovules numerous; stigma capitate or clavate. Fruit a septicidally 2 valved capsule. Seeds many.

*Buddleja* L., Sp. Pl. 1: 112. 1753

Description as of family.

1a. Leaves broad, serrate or crenate; corolla orange at throat *B. macrostachya*

1b. Leaves narrowly lanceolate, entire or subentire; corolla white *B. asiatica*

***Buddleja asiatica*** Lour., Fl. Cochinch. 72. 1790; C.B. Clarke in Hook.f., Fl. Brit. Ind. 4: 82. 1883; Kanjilal *et al.*, Fl. As. 3: 312. 1939; Haridasan & Rao, For. Fl. Megh. 2: 623. 1987; Grierson & Long, Fl. Bhut. 2.3: 1081. 2001.

Shrubs, upto 5m high, young parts with woolly hairs. Leaves narrowly lanceolate, 6-17 x 1-4 cm, acuminate apex, base cuneate, margin minutely serrate, glabrous above, densely woolly beneath; petioles 0.6-0.9 cm. Flowers scented, terminal and axillary in dense spike like long panicles. Calyx campanulate, lobes triangular, stellate pubescent outside, glabrous inside. Corolla white, tubular, lobes rounded, spreading. Stamens included, anthers oblong. Ovary ovoid; style short, stigma capitate. Capsule ellipsoid, compressed.

**Fl. & Fr.:** January-October

**Distribution:** India (throughout), Bangladesh, Bhutan, Cambodia, China, Indonesia, Laos, Malaysia, Myanmar, Nepal, New Guinea, Pakistan, Philippines, Thailand, Vietnam

**Specimen examined:** Grows in open places, along roadsides, forest edges. Tsupfume. NLNU 0014. (Pl. 39)

***Buddleja macrostachya*** Benth., Scroph. Ind. 42. 1835; C.B. Clarke in Hook.f., Fl. Brit. Ind. 4: 81. 1883; Brandis, Ind. Trees 475. 1906; Kanjilal *et al.*, Fl. As. 3: 313. 1939; Haridasan & Rao, For. Fl. Megh. 2: 624. 1987; Grierson & Long, Fl. Bhut. 2.3: 1081. 2001.

Shrub or small trees. Leaves elliptic-lanceolate, 7-20 x 1.5-5 cm, acuminate, base attenuate, often decurrent, margin serrate, glabrate above, densely white tomentose beneath. Flowers in dense elongated paniculate spikes, spike 10-30 cm long, sweet scented. Calyx



lobes ovate, tomentose. Corolla creamish with orange throat, tube 0.5-1 cm, tomentose outside, throat villous, lobes orbicular, spreading. Stamens included, subsessile. Ovary ovoid, tomentose, stigma clavate. Capsules oblong, compressed.

**Fl. & Fr.:** August-December

**Distribution:** India (NE India), E Himalaya, Bangladesh, Bhutan, China, Myanmar, Thailand, Vietnam

**Specimen examined:** Grows in open secondary forest, along roadsides, forest edges. Pfutsero. NLNU 0165. (Pl. 39)

## GENTIANACEAE

Juss., Gen. Pl. 141. 1789

Herbs, shrubs or small trees, annual or perennial. Stem erect or twining. Leaves simple, opposite, rarely alternate, entire; stipule absent. Flowers bisexual, regular, solitary or in panicles, cymes or umbels. Calyx tubular, campanulate, 4-5-lobed, divided almost to base. Corolla tubular, funnelform, campanulate, 4-5-lobed. Stamens 4-5, inserted within corolla tube and alternating with corolla lobes. Ovary superior, 1-2-celled; ovules many, stigma capitate or bilobed. Fruit a capsule or berry.

1a. Corolla with plicae, lobes with 1-2 glandular nectaries *Swertia*

1b. Corolla without plicae and nectaries; lobes tubular, blue *Gentiana*

*Gentiana* L., Sp. Pl. 1: 227. 1753.

Decumbent or erect herbs, annual or perennial. Stems profusely branched. Leaves opposite, basal leaves sometimes forming a rosette. Flowers solitary or in cymes, axillary or terminal; 4-5 merous. Calyx tubular or deeply divided. Corolla tubular, funnelform, tube usually longer than lobes. Stamens inserted on corolla tube, anthers dorsifixed. Ovary sessile

or with short stipe; style short or absent, stigma bilobed. Fruit a capsule, cylindric to ellipsoid, many seeded.

***Gentiana pedicellata*** (D. Don) Griseb., Gen. Sp. Gent.: 273.1838; *Ericala pedicellata* Wall. ex D. Don, Philos. Mag. & J. Sci. 8: 76. 1836; *Gentiana quadrifaria sensu* C. B. Clarke in Hook.f., Fl. Brit. Ind. 4: 111. 1883; Sinha in Singh *et al.*, Fl. Mizo, 2: 122. 2012.

Annual or biennial herbs. Stem erect, tufted, upto 10 cm tall. Leaves coriaceous, margin papillose and ciliated; basal leaves rosulate, elliptic to elliptic-lanceolate, 0.5-2.5 x 0.3-0.8 cm, base narrowed, apex acuminate; stem leaves elliptic, lanceolate or oblanceolate, 0.6-1.5 x 0.2-0.5 cm, base obtuse, apex mucronate, margins finely ciliate. Inflorescence in 3-5 -flowered, terminal. Calyx tubular, lobes spreading, recurved. Corolla tubular or funnelform, blue to purple, lobes ovate, entire or deeply bifid. Capsule ellipsoid or ovoid.

**Fl. & Fr.:** March-July

**Distibution:** India, Bhutan, Myanmar, Nepal, Pakistan

**Specimen examined:** Grows in open forest clearings, wastelands, roadsides. Tsupfume. NLNU 0024. (Pl. 39)

***Swertia* L., Sp. Pl. 1: 226. 1753**

Annual or perennial herbs. Stem erect or decumbent, terete, angled or winged. Leaves simple, opposite, rarely alternate or whorled, sessile or petiolate, margin entire. Flowers 4-5-merous, pedicellate in leafy panicles of axillary and terminal clusters. Calyx and corolla rotate, lobed to base. Stamens as many as corolla lobes, inserted at base of corolla tube. Ovary 1-celled; style slender or absent, stigma bilobed. Fruit a capsule, few to many seeded.

1a. Stem terete; corolla with 2 glands per lobe

*S. bimaculata*

1b. Stem quadrangular; corolla with 1 gland per lobe

*S. nervosa*

*Swertia bimaculata* (Siebold & Zucc.) Hook.f. & Thomson ex C. B. Clarke, J. Linn. Soc., Bot. 14: 449.1875; *Ophelia bimaculata* Siebold & Zucc., Abh. Math.-Phys. Cl. Konigl. Bayer. Akad. Wiss. 4.3: 159. 1846; C. B. Clarke in Hook.f., Fl. Brit. Ind. 4: 123. 1883.

Annual herbs, upto 1.5 m tall. Basal leaves withered at anthesis. Stem leaves sessile or short petiolate; leaves elliptic to ovate-lanceolate, 3.5-9x1-5 cm, base narrow, apex acuminate. Flowers many, in panicles of corymbs. Calyx lobes unequal, spatulate, acuminate. Corolla white or yellow with purple spots, lobes elliptic or obovate, glands 2 per lobe, greenish, viscous, orbicular. Filaments filiform. Capsule ovoid or ellipsoid.

**Fl. & Fr.:** June - November

**Distibution:** India (NE India), E Himalaya, Bhutan, China, Japan, Myanmar, Nepal, Vietnam

**Specimen examined:** Grows in open forest clearings, wastelands, roadsides. Tsupfume. NLNU 0025. (**Pl. 39**)

*Swertia nervosa* (G.Don) Wall. ex C.B.Clarke in Fl. Brit. Ind. 4: 125. 1883; *Agathotes nervosa* G Don, Gen. Hist. 4: 177. 1837; Kanjilal *et al.*, Fl. As. 3: 326. 1939; Grierson & Long, Fl. Bhut. 2.2: 626. 1999; Sinha in Singh *et al.*, Fl. Mizo, 2: 124. 2012.

Annual herbs, upto 90 cm tall. Stems quadrangular, winged. Leaves subsessile, elliptic-lanceolate, 3-5 x 0.9-1.5 cm, base attenuate, apex acute. Flowers 4-merous, in panicles of cymes; bracts linear or lanceolate. Calyx lobes linear, often longer than corolla, apex acute. Corolla lobes green or white with purple markings, elliptic-ovate, acuminate, gland 1 per lobe. Filaments linear. Style short, stigma capitate. Capsule ovoid.

**Fl. & Fr.:** August - November

**Distibution:** NE India, East Himalaya, Bhutan, China, Myanmar, Nepal, Vietnam

**Specimen examined:** Grows in open forest clearings, wastelands, roadsides. Pfutsero.  
NLNU 0167. (Pl. 39)

## **BORAGINACEAE**

Juss., Gen. Pl. 128. 1789

Herbs, shrubs or trees. Leaves alternate, simple, rarely opposite, stipules absent, entire or serrate at margin. Flowers in dichotomous scorpioid cymes which usually elongates and straightens in fruit, rarely solitary and axillary, bisexual, actinomorphic. Calyx infundibuliform, 4-5 lobed, persistent. Corolla tubular, campanulate, rotate, with scales in the throat, lobes 4-5, imbricate in bud, rarely twisted. Stamens 4-5, epipetalous, alternating to corolla lobes; anthers introrse, 2-loculed. Ovary superior; locules 2 with 2 ovules each or 4 and each with 1 ovule. Style terminal or gynobasic. Fruit 1-4 seeded drupes or nutlets; nutlets often ornamented with wings, prickles or bristles.

1a. Herbs; style gynobasic

2a. Scrambling shrub; flowers in 2 rows scorpioid cymes *Tournefortia*

2b. Trees; flowers in panicles or corymbs *Ehretia*

1b. Trees or shrubs; style terminal

3a. Flowers with yellow eye; nutlets glabrous *Trigonotis*

3b. Flowers without yellow eye; nutlets with glochids *Cynoglossum*

***Cynoglossum* L., Sp. Pl. 1: 134. 1753**

Biennial or perennial herbs, rarely annual. Leaves alternate, entire; radical leaves petioled, cauline leaves petiolate or sessile. Flowers in terminal or axillary cymes, crowded or dichotomously branched spreading panicles; pedicellate. Calyx lobes 5, enlarged in fruit.

Corolla blue, lobes 5, campanulate, tubular, throat scales present. Stamens 5, included, inserted at middle or above in corolla tube; anthers ovoid. Stigma capitate, not exserted; ovary 4-parted. Nutlets 4, ovoid to subglobose, attached apically to an elevated gynobase, with glochids, attachment scar subapical.

1a. Corolla blue; nutlets 2-2.5 mm

*C. furcatum*

1b. Corolla white with blue centre; nutlets 1.5-2mm

*C. lanceolatum*

***Cynoglossum lanceolatum*** Forssk., Fl. Aegypt.-Arab. 41. 1775; C.B. Clarke in Hook.f., Fl. Brit. Ind. 4: 156. 1883; Grierson & Long, Fl Bhut. 2.2 907. 1999; Giri *et al.*, Mat. Fl. Aruna. Pradesh 2: 187. 2008.

Perennial herbs with stout rootstock, 30-120 cm tall. Stems erect, hispid. Basal leaves petiolate, upper stem leaves sessile or subsessile; leaves lanceolate, attenuate at base, apex acute, margin crenulate, scabrid. Inflorescence terminal and axillary in divaricate racemes, ebracteate. Flowers whitish blue, pedicel 1-1.5 mm. Calyx lobes 5, ovate, densely pubescent outside glabrous inside, divided almost to base. Corolla lobes 5, white with blue centre, campanulate, ovate obtuse, glabrous. Stamens inserted from the base of the corolla tube. Nutlets ovate globose, with dense glochids.

**Fl. & Fr.:** June-September

**Distribution:** India (throughout), Bhutan, Bangladesh, China, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand; Africa.

**Specimen examined:** Grows as weeds in field margins, paddy fields, roadsides. Kikrumba . NLNU 0452. (Pl. 40)

***Cynoglossum zeylanicum*** (Sw.ex Lehm.) Thunb. ex Brand, Repert. Spec. Nov. Regni Veg. 13: 546. 1915; Giri *et al.*, Mat. Fl. Aruna. Pradesh 2: 187. 2008; *C. furcatum* Wall., Roxb. F.

Ind. 2: 6. 1824; C.B. Clarke in Hook.f., Fl. Brit. Ind. 4: 155. 1883; Kanjilal *et al.*, Fl. As. 3: 337. 1939; Balakr., Fl. Jowai 2: 325. 1983.

Erect herbs or undershrubs with stout rootstock, upto 30-130 cm tall. Stems unbranched below but much branched in inflorescence, with soft dense appressed pubescence. Basal leaves petiolate, oblong lanceolate, base attenuate, apex acute; upper stem leaves sessile, almost clasping to stem, oblong lanceolate, apex acute, margin wavy. Inflorescence axillary and terminal, dichotomously branched, densely villous, ebracteate, pedicel 1-2mm. Calyx lobes ovate, densely hairy outside. Corolla blue or violet, campanulate, lobes ovate obtuse. Nutlets ovate globose, immarginate, with dense glochids.

**Fl. & Fr.:** June-October

**Distribution:** India (throughout), Bhutan, China, Japan, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand, Vietnam.

**Specimen examined:** Grows as weeds in field margins, paddy fields, roadsides. Tsupfume. NLNU 0027. **(Pl. 40)**

*Ehretia* P. Browne, Civ. Nat. Hist. Jamaica 168. 1756

Shrubs or trees. Leaves alternate, often large, serrate or entire. Flowers in terminal or axillary paniced cymes or corymbose. Calyx 5 lobed, small. Corolla white or cream, tube short or cylindric, lobes 5, spreading or reflexed. Stamens 5, exerted. Ovary 2 celled, each locule with 2 ovules. Style terminal, bifid, stigma 2 capitate. Drupes yellow, or pale red, subglobose, glabrous.

- |   |                       |
|---|-----------------------|
| 1a. Leaves serrate; corolla tube twice as long as calyx | <i>E. macrophylla</i> |
| 1b. Leaves entire; corolla tube thrice as long as calyx | <i>E. wallichiana</i> |

*Ehretia macrophylla* Wall., Roxb., Fl. Ind. 2: 343. 1824; C.B. Clarke in Hook.f., Fl. Brit. Ind. 4: 141. 1883; Brandis, Ind. Trees 481. 1906; Kanjilal *et al.*, Fl. As. 3: 334. 1939; Giri *et al.*, Mat. Fl. Aruna. Pradesh 2: 188. 2008; Grierson & Long, Fl. Bhut. 2.2: 875. 1999.

Trees, upto 10 m tall. Branchlets pubescent. Leaves broadly ovate or obovate, 6-17 x 4-12 cm, base cordate or rounded, apex acute or acuminate, margin unequally serrate, shortly bristly above, hairy beneath; petiole 2-4 cm. Inflorescence terminal in a dense compound panicle. Calyx lobes oblong lanceolate, pubescent. Corolla creamy white, scented, corolla tube more than twice the length of calyx, tube 0.5-0.8 cm, lobes reflexed, hairy on back. Anthers exserted, long. Style exserted, stigma bifid. Drupes globose, mucronate, 0.6 cm across.

**Fl. & Fr.:** April-August

**Distribution:** India (NE India), E Himalaya, Bhutan, Myanmar, Nepal, Vietnam

**Specimen examined:** Grows in open secondary forest. Tsupfume. NLNU 0029. (Pl. 40)

*Ehretia wallichiana* Hook.f. & Thomson ex C.B. Clarke in Hook.f., Fl. Brit. Ind. 4: 143. 1883; Brandis, Ind. Trees 481. 1906; Kanjilal *et al.*, Fl. As. 3: 334. 1939; Haridasan & Rao, For. Fl. Megh. 2: 632. 1987; Grierson & Long, Fl. Bhut. 2.2: 874. 1999; Giri *et al.*, Mat. Fl. Aruna. Pradesh 2: 188. 2008.

Small to medium sized trees, glabrous. Bark grayish brown, irregularly fissured. Leaves elliptic, oblong or obelliptic, 7-13 x 4-8 cm, apex acute or acuminate, base rounded or cuneate, glabrous, entire; petiole 1-2 cm. Inflorescence lateral in axils of fallen leaves, compact cymes corymbiform; flowering before the leaves. Calyx small, ovate, 0.2-0.4 cm. Corolla tube more than thrice the length of calyx, white, lobes ovate, strongly recurved.

Stamens exserted, anthers oblong. Style exserted, bifid. Drupes subglobose, ribbed, pyrene compressed.

**Fl. & Fr.:** March-November

**Distribution:** India (NE India), E Himalaya, Bhutan, Myanmar, Nepal

**Specimen examined:** Grows in primary forest. Khuza. NLNU 0813. (**Pl. 40**)

*Tournefortia* L., Sp. Pl. 1: 140. 1753

Trees or scandent shrubs. Leaves alternate, entire, shortly petiolate. Flowers 4-5 merous, numerous, sessile, in terminal, dichotomous, scorpioid cymes, secund in 2 rows. Calyx lobes ovate or lanceolate. Corolla tube cylindric, lacking throat scales, hairy outside, lobes small, spreading. Stamens included in corolla tube, filaments short, anthers oblong. Ovary 4 celled, style short, bifid. Fruit a drupe, ovoid, with 2 seeded pyrenes.

*Tournefortia montana* Lour. Fl. Cochinch. 1: 122. 1790; Grierson & Long, Fl. Bhut. 2.2: 876. 1999; Giri *et al.*, Mat. Fl. Aruna. Pradesh 2: 189. 2008; *T. candollei* C.B. Clarke in Hook.f., Fl. Brit. Ind. 4: 146. 1883; *T. viridiflora* Wall., Roxb., Fl. Ind. 1: 5. 1820; C.B. Clarke, Hook.f., Fl. Brit. Ind. 4: 146. 1883; Kanjilal *et al.*, Fl. As. 3: 336. 1939.

Sub scandent shrubs, young parts hairy. Leaves ovate lanceolate, 7-15 x 3-5 cm, apex acuminate, base rounded or obtuse, margin entire, sparsely hairy above, softly villous beneath; petiole 0.7-1.5 cm long. Flowers 5-merous, in axillary or terminal, dichotomous scorpioid cymes. Calyx lobes lanceolate, hairy. Corolla tubular, 0.8-1.3 cm, tube pale green and hairy outside, lobes creamy white, glabrous. Stamens inserted. Drupes ovoid, sessile, crowned by persistent style.

**Fl. & Fr.:** April-November

**Distribution:** India (NE India), E Himalaya, Bhutan, Cambodia, China, Laos, Vietnam



**Specimen examined:** Grows in tropical forest. Akhegwo. NLNU 0649. (Pl. 40)

*Trigonotis* Steven, Bull. Soc. Imp. Naturalistes Moscou 24(1): 603. 1851.

Perennial herbs, weak or diffused, hairy. Leaves alternate, ovate, lanceolate. Inflorescence axillary, lax, scorpioid cymes, ebracteate or lowest pedicel bracteate. Calyx 5 lobed. Corolla blue or violet, small, 5 lobed, tube shorter than calyx, lobes orbicular, spreading, imbricate in buds, throat scales present, yellow, orange or red. Stamens included. Style short, stigma capitate. Nutlets 4, subsessile, tetrahedral with 4 acute or submarginate edges, glabrous or minutely hairy.

*Trigonotis microcarpa* (DC.) Benth. ex C.B. Clarke in Hook.f., Fl. Brit. Ind. 4: 172. 1883; Grierson & Long, Fl. Bhut. 2.2: 891. 1999; Giri *et al.*, Mat. Fl. Aruna. Pradesh 2: 190. 2008; *Eritrichium microcarpum* DC., Prodr. 10: 123. 1846.

Perennial herbs, 15-50 cm, stems erect or prostrate, more or less hairy. Leaves ovate, apex acute, base obtuse or truncate, margin entire, minutely strigose on both surfaces, petiolate. Inflorescence many flowered terminal or axillary racemes. Calyx lobes ovate, strigose. Corolla blue, lobes orbicular, throat scales yellow. Nutlets tetrahedral, glabrous.

**Fl. & Fr.:** May-October

**Distribution:** India (NE India), E Himalaya, Bhutan, China, Myanmar, Nepal, Tibet

**Specimen examined:** Grows in moist places, along streamsides. Tsupfume. NLNU 0067. (Pl. 40)

## CONVOLVULACEAE

Juss., Gen. Pl. 132. 1789

Herbs or shrubs, usually a twiner or climbers. Leaves alternate, entire, lobed or pinnatisect, stipules absent. Inflorescence terminal or axillary, simple or compound, cymes,

racemes, panicle, or umbels. Flowers regular, bisexual, often showy. Sepals 5, free or rarely connate at base. Corolla sympetalous, campanulate, infundibular, salverform, with 5 shallow lobes. Stamens 5, epipetalous, included or exserted. Ovary superior, surrounded by annular disc; 1-3 locular, ovules 2 per locules. Styles 1 or 2; stigma 2-4, capitate, and 2 lobed. Fruit a capsule or berry, dehiscent by valves or opening irregularly.

- 1a. Style absent; stigma 1, sessile *Erycibe*
- 1b. Style well-developed; stigmas 2
  - 2a. Fruit indehiscent, pericarp fleshy *Argyreia*
  - 2b. Fruit thin walled, opening by valves or irregularly dehiscent
    - 3a. Outer sepals persistent falling off with fruit, ovary 1-loculed
    - 4a. Stems downy tomentose; 3 segments of fruiting calyx much enlarged *Poranopsis*
    - 4b. Stems glabrescent; all segments of fruiting calyx much enlarged *Porana*
  - 3b. Outer sepals deciduous or if present not falling off with fruit; ovary 2 or 4-loculed
    - 5a. Pollen grains spinulose *Ipomoea*
    - 5b. Pollen grains smooth *Merremia*

*Argyreia* Lour., Fl. Cochinch. 1: 95, 134. 1790

Shrubs, often large twiners or scramblers, stems woody and hairy. Leaves alternate, usually cordate at base, petiolate. Inflorescence axillary, seldom terminal, in cymes or capitate; bracts persistent or caducous. Sepals persistent, sub equal, often enlarging in fruit. Corolla campanulate or infundibular, limb shortly lobed, with mid petal bands, pubescent. Stamens inserted near base of corolla, included or exserted. Ovary 2 or 4 loculed, 4 ovuled; stigma 2, globose. Fruit an indehiscent berry.

*Argyreia capitata* (Vahl) Arn. ex Choisy, Conv. Or. 41. 1834; Balakr., Fl. Jowai 2: 328. 1983; Haridasan & Rao, For. Fl. Megh. 2: 636. 1985; *Convolvulus capitatus* Vahl, Symb. Bot. 3: 28. 1794; *Lettsomia strigosa* Roxb. Fl. Ind. 2: 80. 1824; C.B. Clarke in Hook.f., Fl. Brit. Ind. 4: 193. 1883; Kanjilal *et al.*, Fl. As. 3: 345. 1939.

Large climbers, with dense brownish hairs. Leaves ovate-lanceolate, 7-15 x 4-9 cm, base cordate, apex shortly acuminate, densely hairy on both surface, margin entire, lateral nerves 12-16 pairs; petioles 3-15 cm long. Inflorescence capitate cymes on long peduncles, 10-15 cm long. Bracts ovate, persistent, hairy. Calyx segments densely hairy. Corolla 4-5 cm long, purple with darker throat, tube bristly outside. Stamens included, anthers oblong. Stigma globose. Fruit a capsule.

**Fl. & Fr.:** September-March

**Distribution:** India (throughout), E & W Himalaya, Bangladesh, China, Myanmar, Sri Lanka, Thailand, Vietnam

**Specimen examined:** Grows climbing on trees in secondary forest. Thestumi, Lozaphuhu. NLNU 0495. (Pl. 41)

*Erycibe* Roxb., Pl. Coromandel 2: 31, t. 159. 1798

Large climbing shrubs. Older branches lenticellate, young parts ferruginous, pubescent. Leaves simple, entire, coriaceous, shortly petiolate. Inflorescence axillary or terminal, racemose or paniculate cymes. Flowers small, fragrant. Calyx segments 5, subequal, persistent, leathery, densely hairy outside. Corolla deeply 5 lobed, tube short, glabrous outside, lobes with mid petal bands hairy outside, glabrous inside. Stamens 5, inserted just above corolla base. Ovary ellipsoid, 1-loculed, ovules 4; stigma large, subglobose. Fruit a berry, ovoid or ellipsoid.

***Erycibe paniculata*** Roxb., Pl. Cor. 2: 31.t.159. 1798; C.B. Clarke in Hook.f., Fl. Brit. Ind. 4: 180. 1883; Kanjilal *et al.*, Fl. As. 3: 360. 1939; Haridasan & Rao, For. Fl. Megh. 2: 639. 1985.

Large woody climbers, with drooping branches. Leaves elliptic-lanceolate, oblong-lanceolate, 6-15 x 1-5 cm, apex shortly acuminate, base cuneate, glabrous, coriaceous, margin entire. Inflorescence terminal or axillary, in paniculate cymes. Calyx ferruginous-tomentose. Corolla campanulate, white, lobes crisped. Stamens included. Stigma sessile, often 5-lobed. Berry ellipsoid, pulpy, black when ripe.

**Fl. & Fr.:** April-November

**Distribution:** India (throughout), Bhutan, China, Myanmar, Nepal, Thailand, Sri Lanka

**Specimen examined:** Grows in primary forest climbing on large trees. Sakraba. NLNU 0728. (Pl. 41)

***Ipomoea*** L., Sp. Pl. 1: 159. 1753

Twining or prostrate herbs or shrubs, rarely erect. Leaves alternate, simple, entire or lobed, cordate, sometimes palmately compound. Inflorescences mostly in axillary cymes, 1-many flowered. Calyx segments 5, equal or unequal, enlarged in fruit. Corolla infundibular or campanulate, entire or slightly lobed, limb plicate. Stamens 5, included or exserted. Ovary usually 2 loculed, rarely 4, ovules 4, stigma 2-lobed. Capsule globose or ovoid.

1a. Sepals long attenuate, or long and linear acuminate apically;

corolla dark blue

*I. nil*

1b. Sepals acute, acuminate or obtuse apically; corolla reddish, purplish

lilac to pink

*I. purpurea*

*Ipomoea nil* (L.) Roth, Cat. Bot. 1: 36. 1797; Haridasan & Rao, For. Fl. Megh. 2: 642. 1985; *Convolvulus nil* Lin. Sp. Pl. ed. 2: 219. 1762; *Ipomoea hederacea* Jacq., C.B. Clarke in Hook.f., Fl. Brit. Ind. 4: 199. 1883; Kanjilal *et al.*, Fl. As. 3: 346. 1939.

Annual extensive twining herbs. Stem covered with retrorse hairs. Leaves broadly ovate, 7-14 x 6-12 cm, base cordate, apex acute to acuminate, entire or shallowly 3-lobed, appressed hairy on both surface; petioles 3-10 cm. Inflorescence axillary, 1 to few flowered; bracts linear. Sepals lanceolate, with spreading hairs outside. Corolla deep purple, infundibular, glabrous, tube whitish. Stamens and style included. Stigma 3-lobed. Capsule globose, glabrous.

**Fl. & Fr.:** July-February

**Distribution:** India (throughout), Bhutan, China, Myanmar, Nepal, Thailand, Sri Lanka

**Specimen examined:** Grows trailing on slopes and forest edges on bushes. Razea. NLNU 0197. (Pl. 41)

*Ipomoea purpurea* (L.) Roth, Bot. Abh. 27. 1787; C.B. Clarke in Hook.f., Fl. Brit. Ind. 4: 193. 1883; Kanjilal *et al.*, Fl. As. 3: 346. 1939; Haridasan & Rao, For. Fl. Megh. 2: 642. 1985; Grierson & Long, Fl. Bhut. 2.2: 848. 1999; *Convolvulus purpurea* L. Sp. Pl. ed. 2: 219. 1762.

Annual twining herbs. Stem covered with appressed and retrorse hairs. Leaves broadly ovate to suborbicular, 4-10 x 2-9 cm, base cordate, apex shortly acuminate, entire but occasionally 3-lobed, shortly pubescent on both sides. Inflorescence in axillary, 1-5 flowered cymes on long peduncles. Sepals unequal, with spreading hairs at base. Corolla purplish pink, infundibular, tube whitish, glabrous. Stamens and style included. Capsule globose.

**Fl. & Fr.:** July-February

**Distribution:** India (throughout), Bhutan, China, Myanmar, Nepal, Thailand, Sri Lanka

**Specimen examined:** Grows twining on slopes and forest edges. Razeba. NLNU 0195. (Pl. 41)

*Merremia* Dennstedt ex Endlicher, Gen. Pl. 1: 1403. 1841

Twining or prostrate, herbs or shrubs. Leaves alternate, simple or palmately lobed or compound. Flowers axillary, solitary or in few flowered cymes, peduncles long; bracts small. Sepals 5, subequal, persistent, often enlarged in fruit. Corolla infundibular or campanulate. Stamens included, often unequal, anthers straight or twisted. Ovary 2 or 4 loculed, ovules 4. Style filiform, stigma 2-globular. Fruit a capsule, dehiscing by 4-valves.

1a. Leaves usually entire, oblong; flowers white

*M.umbellata*

1b. Leaves palmately lobed; flowers yellow

*M.vitifolia*

*Merremia umbellata* (L.) Hallier f., Engl. Bot. Jahrb. 16: 552. 1893; Haridasan & Rao, For. Fl. Megh. 2: 643. 1985; Grierson & Long, Fl. Bhut. 2.2: 853. 1999; *Ipomoea cymosa* (Desr.) R. & S. Syst. 4: 241. 1819; C.B. Clarke in Hook.f., Fl. Brit. Ind. 4: 211. 1883; Kanjilal *et al.*, Fl. As. 3: 356. 1939; *Convolvulus umbellatus* L. Sp. Pl. 155. 1753.

Scandent twining perennial. Stem angular or terete, sometimes rooting at nodes, hairy or glabrous, young parts with milky latex. Leaves oblong-lanceolate or oblong-elliptic, 4-11 x 2-7 cm, apex acute, base shallowly cordate to truncate, pubescent on both sides, margin entire. Flowers in axillary subumbellate cymes, 1-12 flowered. Calyx lobes unequal, elliptic to orbicular, aristate. Corolla white with a creamish yellow tinge, infundibular, slightly lobed. Capsule globose, glabrous. Seeds densely hairy.

**Fl. & Fr.:** February-August

**Distribution:** India, Bhutan, China, Myanmar, Nepal, Thailand, Sri Lanka

**Specimen examined:** Grows twining on slopes and trees in open secondary forest. Chizami. NLNU 0562. (Pl. 41)

*Merremia vitifolia* (Burm. f.) Hallier f., Bot. Jahrb. 16: 552. 1893; Kanjilal *et al.*, Fl. As. 3: 357. 1939; Haridasan & Rao, For. Fl. Megh. 2: 643. 1985; Grierson & Long, Fl. Bhut. 2.2: 852. 1999; *Convolvulus vitifolius* Burm.f. Fl. Ind. 45.t. 18.f.1. 1768; *Ipomoea vitifolia* (Burm.f.) Bl., Bijdr. 709. 1826; C.B. Clarke in Hook.f., Fl. Brit. Ind. 4: 213. 1883.

Large twiners, hairy. Leaves orbicular, palmately 5-7 lobed, 5-10 x 4-8 cm, lobes broadly triangular to lanceolate, base deeply cordate, apex acute to acuminate, densely hairy on both surface when young. Flowers in axillary cymes, 1-7 flowered, peduncles and pedicels hairy. Calyx lobes oblong or ovate-oblong, outer 2 hairy outside, inner ones glabrous, persistent, enlarged in fruit. Corolla yellow, infundibular, glabrous outside, mid-petal bands with 5 distinct dark bands. Anthers spirally twisted. Capsule subglobose; seeds black.

**Fl. & Fr.:** February-August

**Distribution:** India, Bhutan, China, Myanmar, Nepal, Thailand, Sri Lanka

**Specimen examined:** Grows twining on slopes and trees in open secondary forest. Khuza. NLNU 0850. (Pl. 41)

*Porana* Burm.f., Fl. Ind. 51. t. 21. f. 1. 1768

Herbaceous or woody climbers. Leaves simple, ovate, entire, petiolate, palmately veined. Flowers in axillary or terminal cymes or panicles; bracts leaf-like, small or absent. Sepals 5, free, outer 3 greatly enlarged in fruit, inner 2 slightly so. Corolla regular,

infundibular, limb 5-lobed or sub-entire. Stamens 5, adnate to corolla. Ovary glabrous. Fruit a capsule, 1-seeded, indehiscent or opening by valves.

***Porana racemosa*** Roxb., Pl. Cor. 3: 31.t. 235. 1819; Fl. Ind. 2: 41. 1824; C.B. Clarke in Hook.f., Fl. Brit. Ind. 4: 222. 1883; Kanjilal *et al.*, Fl. As. 3: 353. 1939; Balakr., Fl. Jowai 2: 328. 1983; Haridasan & Rao, For. Fl. Megh. 2: 644. 1985; Grierson & Long, Fl. Bhut. 2.2: 857. 1999.

Slender twining shrubs, forming dense masses. Stem reddish, pubescent. Leaves ovate, 2.5-10 x 2-7 cm, base deeply cordate, acuminate apex, entire, pubescent on both surfaces, basal nerves 3-5; petioles 2-5 cm. Flowers in axillary and terminal dichotomous compound racemes, bracts persistent. Sepals equal, linear-oblongate, persistent. Corolla white, with yellow tube, lobes longer than the tube. Stigma bilobed. Capsule ovoid, crowned with persistent calyx forming reddish-green wings.

**Fl. & Fr.:** July-December

**Distribution:** India, Bhutan, China, Myanmar, Nepal, Thailand, Sri Lanka

**Specimen examined:** Grows twining on bushes in open forest edges, along roadsides. Khuza. NLNU 0848.

***Poranopsis*** Roberty, Candollea 14: 26. 1952

Lianas. Leaves simple, petiolate, cordate-ovate. Flowers in axillary or terminal panicles. Sepals 5, free, outer 3 greatly enlarged, inner 2 slightly so. Corolla 5, hairy outside, glabrous inside. Ovary 1-locule. Fruit a capsule, 1-seeded.

***Poranopsis paniculata*** (Roxb.) Roberty, Cand. 14: 26. 1952; *Porana paniculata* Roxb., Pl. Cor. 3: 31. 1819; C.B. Clarke in Hook.f., Fl. Brit. Ind. 4: 222. 1883; Kanjilal *et al.*, Fl. As. 3: 354. 1939; Haridasan & Rao, For. Fl. Megh. 2: 644. 1985; Grierson & Long, Fl. Bhut. 2.2: 857. 1999.



Large woody climber. Bark rough, branchlets tomentose. Leaves ovate, 4-10 x 3-9 cm, base cordate, apex caudate acuminate, entire, basal nerves 5-7, pubescent, membranous. Flowers in axillary and terminal large panicle, upto 30 cm long; bracts leaf-like, bracteoles subulate. Calyx segments enlarged in fruit, pubescent. Corolla white, narrowly funnel-form, limb 5-lobed.

**Fl. & Fr.:** September-March

**Distribution:** India, Bhutan, China, Myanmar, Nepal

**Specimen examined:** Grows climbing on bushes, thickets in open forest edges, along roadsides. Mesulumi. NLNU 0449. (Pl. 42)

## SOLANACEAE

Juss., Gen. 1789 (*Solaneae*)

Herbs, shrubs or trees. Leaves simple, alternate, entire, lobed or pinnately compound. Flowers solitary, axillary or extra-axillary, or in racemes, spikes, panicles, corymbs or cymes, actinomorphic, rarely zygomorphic. Calyx campanulate or tubular, often enlarged in fruit, persistent. Corolla rotate, campanulate. Stamens epipetalous and alternating with corolla lobes. Ovary superior, 2-celled, sometimes 3-5-celled. Fruit a berry or capsule; seeds many, small, compressed, reniform or discoid.

1a. Calyx enlarged in fruit, enclosing the fruit

2a. Calyx deeply divided upto base

*Nicandra*

2b. Calyx divided to near middle

*Physalis*

1b. Calyx not enclosing the fruit

3a. Fruit a capsule

4a. Flowers large, upto 20 cm long

*Brugmansia*

- |                                   |                   |
|-----------------------------------|-------------------|
| 4b. Flowers upto 6 cm long        | <i>Nicotiana</i>  |
| 3b. Fruit a berry                 |                   |
| 5a. Flowers in axillary fascicles | <i>Lycianthes</i> |
| 5b. Flowers in cymes or racemes   | <i>Solanum</i>    |

***Brugmansia* Pers., Syn. Pl. 1: 216. 1805**

Herbs or shrubs. Leaves alternate, large. Flowers solitary, large. Calyx tubular, elongate, limb 5-toothed, persistent. Corolla tubular or funnel shaped, long, entire or shortly lobed. Stamens 5, alternating with corolla lobes. Style filiform; stigma 2-lobed. Ovary 2-4 celled. Fruit a capsule, dehiscing irregularly or by 4 valves. Seeds numerous.

***Brugmansia suaveolens*** (Humb. & Bonpl. ex Willd.) Sweet, Hort. Suburb. Lond.: 41. 1818; Balakr., Fl. Jowai 2: 330. 1983; Haridasan & Rao, Forest Fl. Megh. 2: 646. 1987; *Datura suaveolens* Humb. & Bonpl. ex Willd., Enum. Pl.: 227. 1809.

Shrubs, stems much branched. Leaves ovate-oblong, 16-30 x 6-12 cm, apex acuminate, base cuneate, pubescent, margin entire. Flowers large, white, solitary, pendulous. Calyx funnel shaped, upto 12 cm long, lobes 5. Corolla funnel-shaped, wide above, upto 30 cm long, lobes 5 angled. Capsule oblong, smooth.

**Fl. & Fr.:** May - October

**Distribution:** Indigenous to Mexico, Chile and Peru. Cultivated and run wild in India.

**Specimen examined:** Grows in wastelands, roadsides. Tsupfume. NLNU 0023. (Pl. 42)

***Lycianthes*** (Dunal) Hassl. Annuaire Conserv. Jard. Bot. Genève 20: 180. 1917

Shrubs or herbs. Leaves simple, entire. Flowers in axillary fascicle, actinomorphic. Calyx cup-shaped, truncate, with 5-10 minute teeth. Corolla rotate or stellate, shallowly or

deeply divided. Stamens inserted at apex of corolla tube. Ovary 2-locular. Fruit a berry. Seeds numerous.

***Lycianthes lysimachioides*** (Wall.) Bitter, Abh. Naturwiss. Vereins Bremen 24: 491. 1920; Sinha in Sinha *et al.*, Fl. Mizo., 2: 160. 2012; *Solanum lysimachioides* Wall, in Roxb. Fl. Ind. 2: 257. 1824. excl. syn. *S. biflorum* Lour.; *S. macrodon* Wall, ex Nees var. *lysimachiodes* (Wall.) C. B. Clarke in Hook.f., Fl. Brit. India 4: 232. 1883. *Lycianthes biflora* subsp. *lysimachioides* (Wall.) Deb in Bot. J. Linn. Soc. 76: 293. 1978.

Prostrate perennial herb, upto 70 cm high; stem pilose. Leaves in false pairs, shortly petiolate; ovate, 0.8-5.5 x 0.6-3 cm, apex acute or bluntly acuminate, base cuneate, sparsely pilose above and with more slender hairs on veins beneath. Flowers solitary in axils. Calyx tube cup-shaped, lobes 10, spreading, in 2 slightly unequal series. Corolla white or pale yellow; lobes lanceolate. Stamens 5; anthers narrowly oblong. Berry red, soft and fleshy.

**Fl. & Fr.:** May - October

**Distribution:** India (NE India), E & W Himalaya, China, Myanmar, Nepal, Vietnam, Taiwan

**Specimen examined:** Grows in wastelands, roadsides. Khezhakhen. NLNU 0250.

***Nicandra*** Adanson, Fam. Pl. 2: 219. 1763

Herbs. Leaves alternate, sinuate or toothed. Flowers solitary, axillary. Calyx deeply divided into 5 cordate sepal-like lobes, much enlarged in fruit. Corolla actinomorphic, campanulate; limb 5-plicate. Stamens attached near base of corolla. Ovary 3-5-locular, ovules numerous. Fruit a pendulous globose berry.

*Nicandra physalodes* (L.) Gaertn., Fruct. Sem. Pl. 2: 237. 1791; C.B. Clarke in Hook.f., Fl. Brit. India 4: 240. 1883; Balakr., Fl. Jowai 2: 330. 1983; *Atropa physalodes* L. Sp. Pl. 181. 1753.

Glabrous herbs with spreading branches. Leaves ovate to lanceolate, 8-15 x 3-7 cm, base cuneate, apex acute, margin sinuate or crenate, sparsely pubescent on both surfaces. Calyx lobes deeply parted, ovate. Corolla campanulate, bluish purple with white centre. Berries globose.

**Fl. & Fr.:** June - January

**Distribution:** Native of Peru, widely distributed in parts of the world.

**Specimen examined:** Grows in open wastelands, roadsides. Kikruma. NLNU 0461.

*Nicotiana* L., Sp. Pl. 1: 180. 1753

Herbs or shrubs with stellate hairs. Leaves entire or subentire, petiolate or sessile. Flowers in terminal panicles or subterminal racemes. Calyx tubular or tubular-campanulate, lobed. Corolla tubular or funnelform; tube lobed to subentire. Stamens inserted below middle of corolla tube. Disc ringlike, nectariferous. Ovary 2-celled. Stigma 2-lobed. Fruit a dry capsule dehiscing by apical valves. Seeds numerous, minute.

*Nicotiana tabacum* L., Sp. Pl. 180. 1753; C. B. Clarke in Hook.f., Fl. Brit. Ind. 4: 245. 1883; Kanjilal *et al.*, Fl. As. 3: 374. 1939; Sinha in Sinha *et al.*, Fl. Mizo., 2: 163. 2012.

Herbs, annual or perennial, 30-80 cm high. Stems and branches stout, densely glandular pubescent. Leaves elliptic or oblanceolate, 7-14 x 2-5 cm, base cuneate or attenuate, apex acute or acuminate, margins entire, shortly pubescent; lower ones with short winged petioles. Flowers in paniced racemes, bracteate. Calyx glandular pubescent. Corolla

reddish or rose with greenish white tube, glandular pubescent outside, lobes 5, spreading.

Fruit a capsule, ovoid or globose, enclosed in calyx.

**Fl. & Fr.:** January - April

**Distribution:** Native of South America, widely distributed in parts of the world.

**Specimen examined:** Grows in open places, often cultivated. Zhavame. NLNU 0266.

*Physalis* L., Sp. Pl. 1: 182. 1753

Annual or perennial herbs. Leaves alternate, petiolate, entire, sinuate or shortly lobed. Flowers solitary or paired, axillary, nodding. Calyx campanulate, 5-lobed, much enlarged in. Corolla broadly campanulate, 5-lobed. Stamens 5, inserted near base of corolla, anthers shorter than filaments. Ovary 2-celled. Fruit a globose berry enclosed within persistent calyx. Seeds numerous.

*Physalis peruviana* L., Sp. Pl., ed. 2, 1670. 1763; C. B. Clarke in Hook.f., Fl. Brit. Ind. 4: 238. 1883; Kanjilal *et al.*, Fl. As. 3: 364. 1939; Giri *et al.*, Mater. Fl. Aruna. Pradesh 2: 204. 2008; Sinha in Sinha *et al.*, Fl. Mizo., 2: 165. 2012.

Perennial herbs, erect, 30-100 cm high, stems glandular pubescent or villous. Leaves ovate, 5-10 x 4-6 cm, apex acute or acuminate, base cordate to obtuse, margins entire or dentate, villous pubescent on both surfaces. Flowers axillary, solitary. Calyx divided up to middle, lobes lanceolate, pubescent outside. Corolla yellow with purple spots inside, pubescent, lobes shallowly triangular. Filaments bluish. Berries ellipsoid, yellow, glabrous.

**Fl. & Fr.:** October - February

**Distribution:** Native of South America, widely naturalized elsewhere.

**Specimen examined:** Grows in open places, roadsides, wastelands. Zelome. NLNU 0180.

(Pl. 42)

***Solanum* L., Sp. Pl. 1: 184. 1753**

Herbs, shrubs or small trees, sometimes climbing, unarmed or armed with prickles or spines, usually with stellate hairs. Leaves simple or lobed. Flowers regular or slightly irregular, usually in cymes or racemes, often extra-axillary, rarely solitary. Calyx campanulate or cup-shaped, 5-lobed. Corolla rotate or shortly campanulate, 5-lobed, spreading or recurved. Stamens 5, attached near mouth of short corolla tube, the anthers often forming a cone. Fruit berry. Seeds compressed, discoid.

- |   |                     |
|---|---------------------|
| 1a. Plants armed  | <i>S. torvum</i>    |
| 1b. Plants unarmed  |                     |
| 2a. Shrubs or small trees; leaves and stem woolly tomentose | <i>S. erianthum</i> |
| 2b. Herbs; leaves and stem not woolly tomentose             | <i>S. nigrum</i>    |

***Solanum erianthum*** D. Don , Prodr. Fl. Nepal. 96. 1825; Haridasan & Rao, Forest Fl. Megh. 2: 647. 1987; Giri *et al.*, Mater. Fl. Aruna. Pradesh 2: 206. 2008; *S. verbascifolium* non L. 1753; C. B. Clarke in Hook.f., Fl. Brit. Ind. 4: 253. 1883; Kanjilal *et al.*, Fl. As. 3: 367. 1939.

Shrub or small trees, upto 6 m high. Young branches terete, densely stellate-tomentose. Leaves ovate, ovate-lanceolate, 9-20 x 4-8 cm, apex acute, base obtuse or cuneate, stellately woolly on both surfaces. Flowers in terminal cymes or corymbose cyme. Calyx campanulate. Corolla white, densely stellate outside. Berry globose, yellow when ripened.

**Fl. & Fr.:** Nearly throughout the year.

**Distribution:** Native of South America, widespread in tropical Asia and Oceania.

**Specimen examined:** Grows in open places, roadsides, wastelands. Thetsumi. NLNU 0799.

**(Pl. 42)**

*Solanum nigrum* L., Sp. Pl. 1: 186. 1753; C. B. Clarke in Hook.f., Fl. Brit. Ind. 4: 229. 1883; Kanjilal *et al.*, Fl. As. 3: 366. 1939; Giri *et al.*, Mater. Fl. Aruna. Pradesh 2: 207. 2008; Sinha in Sinha *et al.*, Fl. Mizo., 2: 169. 2012.

Erect herbs, unarmed. Stems and branches angular, glabrous. Leaves ovate-lanceolate or oblong-ovate, 3-9 x 2-3.5 cm, apex acute to acuminate, base cuneate, glabrous, margin entire, slightly sinuate; petioles upto 1.5 cm. Flowers white, small, in extra-axillary subumbellate cymes. Calyx sparsely pubescent, 5-toothed. Corolla pubescent, 5-lobed. Berry globose, blackish when ripened.

**Fl. & Fr.:** May - November

**Distribution:** Widely distributed in S.E. Asia, Australia, Africa and America.

**Specimen examined:** Grows in moist and shady places along roadsides. Thetsumi. NLNU 0798.

*Solanum torvum* Swartz, Prodr. 47. 1788; C. B. Clarke in Hook.f., Fl. Brit. Ind. 4: 234. 1883; Kanjilal *et al.*, Fl. As. 3: 369. 1939; Giri *et al.*, Mater. Fl. Aruna. Pradesh 2: 208. 2008; Sinha in Sinha *et al.*, Fl. Mizo., 2: 169. 2012.

Erect shrubs, upto 2 m high; stems and petioles with scattered prickles. Leaves ovate, shallowly lobed, 6-13 x 4-12 cm, apex acute or obtuse, base rounded or cordate, margin entire, sinuate or lobed, pubescent, sparsely prickly on mid rib. Flowers in many flowered, sessile or shortly pedunculate, corymbose cymes. Calyx cupular, glandular pubescent; lobes lanceolate. Corolla stellate pubescent outside, white, lobes 5, ovate-triangular. Stamens 5. Berries globose, yellow-orange when ripened.

**Fl. & Fr.:** April - December.

**Distribution:** Native of the Caribbean, widely naturalized in tropical regions

**Specimen examined:** Grows in open places near forest, roadsides, wastelands. Thetsumi.  
NLNU 0796.

## SCROPHULARIACEAE

Juss., Gen. Pl. 117. 1789

Herbs or shrubs, rarely trees. Leaves alternate, opposite or whorled. Flowers bisexual, irregular, in a raceme or spike, or solitary. Sepals 4-5-lobed. Petals often bilabiate, 4-5-lobed, sometimes spurred. Stamens usually 4, rarely 2 or 5, often didynamous. Ovary 2-celled, superior; stigma capitate or 2-lobed. Ovules many. Fruit a capsule or berry.

- 1a. Trees *Wightia*
- 1b. Shrubs or herbs
  - 2a. Stamens 4; 2 fertile and 2 sterile or staminodes
    - 3a. Leaves entire, much reduced less than 2cm *Dopatrium*
    - 3b. Leaves serrate, well developed, more than 9 cm *Bonnaya*
  - 2b. Stamens 4 or 5; all or 4 fertile
    - 4a. Leaves pinnatisect or pinnatifid *Pedicularis*
    - 4b. Leaves simple
      - 5a. Calyx winged or keeled *Torenia*
      - 5b. Calyx not winged or keeled
        - 6a. Flowers in terminal spikes or racemes, axillary, solitary
          - 7a. Calyx subtended by a pair of bracteoles *Alectra*
          - 7b. Calyx not subtended by a pair of bracteoles *Lindenbergia*



6b. Flowers in second terminal racemes, or solitary and axillary

8a. Leaves usually radical in a basal rosette; flowers white or bluish

*Mazus*

8b. Leaves all cauline; flowers yellow

*Mecardonia*

*Alectra* Thunb., Nov. Gen. Pl. 81. 1784

Erect herbs, usually scabrid. Leaves opposite or alternate, toothed. Flowers in terminal spikes or racemes, solitary in the axils of bracts, bracteolate. Calyx campanulate, leafy, 5-lobed. Corolla tube broad, limb 5, oblique, spreading. Stamens 4, didynamous. Style long; stigma elongate. Fruit a capsule, subglobose, loculicidal, valves entire or bifid.

*Alectra avensis* (Benth.) Merr., Philipp. J. Sci., C 12: 109. 1917; Balakr., Fl. Jowai 2: 336. 1983; *A. indica* Benth., DC. Prodr. 10: 339. 1846; Hook.f., Fl. Brit. Ind. 4: 297. 1884; Kanjilal *et al.*, Fl. As. 3: 381. 1939.

Erect herbs. Stems scabrid, naked below, branched above. Leaves upper alternate, lower opposite or sub-opposite, scabrid, lanceolate, 1.5-4 x 0.5-1.5 cm, base cuneate, apex acute, margin coarsely toothed, sessile or subsessile. Flowers yellow, solitary, in terminal spikes, pubescent. Bracts longer than flowers, bracteoles filiform, ciliate. Calyx tube 10-ribbed, lobes 5, persistent, pubescent. Corolla subequally 5-lobed, limb oblique. Stamens 4, didynamous. Stigma fleshy, fusiform. Capsule subglobose, 4-lobed.

**Fl. & Fr.:** August - November

**Distribution:** India (NE India), E Himalaya, China, Myanmar, Philippines, Taiwan, Thailand, Vietnam

**Specimen examined:** Grows in open forest edges. Lozaphuhu. NLNU 0494. (Pl. 42)

***Bonnaya*** Link & Otto, Icon. Pl. Select. 25. 1820

Annual or perennial herbs. Stem erect or prostrate, quadrangular. Leaves opposite, simple, pinnately or palmately nerved. Flowers in axillary or terminal racemes or solitary and axillary or in umbel like cluster. Calyx 5, free or connate. Corolla tubular, bilabiate, upper lip emarginate or shallowly 2-lobed; lower lip 3-lobed. Stamens 2 or 4, posterior pair fertile, anterior pair fertile or sterile or reduced to staminodes. Fruit a capsule, septicidal.

1a. Corolla upto 1 cm long; leaves sessile or subsessile, oblong-lanceolate *B. antipoda*

1b. Corolla 1-1.5 cm long; leaves petiolate, ovate-oblong *B. ruellloides*

***Bonnaya antipoda*** (L.) Druce, Rep. Bot. Exch. Club Soc. Brit. Isles 3: 415. 1914; *Lindernia antipoda* (L.) Alston, Trimen, Handb. Fl. Ceylon 6(Suppl.): 214. 1931; Balakr., Fl. Jowai 2: 340. 1983; Sinha in Singh *et al.*, Fl. Mizo. 2: 180. 2012; *Ruellia antipoda* L., Sp. Pl. 635. 1753; *Bonnaya veronicifolia* (Retz.) Spreng. Syst. Veg. 1: 41. 1824; Hook.f., Fl. Brit. Ind. 4:285. 1884; *Bonnaya veronicifolia* var. *grandiflora* (Retz.) Hook.f., Fl. Brit. India 4: 285. 1884.

Decumbent or creeping annual herbs, rooting at nodes. Leaves subsessile, opposite, oblong or oblanceolate, 1-3 x 0.5-1 cm, apex acute, base attenuate, margin crenate-serrate. Flowers in terminal lax racemes, or solitary and axillary. Calyx deeply 5-lobed, lobes linear-lanceolate. Corolla pale purplish pink. Stamens 4, posterior 2 fertile, anterior 2 staminodes. Capsules cylindrical.

**Fl. & Fr.:** June - December

**Distribution:** India (throughout), E Himalaya, Bangladesh, Bhutan, Cambodia, China, Nepal, Myanmar, Thailand, Vietnam

**Specimen examined:** Grows in marshy open places and streamsides. Chizami. NLNU 0564.

***Bonnaya ruelloides*** (Colsm.) Spreng., Syst. Veg., ed. 16, 1: 41. 1824; *Lindernia ruelloides* (Colsm.) Pennell, Brittonia 2: 182. 1936; Sinha in Singh *et al.*, Fl. Mizo. 2: 181. 2012; Grierson & Long, Fl. Bhut. 2.3: 1125. 2001; *Gratiola reptans* Roxb., Fl. Ind. 1: 140. 1820. *Bonnaya reptans* (Roxb.) Spreng., Syst. Veg. 1: 41. 1824; Hook.f., Fl. Brit. Ind. 4: 284. 1884.

Prostrate to erect herbs, stems creeping and rooting at nodes. Leaves ovate or oblong, 1-2.5 x 0.5-1 cm, apex obtuse, base acute, attenuate, margin crenate-serrate. Flowers in lax racemes. Calyx deeply 5-lobed, lobes linear-lanceolate. Corolla purplish white to pink. Fertile stamens 2, staminodes 2. Capsule cylindrical.

**Fl. & Fr.:** September - November

**Distribution:** India (NE India), E Himalaya, Bangladesh, Bhutan, Cambodia, China, Nepal, Myanmar, Thailand, Vietnam

**Specimen examined:** Grows in marshy open places and streamsides. Chizami. NLNU 0566.

**(Pl. 42)**

***Dopatrium*** Buch.-Ham. ex Benth., Edwards's Bot. Reg. 21: t. 1770 (4). 1835

Glabrous, slender aquatic herbs. Leaves opposite, lower ones small, upper ones minute. Flowers small, solitary, axillary. Calyx 5. Corolla bilabiate, tube slender below, throat broad; upper lip bifid, lower lip 3-lobed. Stamens 4, 2 perfect, 2 staminodes. Style short. Fruit a capsule. Seeds numerous, minute.

***Dopatrium junceum*** (Roxb.) Buch.-Ham. ex Benth., Edwards's Bot. Reg. 21: t. 1770 (4). 1835; Hook. f., Fl. Brit. Ind. 4: 274. 1884; Grierson & Long, Fl. Bhut. 2.3: 1114. 2001.

Fleshy, erect herbs, much branched from the base. Stems 10-40 cm high. Lower leaves few, oblong, obtuse, upper leaves much reduced and small. Flowers borne in upper

leaf axils, sessile or on filiform pedicels. Calyx segments obtuse. Corolla pale purple. Capsule ellipsoid or subglobose.

**Fl. & Fr.:** September - November

**Distribution:** India (throughout), Bhutan, China, Indonesia, Japan, Malaysia, Myanmar, Philippines, Thailand, Vietnam, Australia, Oceania

**Specimen examined:** Grows in marshy open places, ricefields. Chizami. NLNU 0568.

*Lindenbergia* Lehm., Index Seminum (HGB, Hamburgensis) 8. 1829

Annual or perennial herbs. Stems erect or procumbent, much branched, hairy. Leaves opposite or upper ones alternate. Flowers in terminal spikes or racemes, solitary, axillary. Calyx 5-lobed. Corolla tubular, bilabiate. Stamens 4, didynamous, inserted on corolla tube near the base. ovary glabrous or hairy. Fruit a capsule, loculicidally 2-grooved, usually covered by persistent calyx; seeds many.

*Lindenbergia muraria* (Roxb. ex D. Don) Bruhl, J. Dept. Sci. Calcutta Univ. 2: 27. 1920; Balakr., Fl. Jowai 2: 336. 1983; Grierson & Long, Fl. Bhut. 2.3: 1107. 2001; *L. urticifolia* Lehm., Index Seminum (HGB, Hamburgensis) 8. 1829; Hook.f., Fl. Brit. Ind. 4: 262. 1884.

Annual herbs, stems branched from base, hairy, quadrangular. Leaves opposite, alternate towards apex, ovate, base cuneate, apex obtuse or sub-acute, sparsely pilose on both surfaces, margin serrate but entire towards base. Flowers axillary, solitary. Calyx ribbed, lobes ovate. Corolla yellow, tube cylindrical, 0.5-0.8 cm. Capsule vertically 2-grooved, hairy.

**Fl. & Fr.:** June - October

**Distribution:** India (throughout), E&W Himalaya, Afghanistan, Bangladesh, Bhutan, China, Nepal, Myanmar, Pakistan, Thailand, Tibet, Vietnam

**Specimen examined:** Grows in moist shaded places. Chozuba. NLNU 0317. (Pl. 43)

*Mazus* Lour., Fl. Cochinch.: 385. 1790

Herbs, small, often with stolons. Leaves usually rosette at base, alternate or opposite above. Flowers small, in secund terminal, bracteate raceme. Calyx campanulate, 5-fid. Corolla tube short, bilabiate, upper lip erect, bifid; lower lip spreading, 3-lobed, throat with 2-lobed palate. Stamens 4, didynamous, inserted in corolla tube. Fruit a capsule, loculicidal, globose or compressed. Seeds minute, numerous.

*Mazus pumilus* (Burm.f.) Steenis, Nova Guinea, n.s., 9: 31. 1958; Balakr., Fl. Jowai 2: 337. 1983; Grierson & Long, Fl. Bhut. 2.3: 1102. 2001; *M. rugosus* Lour. Fl. Cochinch. 385. 1790; Hook.f., Fl. Brit. Ind. 4: 259. 1884.

Herbs, with numerous stems. Leaves opposite at base, obovate, 2-4 x 1-2 cm; upper leaves obovate-spathulate, 1-3 x 0.5-2 cm, apex obtuse, base cuneate, margin crenate-dentate. Flowers in racemes of 2-20 cm long. Calyx 5-fid. Corolla white or pale blue with 2 yellow spots inside. Stamens 4, didynamous. Capsules subglobose. Seeds minute.

**Fl. & Fr.:** April - December

**Distribution:** India (throughout), E&W Himalaya, Bhutan, China, Indonesia, Japan, Korea, Nepal, Philippines, Thailand, Vietnam

**Specimen examined:** Grows in moist shaded places, forest edges, streamsides. Chozuba. NLNU 0320. (Pl. 43)

*Mecardonia* Ruiz & Pav., Fl. Peruv. Prodr. 95. 1794

Herbs, erect or creeping, glabrous. Leaves opposite. Flowers solitary, axillary, irregular. Sepals 5, free, arranged in 2 series: 3 outer sepals and 2 inner lateral sepals.

Corolla tubular, bilabiate, lower lip 3-lobed; upper lip 2-lobed. Stamens 4, didynamous, and with a small staminode. Fruit a capsule, 2-valved.

*Mecardonia procumbens* (Mill.) Small, Fl. S.E. U.S. 1065. 1903; Grierson & Long, Fl. Bhut. 2.3: 1114. 2001.

Prostrate or decumbent annual herbs. Stem glabrous, quadrangular. Leaves opposite, sub-sessile, ovate-oblong, 0.8-1.5 x 0.3-0.8 cm, base cuneate, apex obtuse, glabrous, margin crenate in upper part and entire towards base. Flowers yellow, solitary, axillary. Calyx divided to base. Corolla tube pubescent. Stamens 4, didynamous. Capsule ovoid or ellipsoid.

**Fl. & Fr.:** March - June

**Distribution:** Native of Tropical & Subtropical America; naturalized in India

**Specimen examined:** Grows in open moist places, roadsides, as weeds in cultivated fields. Chozuba. NLNU 0324.

*Pedicularis* L., Sp. Pl. 607. 1753

Annual or perennial herbs. Leaves alternate, opposite or whorled, simple, variously pinnatifid, or pinnatisect. Flowers bracteate in terminal spikes or racemes, or flowers axillary. Calyx tubular or campanulate, entire or variously divided or toothed. Corolla bilabiate, tube equal to or longer than calyx; upper lip erect, falcate or decurved, acute or beaked; lower lip with 3 spreading erect or deflexed lobes. Stamens 4, didynamous, anthers inside the upper lip. Style long, slender. Fruit a capsule, compressed, ovate or lanceolate. Seeds numerous.

*Pedicularis gracilis* Wall.ex Benth., Scroph. Ind. 52. 1835; Hook.f., Fl. Brit. Ind. 4: 307. 1884; Kanjilal *et al.*, Fl. As. 3: 382. 1939; Grierson & Long, Fl. Bhut. 2.3: 1174. 2001; Singh *et al.*, Fl. Mizo. 2: 188. 2012.

Annual herbs. Stem erect, upto 70 cm or more, much branched, slender, with 4 rows of hairs running entire length. Leaves opposite or in whorls of 4, deeply pinnatifid, segments oblong-lanceolate, glabrous. Flowers in a lax terminal raceme or in whorls of 4-flowered. Bracts pinnatifid. Calyx tubular, 0.6 cm long, tube membranous, 5-lobed, lobes acute-dentate, lobes tip ciliate. Corolla pink, with white throat, tube as long as the calyx, upper lip falcate, beak nearly straight, lower lip broadly orbicular 3-lobed. Capsule oblong, about 1.3 cm long, acute apex.

**Fl. & Fr.:** July - October

**Distribution:** India (NE India), E Himalaya, Bhutan, China, Nepal, Pakistan

**Specimen examined:** Grows in grassy mountain slopes, meadows. Kapamodzu. NLNU 0297.

*Torenia* L., Sp. Pl. 2: 619. 1753.

Glabrous or pubescent, annual or perennial herbs. Leaves opposite, petiolate or sessile, margin entire, crenate or serrate. Flowers axillary or in terminal sub-umbelate or racemes. Calyx bilabiate, with 2-5 lobes, winged, plaited or keeled. Corolla bilabiate, upper lip erect, bifid; lower lip spreading, 3-lobed, tube curved. Stamens 4, didynamous, all perfect. Ovary bilocular. Fruit a capsule, linear or oblong. Seeds numerous, rugose.

1a. Calyx 2-lobed, divided upto the middle; corolla lobes dark purple *T.diffusa*

1b. Calyx 5-lobed, divided upto the base; corolla lobes violet, lower with 3 deep purple tips *T.violacea*

*Torenia diffusa* D. Don, Prodr. Fl. Nep. 86. 1825; Balakr., Fl. Jowai 2: 338. 1983; Sinha in Singh *et al.*, Fl. Mizo. 2: 188. 2012; *T. vagans* Roxb., Fl. Ind. 3: 96. 1832; Hook.f., Fl. Brit. Ind. 4: 277. 1884.

Erect or decumbent herbs, 20-30 cm high. Stems quadrangular, rooting at nodes, diffusely branched at base. Leaves ovate-lanceolate, 1-3 x 0.5-2 cm, base cuneate, apex acute or sub-acute, margins serrate, puberulous above, sparsely pilose beneath. Flowers axillary, often solitary, pedicels 1-1.5 cm long. Calyx glabrous, divided up to middle into 2 lobes, narrowly winged. Corolla funnel shaped, tube pale purplish, lobes rounded or sub-orbicular, dark purple. Capsule linear, acute.

**Fl. & Fr.:** May - October

**Distribution:** India (throughout), E Himalaya, Bhutan, Nepal

**Specimen examined:** Grows in moist shady or open places. Chozuba. NLNU 0371.

*Torenia violacea* (Blanco) Pennell, J. Arn. Arb. 24: 255. 1943; Balakr., Fl. Jowai 2: 338. 1983; Sinha in Singh *et al.*, Fl. Mizo. 2: 190. 2012; *Torenia peduncularis* Benth. ex Hook.f., Fl. Brit. India 4: 276. 1884.

Erect or decumbent herbs. Stems much branched near base, sharply quadrangular, sparsely hairy on angles. Leaves ovate, 1.5-4 x 1-2 cm, base obtuse or truncate, apex acute or sub-acute, margins serrate, sparsely hairy on both surfaces; petioles slender. Flowers solitary and axillary in upper axils, or 2-4 in a terminal, sub-umbellate corymbs; pedicels 1-2.5 cm long. Calyx ovoid, 5-winged, larger in fruit. Corolla 1.5-3 cm long, tube pale purple, lobes violet. Capsule ellipsoid-lanceolate, upto 1.5 cm long.

**Fl. & Fr.:** May - October

**Distribution:** India (throughout), E Himalaya, Bhutan, Cambodia, Indonesia, Malaysia, Thailand, Vietnam.

**Specimen examined:** Grows in moist shady or open places. Chozuba. NLNU 0372.



***Wightia*** Wall. Pl. Asiat. Rar. 1: 71. 1830

Trees, semi-epiphytic or pseudo lianas. Branches scandent, lenticellate. Leaves opposite, coriaceous, margin entire, exstipulate. Flowers in axillary thyrses, pubescent. Calyx campanulate, irregularly 3-5-lobed. Corolla tube incurved, dilated above, lower lip 3-lobed, spreading, upper lip 2-lobed, erect. Stamens 4, didynamous, exserted, inserted near base of corolla. Style long, apex incurved, stigma simple. Fruit a capsule, 2-valved, septicidal. Seeds numerous, membranous winged.

***Wightia speciosissima*** (D. Don) Merr., J. Arnold Arbor. 19. 1: 67. 1938; Grierson & Long, Fl. Bhut. 2.3: 1136. 2001; Sinha in Singh *et al.*, Fl. Mizo. 2: 190. 2012; *Gmelina speciosissima* D. Don, Prodr. Fl. Nepal. 104. 1825; *Wightia gigantea* Wall, Pl. Asiat. Rar. 1: 71, t. 81. 1830; Hook.f., Fl. Brit. India 4: 257. 1884.

Trees, often semi-epiphytic and climbing up trunks of other trees by means of aerial roots. Leaves elliptic or ovate-elliptic, 10-17 x 6-12 cm, apex acute or subacute, base obtuse or rounded, glabrous above, tomentose beneath; petioles 2-3 cm long. Flowers borne on leafless shoots, pinkish, many-flowered, peduncles 6-10 cm long. Calyx lobes rounded, dull green with purple tinged near base, tomentose outside. Corolla tube densely tomentose outside, glabrous inside 2.5-3.5 cm long, lobes tomentose both inside and outside. Filaments whitish, anthers pinkish brown. Styles pinkish. Capsule linear or oblong-linear, faintly coriaceous, 2.5-4 m long.

**Fl. & Fr.:** September - November

**Distribution:** India (throughout), E Himalaya, Bhutan, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in forest, on rocks. Tsupfume. NLNU 1021. (**Pl. 43**)

## OROBANCHACEAE

Vent, Tabl. Regn. Veg. 2: 292. 1799

Herbs, annual or perennial. Plant with or without chlorophyll. Stems simple, branched or unbranched, scabrid or scaly. Flowers bisexual, irregular, solitary in scapes, or in axils of scales or bracts, or in spikes or racemes. Calyx campanulate or tubular, 4-5-lobed or spathe-like. Corolla bilipped, campanulate or tubular, lobes 5, unequal. Stamens 4, didynamous, filaments slender. Ovary superior, 1-celled; ovules 2-many; stigma 2-4-lobed or inflated. Fruit a capsule, dehiscing by 2-3 valves; seeds numerous.

*Aeginetia* L. Sp. Pl. 632. 1753

Herbs, fleshy. Stem short, scaly. Flowers large, solitary, or clustered at stem apex. Calyx spathe-like, split nearly to base on lower side. Corolla tubular or campanulate, 2-lip, 5-lobed. Stamens 4, included. Ovary 1-celled; style curved; stigma peltate. Fruit a capsule, dehiscing by valves.

*Aeginetia indica* L., Sp. Pl. 632. 1753; Hook.f., Fl. Brit. Ind. 4: 320. 1884; Kanjilal *et al.*, Fl. As. 3: 385. 1939; Balakr., Fl. Jowai 2: 340. 1983; Sinha in Singh *et al.*, Fl. Mizo. 2: 191. 2012.

Leafless herbs, 20-50 cm, root parasite. Stem unbranched or branched near base. Scapes few, solitary or grouped, brown, streaked purple, with few scales at base. Flowers solitary, terminal. Calyx purple, spathe-like, split nearly to base, apex acute to acuminate. Corolla dark purple, tubular, tube curved, 4-5 cm long, lobes fimbriate at margins. Stamens didynamous, included; filaments purple, anthers yellow. Ovary 1-celled; stigma pale yellow. Fruit ovoid.

**Fl. & Fr.:** September - February

**Distribution:** India (throughout), E Himalaya, Bangladesh, China, Myanmar, Nepal, Philippines, Sri Lanka, Taiwan, Thailand, Vietnam

**Specimen examined:** Grows in shaded areas in forests. Lozaphuhu. NLNU 0481. **(Pl. 43)**

## GESNERIACEAE

Dumort., Anal. Fam. Pl. 30. 1829

Herbs or shrubs, sometimes epiphytic. Leaves simple, opposite, alternate or whorled, fleshy or coriaceous, entire or toothed, stipules absent. Flowers bisexual, irregular, arranged in spikes or bracteate raceme. Sepals 5, fused at base. Corolla tubular, often 2-lipped. Stamens 2 or 4, often inserted on corolla tube, staminodes 1-3 or absent. Ovary superior, 1-celled. Fruit often a capsule with many seeds.

1a. Fertile stamens 4; leaves thick and fleshy *Aeschynanthus*

1b. Fertile stamens 2; leaves herbaceous

2a. Seeds with hair-like appendage at each end *Lysionotus*

2b. Seeds without hair-like appendage

3a. Flowers in long racemes *Rhynchoglossum*

3b. Flowers in cymes *Henckelia*

*Aeschynanthus* Jack, Trans. Linn. Soc. London 14: 42. 1823

Undershrubs, epiphytic. Stems slender, erect or creeping, often rooting at nodes. Leaves simple, opposite, alternate or whorled, fleshy or leathery, entire or rarely toothed. Flowers bisexual, zygomorphic. Inflorescence terminal or axillary, cymose, clustered or solitary. Calyx 5-lobed or divided to base. Corolla with a distinct tube, limb often 2-lipped.

Stamens 2-4, inserted on corolla tube, didynamous; anthers exserted, connivent in pairs. Ovules many. Fruit a linear capsule, loculicidally 2-valved. Seeds minute, rugose or papillate.

1a. Leaves narrowly elliptic-lanceolate or lanceolate

2a. Calyx lobes obtuse, about one third of the length of tube *A. hookeri*

2b. Calyx lobes acute, much longer than tube *A. parasiticus*

1b. Leaves elliptic-oblong lanceolate

3a. Calyx red, divided nearly to base *A. bracteatus*

3b. Calyx yellowish green, lobes equalling tube *A. parviflorus*

*Aeschynanthus bracteatus* Wall. ex. A. DC., Prodr. 9: 261. 1845; C.B. Clarke in Hook.f., Fl. Brit. Ind. 4: 342. 1884; Kanjilal *et al.*, Fl. As. 3:391. 1939; Balakr. Fl. Jowai 2: 345. 1983; Haridasan & Rao, For. Fl. Megh. 2: 651. 1987; Grierson & Long, Fl. Bhut. 2. 3: 1301. 2001.

Epiphytic shrub, laxly branched, glabrous. Leaves elliptic, oblong-elliptic, 8-14 x 2.5-4 cm, apex acuminate, base cuneate, margin entire; petiole 1-1.5 cm long. Flowers in terminal clusters, peduncles 1-5 cm long; bracts paired, ovate 1.5- 3 cm, red. Calyx divided nearly to base, lobes lanceolate, red. Corolla scarlet, glabrous outside, 3.5 cm long, mouth scarcely oblique, upper lip erect, shallowly bilobed, lower lip 3-lobed, marked with purplish blotches. Stamens far exserted, filaments glandular-puberulous. Ovary glandular puberulent. Capsule about 14 cm long, seeds with 1 hair-like appendage at each end.

**Fl. & Fr.:** August - October

**Distibution:** Northeast India, East Himalaya, Bhutan, China, Myanmar, Vietnam

**Specimen examined:** Grows on trees in shady places in forests. Pfutsero. NLNU 0172. (Pl. 43)

*Aeschynanthus hookeri* C.B. Clarke, A. & C. de Candolle, Monogr. Phan. 5: 21. 1883; C.B. Clarke in Hook.f., Fl. Brit. Ind. 4: 338. 1884; Kanjilal *et al.*, Fl. As. 3: 388. 1939; Grierson & Long, Fl. Bhut. 2. 3: 1302. 2001.

Epiphytic undershrubs, glabrous, laxly branched. Stem slender. Leaves opposite, narrowly elliptic-lanceolate, 6-11 x 1.3-2.4 cm, apex acuminate, base cuneate, margin entire, or bluntly distant toothed, fleshy; petiole 0.7-1.2 cm. Flowers several, clustered at tip of stem, later overtopped by new growth. Bracts linear-lanceolate, 0.3-1 cm; pedicels 1.2- 2 cm. Calyx tube 0.8-1.4 cm long, lobes 0.3-0.5 cm, oblong, apex obtuse, glabrous, reddish. Corolla glandular pubescent outside, 3-3.5 cm long, tube curved near apex, throat yellow, rest of corolla orange red, each lobe with a dark purplish median line. Stamens far exserted, filaments glandular puberulous. Style glandular puberulous. Capsule about 20 cm long.

**Fl. & Fr.:** May - October

**Distibution:** Northeast India, East Himalaya, Bhutan, China, Myanmar, Nepal

**Specimen examined:** Grows on trees in shady places in forests. Pfutsero. NLNU 1051. (Pl. 43)

*Aeschynanthus parasiticus* (Roxb.) Wall., Numer. List: no. 796. 1829; Balakr. Fl. Jowai 2: 344. 1983; Sinha in Singh *et al.*, Fl. Mizo. 2: 199. 2012; *Aeschynanthus grandiflorus* (D. Don) Spreng., Syst. Veg. 4.2 : 238. 1827; C. B. Clarke in Hook.f., Fl. Brit. Ind. 4: 338. 1884; Kanjilal *et al.*, Fl. As. 3: 389. 1939.

Epiphytic undershrubs, laxly branched. Stem slender, pendent, rooting at nodes, glabrous. Leaves opposite, lanceolate, 6-13 x 2-3 cm, base cuneate, apex acuminate, margin

entire, or distant bluntly toothed, fleshy; petiole 0.6-1.2 cm. Flowers in terminal clusters, about 5 cm long; pedicels 1-1.5 cm long. Calyx tube about 0.2-0.4 cm long, lobes lanceolate, acute, equal to or as long as tube. Corolla glandular pubescent outside, inside with very coarse gland tipped hairs, tube curved and inflated in upper half, orange scarlet with dark purple longitudinal stripes outside and triangular blotch on the inner side. Stamens 4, anthers exserted, filaments hairy. Capsule linear, upto 15 cm long.

**Fl. & Fr.:** August - September

**Distibution:** (India) NE India, E Himalaya, Andaman Island, Bangladesh, Bhutan, China, Myanmar, Nepal, Vietnam

**Specimen examined:** Grows on trees in shady places in forests. Thetsumi. NLNU 0792. (**Pl. 44**)

*Aeschynanthus parviflorus* (D.Don) Spreng., Syst. Veg. 4.2: 238. 1827; Grierson & Long, Fl. Bhut. 2. 3: 1303. 2001; Sinha in Singh *et al.*, Fl. Mizo. 2: 200. 2012; *Trichosporum parviflorum* D. Don, Edinburgh Philos. J. 7: 85. 1822; *Aeschynanthus ramosissimus* Wall., Pl. Asiat. Rar. 1: 55. 1830; C. B. Clarke in Hook.f., Fl. Brit. Ind. 4: 339. 1884.

Epiphytic undershrubs, upto 1 m long. Stems spreading, laxly branched, glabrous. Leaves opposite, broadly lanceolate, 6-10 x 2-3.8 cm, base cuneate, apex acuminate, margin entire; petiole 0.5-1 cm long. Flowers several, clustered at tip of stem, later overtopped by new growth. Bracts linear-lanceolate, 0.2-0.5 cm long. Pedicels 0.7- 1 cm long. Calyx light bright orange yellow, tube 0.2-0.5 cm long, glabrous, lobes lanceolate, 0.6-0.8 cm. Corolla orange red, throat yellowish or light orange, crimson median patch on each lobe. Stamens far exserted, filaments glandular pubescent. Capsule linear, 10-18 cm long. Seeds with 2 long hair at one end, 1 at the other end.

**Fl. & Fr.:** July - October

**Distibution:** India (NE India), E & W Himalaya, Bhutan, China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows on trees in forests. Wazeho. NLNU 0643. (Pl. 44)

*Henckelia* Spreng., Anleit. Kenntn. Gew., ed. 2, 2. 1: 402. 1817

Herbs, stemless or with simple or branched stem. Leaves opposite, rarely alternate, unequal. Flowers in axillary few flowered cymes or solitary. Calyx 5-lobed. Corolla funnel shaped; limb bilipped, 5-lobed, subequal. Stamen 2, included; staminodes 3. Ovary linear 1-loculed, seldom 2-loculed. Capsule long, linear, loculicidally 2-valved.

*Henckelia pumila* (D. Don) A. Dietr., Sp. Pl. 1: 574. 1831; *Chirita pumila* D. Don, Prodr. Fl. Nepal.: 90. 1825; C. B. Clarke in Hook.f., Fl. Brit. Ind. 4: 357. 1884; Balakr. Fl. Jowai 2: 347. 1983; Grierson & Long, Fl. Bhut. 2. 3: 1317. 2001; Sinha in Singh *et al.*, Fl. Mizo. 2: 205. 2012.

Erect herbs, upto 30 cm tall. Stem base decumbent, rooting. Leaves opposite, often unequal, elliptic-oblong to lanceolate, 6-15 x 2.5-6 cm, apex acute, base oblique, pubescent on both surface, margin serrate; petioles 0.5-2.5 cm long, pubescent. Inflorescence 1-3 flowered, in axillary cymes, mostly in axils of upper leaves. Calyx tubular, deeply divided, with dense white hairs, lobes narrow lanceolate. Corolla tubular, funnel shaped, glandular pubescent outside, tube white with purple around the mouth, inside with yellow streaks. Stamens 2, fused to the corolla tube; filament short. Stigma bifid. Capsules linear, upto 12 cm long.

**Fl. & Fr.:** July - October

**Distibution:** India (NE India), E & W Himalaya, Bhutan, China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in moist places, rocks, in shaded forests. Lozaphuhu. NLNU 0482. (Pl. 44)

*Lysionotus* D. Don, Edinburgh Philos. J. 7: 85. 1822

Herbs or subshrubs. Stem creeping, flowering stem erect. Leaves opposite or whorled, rarely alternate, glabrous, sometimes puberulent. Flowers in axillary or terminal cymes. Calyx divided nearly to base. Corolla tubular, bilabiate. Stamens 2, included. Ovary stipitate; style simple. Capsule linear, 2-valved. Seeds minute with a long hair at each end.

*Lysionotus serratus* D. Don, Edinburgh Philos. J. 7: 86. 1822; C.B. Clarke in Hook.f., Fl. Brit. Ind. 4: 344. 1884; Kanjilal *et al.*, Fl. As. 3:393. 1939; Balakr. Fl. Jowai 2: 346. 1983; Sinha in Singh *et al.*, Fl. Mizo. 2: 209. 2012.

Herbs or undershrubs, epiphytic on rocks and trees, upto 35 cm tall. Stem decumbent at base. Leaves opposite or ternate, unequal in size, elliptic-lanceolate, 3.5-9 x 1.7-12.5 cm, apex acuminate, base cuneate, sometimes oblique, margins serrate or sinuate; petioles upto 1 cm long. Flowers in terminal pedunculate few flowered cymes; peduncles upto 10 cm long, glabrous. Bracts ovate. Calyx 5, divided nearly to base, lobes lanceolate, apex acute. Corolla pale purple or white with purplish nerves, tubular, inflated in the middle, upper lip shorter than lower. Stamens 2, included. Capsules linear, upto 10 cm long.

**Fl. & Fr.:** July-January

**Distibution:** India (NE India), E & W Himalaya, Bhutan, China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows on rocks or trees in moist shady places in forests. Lozaphuhu. NLNU 0484. (Pl. 44)



***Rhynchoglossum*** Blume, Bijdr. Fl. Ned. Ind.: 741. 1826

Annual or perennial herbs. Leaves alternate, unequal-sided. Flowers in axillary or terminal long racemes. Calyx funnel-shaped, 5-lobed. Corolla tube cylindric, limb bilipped, upper lip small, bilobed, lower larger, entire or 3-lobed. Stamens 4 or 2, included. Fruit a capsule, enclosed by calyx, ellipsoid, loculicidally 2-valved.

***Rhynchoglossum obliquum*** Blume, Bijdr. Fl. Ned. Ind.: 741. 1826; C. B. Clarke in Hook.f., Fl. Brit. Ind. 4: 367. 1884; Kanjilal *et al.*, Fl. As. 3: 398. 1939; Grierson & Long, Fl. Bhut. 2. 3: 1328. 2001; Sinha in Singh *et al.*, Fl. Mizo. 2: 211. 2012.

Annual succulent herbs. Leaves membranous, oblong-elliptic, 3.5- 11 x 2-6 cm, base obliquely rounded or subcordate, apex acuminate, glabrous; petioles 0.5-3 cm long. Flowers in a terminal or axillary spike like raceme, upto 20 cm long, bracts minute. Calyx campanulate, lobes ovate. Corolla purplish blue, bilipped, upper lip shortly bilobed, lower lip longer than upper one and 3-lobed. Stamens 2, included. Stigma dilated. Capsule enclosed by enlarged calyx, ellipsoid.

**Fl. & Fr.:** September - December

**Distibution:** India (NE India), E Himalaya, Bhutan, China, Myanmar, Nepal, Philippines, Taiwan, Thailand, Vietnam

**Specimen examined:** Grows in moist and shady places. Lozaphuhu. NLNU 0478.

**BIGNONIACEAE**

Juss., Gen. Pl. 137. 1789 (*Bignoniae*)

Trees, shrubs or climbers, rarely herbs. Leaves opposite, alternate or whorled, simple or pinnately compound, rarely palmately compound, stipules absent. Flowers bisexual,

zygomorphic, large, in axillary or terminal racemes or panicles, sometimes solitary, rarely flowers borne on old wood. Calyx tubular, truncate, 2-5 lobed. Corolla funnelform, usually bilipped, lobes 5, imbricate. Fertile stamens 4, didynamous, sometimes reduced to 2, others replaced by staminodes. Ovary superior, 2-celled, ovules numerous. Style filiform, stigma bifid. Fruit an elongated capsule, dehiscing loculicidally or septicidally. Seeds flat with large membranous wing.

1a. Leaves 1-2 m long; fertile stamens 5

*Oroxylum*

1b. Leaves upto 1 m long; fertile stamens 4

2a. Leaves 1 pinnate; capsule 4-angled

*Stereospermum*

2b. Leaves 2 pinnate; capsule 2-angled

*Radermachera*

### ***Oroxylum*** Vent., Decas Gen. Nov. 8. 1808

A small tree with few branches. Bark soft, brown, corky outside. Leaves opposite, 2 or 3 pinnately compound, leaflets ovate, entire. Calyx campanulate, leathery, truncate. Corolla tubular, ventricose, creamy white or purplish, lobes unequal. Stamens 5, fertile, unequal. Capsule large, long lanceolate, compressed, woody. Seeds flat, orbicular, surrounded by a transparent broad wing.

***Oroxylum indicum*** (L.) Kurz, For. Fl. Burma 2: 237. 1877; C.B. Clarke in Hook.f., Fl. Brit. Ind. 4: 378. 1884; Kanjilal *et al.*, Fl. As. 3: 401. 1939; Balakr. Fl. Jowai 2: 348. 1983; Haridasan & Rao, For. Fl. Megh. 2: 656. 1987; Grierson & Long, Fl. Bhut. 2.3: 1241. 2001; *Bignonia indica* L., Sp. Pl. 625. 1753.

Small tree, branches few or unbranched. Bark grey, corky. Leaves 2-4, pinnately compound, borne near stem apex; leaflets ovate, acuminate, base usually oblique, or sub cordate, entire. Flowers usually open after sunset, large, in terminal racemes, fetid smell.

Calyx scarcely toothed, coriaceous. Corolla tubular, fleshy, tube reddish purple outside, yellow inside, lobes creamy, margins crenate and irregularly lacinulate. Stamens 5, fertile, tomentose at base. Ovary compressed, ovules numerous. Capsule woody, 40-70 cm long, margin convex. Seeds rounded, surrounded by a papery wing.

**Fl. & Fr.:** June - February

**Distribution:** India (throughout), Bangladesh, Bhutan, Cambodia, China, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, Vietnam

**Specimen examined:** Grows in open forest at low elevations. Khuza. NLNU 0802.

***Radermachera*** Zoll. & Moritz, Syst. Verz. 3: 53. 1855

Trees. Leaves opposite, 1-3 pinnately compound; leaflets entire, petiolate. Flowers in terminal or lateral panicles or reduced to fascicles. Bracts leaflike. Calyx campanulate, apex truncate or 5-lobed. Corolla funnelform, tube short or long, limb usually bilipped. Stamens 4 or 5, didynamous, staminode usually present. Ovary terete, ovules numerous. Style included, stigma 2-lobed. Fruit a capsule, long, terete, dehiscent loculicidally. Seeds flat, with membranous wings at both ends.

***Radermachera sinica*** (Hance) Hemsl., Hook. Icon. Pl. 28: 2728. 1905; Grierson & Long, Fl. Bhut. 2.3: 1241. 2001; Giri *et al.*, Mater. Fl. Aruna. Pradesh 2: 237. 2008; *Stereospermum sinicum* Hance, J. Bot. 10: 16. 1882.

Trees, to 10 m high. Leaves 2 or 3 pinnately compound; leaflets ovate to ovate lanceolate, apex caudate acuminate, base cuneate, margin entire, glabrous. Flowers white to pale yellow, large, in terminal panicles. Bracts linear lanceolate, deciduous. Calyx 5-lobed, ovate, green. Corolla funnelform, lobes fimbriate, rounded, tube 4-5 cm long. Stamens 4,

didynamous, staminode present. Style exerted, stigma 2-lobed. Capsule terete, long, angular, nodding.

**Fl. & Fr.:** May-December

**Distribution:** India (NE India), E&W Himalaya, Bhutan, China, Malaya, Thailand, Vietnam

**Specimen examined:** Grows in open forest. Khezhakheno. NLNU 0226. (**Pl. 44**)

*Stereospermum* Cham., Linnaea 7: 720. 1833

Trees. Leaves opposite, imparipinnate; leaflets entire, elliptic-lanceolate. Flowers in lax terminal or axillary panicle. Calyx campanulate, truncate and unequally lobed. Corolla tubular-ventricose, bilabiate, 5-lobed, subequal, rounded or lacerate. Stamens 4, didynamous, included. Ovary sessile, ovules numerous. Fruit a capsule, terete, slender, dehiscing loculicidally; septum thick, corky. Seeds flat, winged at both ends.

*Stereospermum tetragonum* DC., Biblioth. Univer. Gene. 17: 124. 1838; *S. colais* (Buch.-Ham. ex Dillwyn) Mabb. Tax. 27: 553. 1978; Grierson & Long, Fl. Bhut. 2.3: 1240. 2001; Giri *et al.*, Mater. Fl. Aruna. Pradesh 2: 237. 2008.

Trees, 15-25 m tall. Leaves pinnate, 25-40 cm long; leaflets elliptic, caudate acuminate, glabrous or pubescent, margin entire, petiolules 1 cm. Flowers many in terminal glabrous or pubescent pedunculate panicles; bracts deciduous. Calyx campanulate, glabrous or pubescent. Corolla white with purplish or crimson markings, slightly curved; bilabiate, upper lip 2-lobed, lower lip 3-lobed, glabrous outside, tomentose within. Stigma 2 lobed. Capsule terete, 4 angled, 30-60 cm long, twisted when matured. Seeds ovoid, winged.

**Fl. & Fr.:** May-December

**Distribution:** India (throughout), Bhutan, China, Malaya, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam

**Specimen examined:** Grows in open secondary forest. Khuza. NLNU 0814.

## ACANTHACEAE

Juss., Gen. Pl. 102 1789

Herbs, shrubs, rarely climbers. Leaves opposite, rarely alternate, simple, stipules absent. Flowers usually cymes, racemes, or spikes ,rarely solitary or in axillary whorls; bisexual, often zygomorphic. Calyx 4-5 lobed. Corolla 2 lipped or subequally 5 lobed. Stamens epipetalous, didynamous, 4 or 2. Ovary superior, 2 celled. Capsule loculicidal.

- 1a. Climbing plant; leaves palmately veined ; capsule with long beak *Thunbergia*
- 1b. Herbs or shrubs, not climbing; leaves pinnately veined,  
capsule never beaked
  - 2a. Calyx 4 lobed *Barleria*
  - 2b. Calyx 5 lobed
    - 3a. Corolla subequally 5-lobed
      - 4a. Bracts conspicuous *Strobilanthes*
      - 4b. Bracts inconspicuous *Mackaya*
    - 3b. Corolla distinctly 2-lipped
      - 5a. Flowers enclosed by pair of bracts *Hypoestes*
      - 5b. Flowers not enclosed by pair of bracts
        - 6a. Bracteoles small or absent *Phlogacanthus*
        - 6b. Bracteoles 2
          - 7a. Corolla pale, purple or yellow *Justicia*
          - 7b. Corolla pale pink *Rostellularia*

***Barleria* L., Gen. Pl. 5. 1754**

Herbs or undershrubs, armed or unarmed. Leaves opposite, entire, petiolate. Inflorescence axillary cymes or in dense cluster or solitary. Calyx deeply 4 lobed, outer 2 lobe larger than the inner 2. Corolla funnel shaped, limb 5 lobed, subequal. Stamens 2 or 4, didynamous, inserted. Stigma bifid or entire.

***Barleria cristata* L.** Sp. Pl.: 636. 1753; C.B. Clarke in Hook.f., Fl. Brit. Ind. 4:488. 1884; Grierson & Long, Fl. Bhut. 2.3:1281. 2001; Kanjilal *et al.*, Fl. As. 3: 445. 1939; Giri *et al.*, Mater. Fl. Aruna. Pradesh 2: 240. 2008.

Undershrubs, upto 70 cm. Stems covered with soft hairs. Leaves elliptic-oblong, 5-9 x 2-4 cm, acute at both ends, both surfaces pubescent. Flowers in axillary capitates, blue. Bracts absent, bracteoles linear. Outer calyx lobes elliptic-lanceolate, 2-2.5 cm, hairy, reticulate; inner calyx lobes linear-lanceolate, 0.6-1.2 cm, margin scarious. Corolla tube pubescent, cylindric then gradually widened; lobes broadly ovate, glabrous. Stamens 2. Capsule ellipsoid, 1.5-1.7 cm long, glabrous.

**Fl. & Fr:** September - February

**Distribution:** India, China, Myanmar, Thailand, Vietnam, Cambodia, Bangladesh, Nepal, Sri Lanka

**Specimen examined:** Grows in forest edges, roadsides. Thetsumi. NLNU 0791. **(Pl. 44)**

***Hypoestes* Sol. ex R. Br., Prodr. Fl. Nov. 474. 1810**

Herbs or undershrubs. Leaves opposite, petiolate. Inflorescence axillary or terminal spikes. Bracts 2-4, enclosing 1-5 flowers of which one is obsolete. Calyx 5-lobed, lobes

equal or subequal. Corolla tube slender and slender, 2-lipped, lower lip shallowly 3-lobed, upper lip subentire or shallowly 2-lobed. Stamens 2. Capsule 2-4 seeded.

***Hypoestes triflora*** (Forssk.) Roem. & Schult., Syst. Veg., ed. 15 bis 1: 141. 1817; C. B. Clarke in Hook.f., Fl. Brit. Ind. 4: 557. 1885; Kanjilal *et al.*, Fl. As. 3: 540. 1939; Balakr., Fl. Jowai 2: 361. 1983.

Much branched herb. Leaves ovate, acute, broadly cuneate at base, acuminate, puberulous, crenate, 2-6 x 1-4cm, petiole 0.5-3cm. Flowers cymes in axillary or terminal cluster having 1-5 flowers. Bracts obovate to oblanceolate, one slightly larger than the other. Calyx glabrous, about 0.5 cm long. Corolla pinkish white, with maroon markings about 1.5 cm long. Capsule clavate, glabrous.

**Fl. & Fr.:** October – January.

**Distribution:** India (NE India), Himalaya, Bhutan, Myanmar, China, Nepal, Africa

**Specimen examined:** Grows in shaded moist places, along roadsides. Tsupfume. NLNU 0068. (Pl. 45)

***Justicia*** L., Sp. Pl. 1: 15. 1753

Herbs or shrubs. Leaves entire. Flower sessile or subsessile in spikes or panicles. Bracts large and conspicuous. Calyx 5 or 4 lobed. Corolla 2 lipped, upper lip 2 lobed or uneven, lower lip 3 lobed. Stamens 2. Capsule clavate, 4 seeded.

1a. Flowers in dense; bracteate pedunculate spikes *J. adhatoda*

1b. Flowers in pairs along rachis; in solitary or panicked spikes *J. vasculosa*

*Justicia adhatoda* L. Sp. Pl.: 15. 1753; Grierson & Long, Fl. Bhut. 2.3:1287. 2001; Giri *et al.*, Mater. Fl. Ar. Pradesh 2: 244. 2008; *Adhatoda vasica* Nees, Wall., Pl. As. Rar. 3: 103. 1832; C.B. Clarke in Hook.f., Fl. Brit. Ind. 4:540. 1885; Kanjilal *et al.*, Fl. As. 3: 455. 1939.

Dense evergreen shrub. Leaves lanceolate, elliptic-lanceolate, entire, base cuneate, apex acute or acuminate, subcoriaceous. Flowers white in axillary or terminal dense bracteate, pedunculate spikes, 5-10 cm long. Bracts ovate or elliptic, acute. Calyx 5 lobed, lobes oblong-lanceolate. Corolla 2 lipped, white with purple lines, tube short and broad, upper lip hooded, lower lip 3 lobes. Stamens 2. Capsule clavate, 4 seeded, pubescent.

**Fl. & Fr:** January-May

**Distribution:** India (throughout), Myanmar, Nepal, Vietnam

**Specimen examined:** Grows around human habitation. Chozuba. NLNU 0328. **(Pl. 45)**

*Justicia vasculosa* (Nees) T. Anderson, J. Linn. Soc., Bot. 9: 575. 1867; C.B. Clarke in Hook.f., Fl. Brit. Ind. 4:533. 1885; Kanjilal *et al.*, Fl. As. 3: 454. 1939; Grierson & Long, Fl. Bhut. 2.3:1288. 2001; Balakr., Fl. Jowai 2: 362. 1983; *Gendarussa vasculosa* Nees in Wall. Pl. As. Rar.3: 104. 1832.

Perennial herbs, stem glabrous. Leaves ovate-lanceolate, acuminate, attenuate at base, margin wavy, glabrous above, slightly pubescent on nerves beneath. Inflorescence spike terminal or axillary. Flowers pale yellow with purple markings, opposite in paniculate spikes. Bracts lanceolate. Calyx 5 lobed, lanceolate, pubescent, tip purple, about 0.4 cm. Corolla about 1.3 cm, pubescent, upper lip entire, lower lip 3 lobed strongly bent downwards. Stamens included.

**Fl. & Fr.:** February - May

**Distribution:** India (NE India), E Himalaya, Myanmar, Vietnam, Thailand



**Specimen examined:** Grows in shaded places in forest floors. Khuza. NLNU 0816. **(Pl. 45)**

*Mackaya* Harv., Thes. Cap. 1: 8. 1859

Herbs or undershrubs. Leaves elliptic, ovate-elliptic, entire or subentire. Flowers in lax or dense simple or compound spikes or racemes. Bracts and bracteoles linear. Calyx 5 lobed, linear – lanceolate. Corolla tube cylindric, funnel shaped or ventricose above, 5 lobed, subequal. Stamens 4, didynamous. Stigma bifid or sub capitate. Capsule elliptic.

*Mackaya neesiana* (Wall.) Das, Fl. As. 3: 447. 1939; *Asystasia neesiana* (Wall.) Nees, N. Wall. Pl. Asiat. Rar. 3: 89. 1832; C.B. Clarke in Hook.f., Fl. Brit. Ind. 4: 496. 1884.

Small shrub. Leaves elliptic or ovate-elliptic, acute or acuminate, glabrous above, pubescent on the nerves beneath shallowly toothed, base narrowed into the stalk, uppermost pair of leaves almost sessile with subcordate base. Flowers pink to purplish blue, in long lax raceme, pubescent. Calyx segments linear, pubescent. Corolla tube slender and long, about 3-4 cm long, pubescent, upper 2 lipped reflexed. Capsule long.

**Fl. & Fr:** August-January

**Distribution:** India (NE India), E Himalaya, Myanmar, China, Thailand, Vietnam, Malaya

**Specimen examined:** Grows in evergreen broad leaved forest, streamsides, moist banks.

Lozaphuhu . NLNU 0477. **(Pl. 45)**

*Phlogacanthus* Nees, Pl. Asiat. Rar. (Wall.) 3:76, 99.1832

Herbs or shrubs. Leaves opposite, entire or crenate. Flowers orange red or pink, in terminal thrysoid panicle, rarely axillary. Bracts small. Calyx deeply 5-lobed. Corolla tubular, limb subequally 5 lobes or 2-lipped, curved. Stamens 2. Capsule elongate, many seeded.

- 1a. Flowers in axillary cymes *P. pubinervius*
- 1b. Flowers in terminal thyrses
  - 2a. Leaves glabrous, corolla widened at the mouth *P. asperulus*
  - 2b. Leaves pubescent, corolla slightly widened at the mouth *P. tubiflorus*

***Phlogacanthus asperulus*** Nees, N. Wall., Pl. Asiat. Rar. 3: 99. 1832; C.B. Clarke in Hook.f., Fl. Brit. Ind. 4:512. 1884; Kanjilal *et al.*, Fl. As. 3: 444. 1939; Balakr., Fl. Jowai 2:362. 1983; Giri *et al.*, Mater. Fl. Aruna. Pradesh 2: 247. 2008.

Glabrous shrub. Leaves elliptic-lanceolate, entire or undulate, acuminate, base cuneate, glabrous, some leaves dark red or maroon beneath. Inflorescence terminal, a dense thryoid panicle. Flowers pink to light purple with reddish spots. Calyx lobes linear, pubescent. Corolla tube long and slender, about 1.2 cm long, curved and widened at the mouth, pubescent. Capsule glabrous, many seeded.

**Fl. & Fr:** March-June

**Distribution:** India (N E India), Bangladesh

**Specimen examined:** Grows in open primary forest. Chozuba. NLNU 0312. **(Pl. 45)**

***Phlogacanthus pubinervius*** T. Anderson, J. Linn. Soc., Bot. 9: 508. 1867; C.B. Clarke in Hook.f., Fl. Brit. Ind. 4:513. 1884; Kanjilal *et al.*, Fl. As. 3: 444. 1939; Haridasan & Rao, For. Fl. Megh. 2:664. 1987; Balakr., Fl. Jowai 2:359. 1983.

Much branched shrub, stem brown, 4 angled. Leaves elliptic, ovate, acute or acuminate, cuneate, entire, glabrous, pubescent on nerves beneath. Flowers orange yellow, in small sub sessile axillary cymes. Calyx linear lanceolate, hairy at margin. Corolla tubular, inflated from base, widened at mouth, pubescent. Stamens 2, anthers exerted. Capsule long, many seeded.

**Fl. & Fr:** November-May

**Distribution:** India (NE India), E Himalaya, Bangladesh, China, Myanmar

**Specimen examined:** Grows in primary forest, as hedges along roadsides . Tsupfume . NLNU 1011.

*Phlogacanthus tubiflorus* Nees, N. Wall. Pl. Asiat. Rar. 3: 99. 1832; C.B. Clarke in Hook.f., Fl. Brit. Ind. 4:511. 1884; Kanjilal *et al.*, Fl. As. 3: 443. 1939; Haridasan & Rao, For. Fl. Megh. 2:666. 1987; Giri *et al.*, Mater. Fl. Ar. Pradesh 2: 249. 2008.

Shrub, upto 2 m high. Leaves elliptic, ovate-elliptic, acuminate, cuneate at base, entire or sub-entire, granulate above, pubescent beneath. Inflorescence in dense or lax panicles, terminal. Flowers red. Calyx glabrate or pubescent, lanceolate. Corolla tubular, about 2 cm long, curved, slightly widened at the mouth. Capsule about 3.5 cm long.

**Fl. & Fr:** November-March

**Distribution:** India (NE India), E Himalaya, Bangladesh, Myanmar

**Specimen examined:** Grows in primary forest. Khuza. NLNU 0817. **(Pl. 45)**

*Rostellularia* Rchb., Handb. Nat. Pfl.-Syst. 190. 1837

Herbs or shrubs. Leaves entire. Flower sessile or subsessile in spikes or panicles. Bracts large and conspicuous. Calyx 5 or 4 lobed. Corolla 2 lipped, upper lip 2 lobed or uneven, lower lip 3 lobed. Stamens 2. Capsule clavate, 4 seeded.

*Rostellularia procumbens* (L.) Nees, A.P.de Candolle, Prodr. 11:371. 1847; *Justicia procumbens* L., Sp. Pl.: 15. 1753; C.B. Clarke in Hook.f., Fl. Brit. Ind. 4:539. 1885; Kanjilal *et al.*, Fl. As. 3: 455. 1939; Balakr., Fl. Jowai 2:360. 1983; Giri *et al.*, Mater. Fl. Aruna. Pradesh 2: 245. 2008.

Much branched, procumbent herbs. Stem sulcate, hairy. Leaves ovate-elliptic, hairy, cuneate, entire, acute to obtuse. Inflorescence spike, terminal or axillary, densely hairy. Bracts linear, hairy. Calyx lobes linear-lanceolate, densely hairy along margins. Corolla pale pink, glabrous, 2-lipped, lower lip slightly 3 lobed, upper lip 2 lobed. Stamens included. Capsule ellipsoid, 4 seeded.

**Fl. & Fr:** August-December

**Distribution:** India (throughout), Myanmar, Nepal, Vietnam, China, Pakistan

**Specimen examined:** Grows along roadsides and wastelands. Chizami. NLNU 0567.

*Strobilanthes* Blume, Bijdr. Fl. Ned. Ind. 14: 781. 1826

Shrubs or undershrubs. Stems and branches usually 4 angled. Leaves often unequal, toothed or sub entire, opposite, petiolate or sessile. Inflorescence axillary or terminal, bracteate heads, spikes or panicle. Calyx usually 5, deeply lobed, subequal; corolla tubular or funnel shaped, usually straight and gradually widened but sometimes strongly ventricose. Stamens 4, didynamous; capsule 2-4 seeded, oblong.

1a. Inflorescence spike secund

2a. Rachis of inflorescence strongly zigzag, rachis thin *S. helicta*

2b. Rachis of inflorescence slightly zigzag,  
rachis broadly winged *S. pterygorrhachis*

1b. Inflorescence spike dense or panicle or capitate

3a. Corolla glabrous

4a. Bracts broadly ovate, leaves pilose *S. echinata*

4b. Bracts lanceolate, leaves glabrous *S. mastersii*

3b. Corolla pubescent

- |  |                      |
|--|----------------------|
| 5a. Stamens far exserted                 | <i>S. affinis</i>    |
| 5b. Stamens included                     |                      |
| 6a. Bracts broadly ovate, leaves crenate | <i>S. recurva</i>    |
| 6b. Bracts obovate, leaves serrate       | <i>S. torrentium</i> |

***Strobilanthes affinis*** (Griff.) Terao ex J.R.I. Wood & J. R. Benn., Kew Bull., 58: 134. 2003; *Strobilanthesacrocephalus* T. And. in J. Linn. Soc. Bot. 9:473.1867; C.B. Clarke in Hook.f., Fl. Brit. Ind. 4:454. 1884; Kanjilal *et al.*, Fl. As. 3: 422. 1939; *Tarphochlamys affinis* (Griff.) Bremek. in Verh. Kon. Ned. Akad. Wet. Afd. Nat. Sect. 2. 41(1): 157. 1944; Balakr., Fl. Jowai 2: 354. 1983.

Undershrub to 60 cm tall. Stem and branches hirsute, 4 angled, reddish brown. Leaves ovate, 3-6 x 2-3.5 cm, base rounded to cuneate and decurrent onto petiole, sparsely strigose adaxially and denser abaxially, lower surface yellowish green, upper surface dark green, petiole 0.5-3 cm, secondary veins 5-7 on each side. Inflorescence axillary or terminal, dense spikes, 1.5-5cm, peduncle 0.5-2.5 cm, densely gland tipped pilose; bracts suborbicular, ovate, obovate or elliptic, ciliate at margins. Calyx 5 lobed almost to base, lobes unequal, one slightly longer than others, gland tipped pilose, ciliated margin, apex obtuse. Corolla purplish blue, ca. 2 cm, outside pilose, inside glabrous except for trichomes retaining style, tube cylindric basally and gradually widened at mouth. Stamens 4, didynamous, far exserted. Capsule oblong, hairy. Seeds brown, orbicular, pubescent.

**Fl. & Fr:** September - February

**Distribution:** India (N.E. India), Myanmar, China

**Specimen examined:** Grows along mountain slopes, thickets, along roadside. Thetsumi.

NLNU 00780. (Pl. 46)

***Strobilanthes echinata*** Nees, N. Wall., Pl. Asiat. Rar. 3: 85. 1832; Grierson & Long, Fl. Bhut. 2.3:1262. 2001; *Strobilanthes pectinatus* T. And., J. Linn. Soc., Bot. 9: 474. 1867; Kanjilal *et al.*, Fl. As. 3: 420. 1939; C. B. Clarke in Hook.f., Fl. Brit. Ind. 4:447. 1884; *Goldfussia echinata* (Nees) Balakr., Fl. Jowai 2: 355. 1983.

Shrubs, 0.5-1.5 m tall. Stem 4 angled, woody, pubescent above, glabrescent below. Leaves elliptic, ovate-lanceolate, 5-12 x 2-4 cm, acuminate apex, base cuneate and decurrent onto petiole, margin serrate, abaxially pale green, adaxially green, pilose above, softly tomentose beneath, petiole 1-4cm. Inflorescence subcapitate, peduncle short, hairy, bracts large, ovate. Calyx deeply lobed, 0.8-1.2 cm, lobes linear, pubescent. Corolla purple, 4-5 cm long, glabrous, tube basally cylindric, then gradually widened at mouth. Stamens 4, didynamous, included. Capsule glabrous.

**Fl. & Fr:** July-January

**Distribution:** India (NE India), E Himalaya, China, Myanmar, Thailand, Vietnam, Cambodia

**Specimen examined:** Grows in moist forest under the canopy of big trees. Tsupfume. NLNU 1013.

***Strobilanthes helictus*** T. Anderson, J. Linn. Soc., Bot. 9: 479.1867; C.B. Clarke in Hook.f., Fl. Brit. Ind. 4: 469. 1884; Kanjilal *et al.*, Fl. As. 3: 431. 1939; Grierson & Long, Fl. Bhut. 2.3:1272. 2001; Giri *et al.*, Mater. Fl. Ar. Pradesh 2: 255. 2008.

Undershrubs, 50-100cm. Stems 4 angled, erect, glabrous, sometimes pubescent above. Leaves nearly equal, shortly petioled, elliptic, 5-12 x 2-6 cm, adaxially dark green, abaxially paler, margin serrate, base attenuate and decurrent onto petiole, apex acuminate. Inflorescence axillary, spikes 3- 14 cm, rachis zigzag; flowers usually solitary, 0.7-1 cm

apart. Bracts linear, glabrous, persistent; calyx deeply lobed, linear, apex acuminate, unequal; corolla pale purple, glabrous, tube cylindric then abruptly widened and bent 90° below mouth. Capsule oblong, glabrous.

**Fl. & Fr:** September – February

**Distribution:** India (NE India), E Himalaya, Nepal, China, Myanmar

**Specimen examined:** Moist broad leaved forest, along shaded roadside. Pfutsero. NLNU 1015. (Pl. 46)

*Strobilanthes mastersii* T. Anderson, J. Linn. Soc. Bot. 9: 481. 1867; C. B. Clarke in Hook.f., Fl. Brit. Ind. 4: 476. 1884; Kanjilal *et al.*, Fl. As. 3: 436. 1939.

Shrub, 1-3 m tall. Stem tetraginous, sulcate, young branches glandular, hairy. Leaves ovate to ovate-lanceolate, 10-18 x 4-9 cm, acuminate apex, margin serrate, petiole 0-2cm, base rounded on apical leaves and broadly cuneate on basal leaves, base oblique. Inflorescence terminal, paniculate, upto 30 cm, densely gland tipped pilose; bracts leaflike, lanceolate. Calyx deeply divided, 5 lobed, lanceolate, apex acuminate, densely gland tipped pilose. Corolla straight, ventricose, purple-pink, glabrous outside, glabrous inside except for trichomes retaining styles. Stamens 4, didynamous, included, filaments glabrous. Style slender. Capsule clavate, tip glandular.

**Fl. & Fr:** September - February

**Distribution:** India (NE India), China, Myanmar

**Specimen examined:** Moist broad leaved forest, along shaded roadside. Tsupfume. NLNU 1014. (Pl. 46)

*Strobilanthes pterygorrhachis* C. B. Clarke, J. Linn. Soc., Bot. 25: 54. 1889.

Shrubs, 1-1.8 m tall. Stem weakly tetragonal, glabrous. Leaves ovate, 7-13 x 3-8, petiole ca. 5cm, glabrous, margin serrate, base cuneate, apex acuminate. Inflorescence

terminal or axillary, secund, spikes; rachis to 25 cm, broadly winged, bracts leaflike. Flowers usually in pairs. Calyx 5, deeply lobed, segments upto 2.5cm, narrowly lanceolate, apex aristate. Corolla ca. 3.5cm, yellow, with maroon streaks at the base, pubescent outside, glabrous inside except for trichomes retaining style, base cylindric, then abruptly widened and bent below the mouth. Ovary coma shaped.

**Fl. & Fr:** September - February

**Distribution:** India (NE India), China

**Specimen examined:** Moist forested areas, along shaded roadside. Tsupfume. NLNU 1016.  
(Pl. 46)

*Strobilanthes recurva* C.B. Clarke, J. Linn. Soc., Bot. 25: 52. 1889.

Undershrub, about 70 cm, stem and branches pubescent. Leaves ovate, 4-8 x 2.5-5 cm, petiole 0.5-4 cm, margin crenate, apex acuminate, base rounded to cuneate and decurrent onto petiole; subglabrous adaxially, pubescent abaxially, secondary veins 6-8 on each side. Inflorescence axillary or terminal, spike, upto 5 cm, densely gland tipped pilose; bracts broadly ovate, subpetiolate, persistent, ciliated, apex subacute. Calyx 5, lobed, segment linear, spatulate, pilose gland tipped. Corolla about 3 cm, almost straight, tube basally cylindrical and gradually widened at mouth, bluish-purple, hairy outside, glabrous inside except for trichome retaining style. Capsule pubescent at tip.

**Fl. & Fr:** September - February

**Distribution:** India (NE India)

**Specimen examined:** Moist forested areas, along shaded roadside. Pfutsero. NLNU 1018.  
(Pl. 46)

*Strobilanthes torrentium* Benoist, Bull. Mus. Natl. Hist. Nat. 28:188. 1922.



Undershrubs, 1-1.5 m, isophyllous or anisophyllous. Stems quadrangular, erect, pubescent. Leaves petiolate, hairy, dark green above, petiole 0.5- 4.5 cm long, margin serrate, apex acuminate, base cuneate, decurrent on petiole, secondary veins 5-7 on each side. Inflorescence axillary or terminal, capitate spikes, densely covered with trichomes. Bracts variable in size and shape, leaf like, with dense hair. Calyx 5 lobed, unequal, villous; corolla 3-4.5 cm long, pale blue or purple, pubescent outside, glabrous inside, basal cylindric then curved and widened at mouth. Stamens 4, didynamous, included, filaments pilose; ovary villous. Capsule oblong, 4 seeded.

**Fl. & Fr:** August – March

**Distribution:** India (NE India), China, Myanmar

**Specimen examined:** Moist broad leaved forest, along shaded roadside. Pfutsero. NLNU 1019. (Pl. 46)

*Thunbergia* Retz., Physiogr. Salsk. Handl. 1(3): 163. 1780

Large climbing shrubs. Leaves ovate or elliptic, base cordate or hastate, margin entire or sinuate lobed, petiolate. Flowers solitary or paired in leaf axils or in racemes with leaf like bract at base of each pedicel. Bracteoles prominent, large enclosing calyx and corolla tube. Calyx small, toothed or obscure. Corolla large, funnel shaped, lobes 5, twisted to the left in bud. Stamens 4, didynamous, inserted near the base of corolla tube. Capsule globose with conspicuous woody beak.

1a. Flowers orange-red, leaves lanceolate, 3-5 nerved

*T. coccinea*

1b. Flowers white or bluish, leaves ovate, 5-7 nerved

*T. grandiflora*

*Thunbergia coccinea* Wall.ex D. Don, Prodr. Fl. Nepal: 120. 1825; C.B. Clarke in Hook.f., Fl. Brit. Ind. 4:393. 1884; Kanjilal *et al.*, Fl. As. 3: 411. 1939; Giri *et al.*, Mater. Fl. Ar. Pradesh 2: 258. 2008; Grierson & Long, Fl. Bhut. 2.3:1248. 2001

Large climbing shrubs with long pendent branches. Leaves lanceolate, elliptic, ovate, 4-15 x 3-10 cm, base cordate to hastate, apex acute to acuminate, margin sinuate or distantly toothed, palmately 3-5 veined, glabrous. Flowers orange-red, fascicled at nodes of elongated pendulous racemes. Bracteoles falcate, dark red, pubescent. Calyx a minute rim. Corolla lobes reflexed, glabrous or pubescent. Capsule glabrous, beaked.

**Fl. & Fr:** September - April

**Distribution:** India (NE India), E & W Himalaya, China, Myanmar, Thailand, Vietnam, Nepal

**Specimen examined:** Grows on shrubs and trees in forest margins. Tsupfume. NLNU 1025.

*Thunbergia grandiflora* (Roxb. ex Rottl.) Roxb., Bot. Reg. 6: 6.1820; C.B. Clarke in Hook.f., Fl. Brit. Ind. 4:392. 1884; Kanjilal *et al.*, Fl. As. 3: 410. 1939; Giri *et al.*, Mater. Fl. Ar. Pradesh 2: 258. 2008; Grierson & Long, Fl. Bhut. 2.3:1248. 2001; Haridasan & Rao, For. Fl. Megh. 2: 670. 1987.

Large scrambling shrub. Leaves ovate to ovate-triangular, scaberulous above pubescent beneath, base cordate, hastate, or shortly cuneate, apex acute or shortly acuminate, palmately 5-7 nerved, margin subentire or angularly tooth. Flowers large, white or bluish, axillary from the uppermost leaves or in dense flowered racemes. Bracts inconspicuous; bracteoles conspicuous, elliptic apiculate. Calyx unlobed. Corolla 6-8cm long, glabrous, tube broad, lobes spreading. Capsule pubescent, beaked.

**Fl. & Fr:** August-March

**Distribution:** India (NE India), E Himalaya, China, Myanmar, Thailand, Vietnam, Nepal, Malaya

**Specimen examined:** Grows on shrubs and trees in forest margins. Tsupfume. NLNU 0081.

## VERBENACEAE

J. St. Hil., Expos. Fam. 1: 245. 1805

Herbs, shrubs or trees. Stem usually quadrangular. Leaves opposite or whorled, simple or palmately compound, sometimes lobed, stipules absent. Flowers bisexual, regular or irregular, racemes, cymes, corymbs or panicles. Calyx tubular at base, 2-6-lobed. Corolla tubular below, funnel-shaped or 2-lipped, 4-6-lobed. Stamens 4, didynamous. Ovary superior, 2-8-celled. Fruit a drupe or berry.

- 1a. Leaves palmately compound *Vitex*
- 1b. Leaves simple
  - 2a. Shrubs, undershrubs or trees; stamens exerted
    - 3a. Inflorescence terminal
      - 4a. Corolla tube short or long; limb bilabiate
        - 5a. Plant armed; corolla tube slender and long *Lantana*
        - 5b. Plant unarmed; corolla tube short *Premna*
      - 4b. Corolla with long slender tube ; limb not bilabiate
        - 6a. Leaf margin entire or undulate or dentate *Clerodendrum*
        - 6b. Leaf margin coarsely serrate *Rotheca*
    - 3b. Inflorescence axillary or axillary and terminal
      - 7a. Corolla lobes equal; stamens equal *Callicarpa*
      - 7b. Corolla lobes unequal; stamens unequal

- |                                  |                          |
|----------------------------------|--------------------------|
| 8a. Calyx saucer-shaped, unlobed | <i>Holmskioldia</i>      |
| 8b. Calyx campanulate, lobed     |                          |
| 9a. Fruit a fleshy drupe         | <i>Gmelina</i>           |
| 9b. Fruit a dry capsule          | <i>Pseudocaryopteris</i> |

***Callicarpa* L. Sp. Pl.: 111. 1753**

Trees or shrubs; branchlets stellately tomentose. Leaves opposite, rarely whorled. Flowers small in lax axillary dichotomous cymes, shorter than the leaves, usually glandular. Calyx shortly campanulate, entire or minutely 4-lobed. Corolla campanulate or tubular; lobes 4, spreading. Stamens 4, anther, exserted. Ovary 2-celled; style slender; stigma slightly bifid. Fruit a globose drupe, subtended by persistent calyx.

- |  |                   |
|--|-------------------|
| 1a. Trees; leaves entire; petioles 3-5 cm long                 | <i>C. arborea</i> |
| 1b. Shrubs; leaves serrate or crenate; petioles upto 1 cm long | <i>C. rubella</i> |

***Callicarpa arborea*** Roxb., Fl. Ind. 1: 405. 1820; C.B. Clarke in Hook.f., Fl. Brit. Ind. 4: 567. 1885; Kanjilal *et al.*, Fl. As. 3: 463. 1939; Balakr., Fl. Jowai 2: 366. 1983; Giri *et al.*, Mater. Fl. Aruna. Pradesh 2: 259. 2008; Sinha in Singh *et al.*, Fl. Mizo. 2: 280. 2012.

Trees, upto 15 m tall. Branchlets 4-angled, stellately tomentose. Leaves elliptic-lanceolate or ovate-lanceolate, 9-30 x 4-15 cm, base cuneate, apex acuminate, margins entire, glabrescent above, stellate-tomentose beneath; petioles 3-5 cm long, stellate-tomentose. Inflorescence dichotomously branched in axillary and supra-axillary cymes; peduncles 3-5 cm long. Corolla purple, 4-lobed, reflexed. Stamens 4, exserted. Drupe globose, purple.

**Fl. & Fr.:** March - December

**Distribution:** India, Bangladesh, Bhutan, China, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam

**Specimen examined:** Grows in open forests and along roadsides. Kikruma. NLNU 0463. (Pl. 47)

*Callicarpa rubella* Lindl., Bot. Reg. 11: t. 883. 1825; C.B. Clarke in Hook.f., Fl. Brit. Ind. 4: 569. 1885; Kanjilal *et al.*, Fl. As. 3: 464. 1939; Balakr., Fl. Jowai 2: 367. 1983; Giri *et al.*, Mater. Fl. Aruna. Pradesh 2: 260. 2008; Sinha in Singh *et al.*, Fl. Mizo. 2: 282. 2012.

Erect shrubs, upto 1 m tall. Stem whitish; young parts glandular-stellate pubescent. Leaves oblong-lanceolate or obovate-lanceolate, 8-16 x 2.5-4 cm, base cordate or subcordate, apex acuminate, margin crenate-serrate, pubescent above, stellate tomentose beneath; petioles 0.5-1 cm. Inflorescence in axillary cymes; peduncles 1-2 cm long. Flowers small, pinkish purple. Calyx stellate tomentose. Corolla 4-lobed. Stamens 4, inserted at base of corolla tube. Fruit a globose drupe, purple.

**Fl. & Fr.:** August - December

**Distribution:** India (NE India), E Himalaya, Bangladesh, Bhutan, China, Jawa, Laos, Myanmar, Philippines, Thailand, Vietnam

**Specimen examined:** Grows in open forests and along roadsides. Kikruma. NLNU 0465 (Pl. 47)

*Clerodendrum* L., Sp. Pl.: 637. 1753

Shrubs or trees, sometimes woody climbers. Leaves opposite or whorled, sometimes palmately lobed. Flowers in axillary or terminal cymes, corymbs or panicles. Calyx campanulate, 5-toothed or truncate, persistent, often enlarging in fruit. Corolla with long

slender tube, lobes subequal, spreading. Stamens 4, exserted; filaments filiform. Ovary 4-celled, style filiform; stigma bifid. Fruit a globose drupe.

1a. Inflorescence lax pendulous panicles; leaves elliptic-lanceolate *C. laevifolium*

1b. Inflorescences in terminal corymbs or capitate; leaves broadly ovate

2a. Panicles capitate; calyx lobes lanceolate, about 2 cm long *C. chinense*

2b. Panicles corymbose; calyx lobes ovate-lanceolate, upto 0.5 cm *C. colebrookianum*

***Clerodendrum chinense*** (Osbeck) Mabb., Plant-book, reimpr.: 707. 1989; *C. lasiocephalum* C.B. Clarke in Hook.f., Fl. Brit. Ind. 4: 594. 1885; Kanjilal *et al.*, Fl. As. 3: 489. 1939; Balakr., Fl. Jowai 2: 370. 1983; Sinha in Singh *et al.*, Fl. Mizo. 2: 288. 2012.

Shrubs, 1-3 m tall. Stem quadrangular, branchlets pubescent. Leaves broadly ovate, 7-14 x 6-11 cm, base truncate or shallowly cordate, apex acute, margin irregularly dentate, pubescent above, tomentose beneath, membranous; petioles 2.5-10 cm long, tomentose. Inflorescence terminal, compact, capitate; bracts ovate lanceolate, purplish green, pubescent. Flowers white becoming pinkish. Calyx campanulate, 5-lobed, divided nearly to base, lanceolate, pubescent, purple or red. Corolla tube slender, glabrous, funnel-form, 5-lobed, lobes oblong or obovate. Stamens 4, didynamous, far exserted. Drupe globose, purple or dark red.

**Fl. & Fr.:** April - August

**Distribution:** India (NE India), E Himalaya, Bhutan, China, Jawa, Myanmar, Nepal, Philippines, Thailand, Vietnam

**Specimen examined:** Grows in open forests and along roadsides. Chizami. NLNU0563. (Pl. 47)

***Clerodendrum colebrookianum*** Walp., Repert. Bot. Syst. 4: 114. 1845; C.B. Clarke in Hook.f., Fl. Brit. Ind. 4: 594. 1885; Kanjilal *et al.*, Fl. As. 3: 488. 1939; Balakr., Fl. Jowai 2: 370. 1983; Sinha in Singh *et al.*, Fl. Mizo. 2: 286. 2012.

Shrubs, upto 5 m tall, with foetid smell. Stem quadrangular, young branchlets pubescent. Leaves opposite, clustered at tip of branches, broadly ovate, 8-20 x 5-14 cm, base subcordate, apex acute, margins entire, glabrous, pubescent on veins beneath; petioles 4-9 cm long, with glands at apex. Inflorescence in terminal compact corymbose panicles; peduncles 5-20 cm long, pubescent. Bracts ovate. Calyx campanulate, pubescent, lobes ovate-lanceolate, becoming scarlet in fruit. Corolla white, tube slender, pubescent, lobes oblong, spreading. Stamens 4, didynamous, far exserted. Drupe globose, bluish-green.

**Fl. & Fr.:** August - November

**Distribution:** India (NE India), E Himalaya, Bangladesh, Bhutan, China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in open forests and in disturbed areas. Chizami. NLNU 0557.

**(Pl. 47)**

***Clerodendrum laevifolium*** Blume, Bijdr. Fl. Ned. Ind.: 808. 1826; *C. wallichii* Merr., J. Arn. Arbor. 33: 220. 1952; Balakr., Fl. Jowai 2: 369. 1983; Sinha in Singh *et al.*, Fl. Mizo. 2: 290. 2012; *C. nutans* Wall. ex D. Don, Prodr. Fl. Nepal.: 103. 1825; C.B. Clarke in Hook.f., Fl. Brit. Ind. 4: 591. 1885; Kanjilal *et al.*, Fl. As. 3: 491. 1939.

Shrubs, upto 3 m tall. Stems quadrangular, glabrous, nodes hairy. Leaves opposite, decussate, oblong-lanceolate or oblanceolate, 6-20 x 2-4 cm, apex acuminate, base cuneate, margin entire or undulate, glabrous; petioles 0.4-1.7 cm long. Inflorescence in terminal lax pendulous, panicles; bracts linear-lanceolate, acuminate; pedicels 1-2 cm long. Calyx ovate,

divided nearly to base, acute, greenish white. Corolla white, tube narrow, lobes obovate, obtuse, glabrous. Stamens 4, far exserted. Drupe globose, dark purple.

**Fl. & Fr.:** August - November

**Distribution:** India, Bhutan, China, Myanmar, Nepal, Pakistan, Thailand, Vietnam

**Specimen examined:** Grows in forests and forest edges. Lozaphuhu. NLNU 0473. (Pl. 47)

*Gmelina* L., Sp. Pl. 2: 626. 1753

Trees or shrubs. Branchlets tomentose. Leaves opposite, simple, with gland at the base, mealy. Inflorescence in axillary and terminal racemiform panicles. Calyx funnel-shaped, persistent, limb 5-toothed. Corolla tubular at base, limb oblique, 5-lobed, with enlarged lower lobe forming a lip, other lobes shorter, reflexed. Stamens 4, in 2 pairs, anthers exserted. Ovary 4-celled; style slender; stigma unequally 2-lobed or unlobed. Fruit a fleshy drupe, subtended by persistent calyx.

*Gmelina arborea* Roxb. ex Sm., A. Rees, Cycl. 16:n. 4. 1810; C.B. Clarke in Hook.f., Fl. Brit. Ind. 4: 581. 1885; Kanjilal *et al.*, Fl. As. 3: 466. 1939; Grierson & Long, Fl. Bhut. 2.2: 928. 1999; Sinha in Singh *et al.*, Fl. Mizo. 2: 293. 2012.

Deciduous trees, upto 25 m tall. Branches spreading, branchlets quadrangular, tomentose; bark ashy or grey, with warty lenticular tubercles. Leaves broadly ovate, 6-18 x 5.5-15 cm, apex acute or acuminate, base truncate or shallowly cordate, with 2 glands at the junction of petiole, glabrous above, tomentose beneath, lateral nerves 6-10 pairs; petioles 2-9 cm long. Inflorescence in axillary or terminal panicles. Flowers yellow; bracts linear-lanceolate. Calyx tomentose, tube funnel-shaped, 5-toothed. Corolla infundibular, pubescent, tube short, limb oblique with 5 unequal lobes. Stamens 4, didynamous. Style slender; stigma unequally bifid, curved at the apex. Drupe obovate, with persistent calyx.



**Fl. & Fr.:** March - May

**Distribution:** India, Bhutan, China, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, Vietnam

**Specimen examined:** Grows in primary and secondary forests. Chozuba. NLNU 0327. (Pl. 47)

*Holmskioldia* Retz., Observ. Bot. 6: 31. 1791

Shrubs. Leaves opposite, simple. Inflorescence in axillary and terminal racemes. Calyx showy, broadly saucer-shaped, unlobed. Corolla narrowly funnel-shaped, curved, limb 5-lobed, lower lip longer. Stamens 4, in 2 pairs, anthers exserted. Ovary 4-celled; styles equalling stamens, stigma bifid. Fruit a drupe, 4-lobed, separating when ripe into 1-seeded part, subtended by enlarged showy calyx

*Holmskioldia sanguinea* Retz., Observ. Bot. 6: 31. 1791; C.B. Clarke in Hook.f., Fl. Brit. Ind. 4: 596. 1885; Kanjilal *et al.*, Fl. As. 3: 493. 1939; Balakr., Fl. Jowai 2: 371. 1983; Grierson & Long, Fl. Bhut. 2.2: 935. 1999.

Straggling woody shrubs, upto 5 m tall. Branches quadrangular, sparsely pubescent, pendent. Leaves opposite, ovate, 3.4-10 x 2-6 cm, base truncate or rounded, apex acuminate, margin entire, pubescent on nerves and gland dotted beneath; petioles 1-3 cm long. Inflorescence in axillary cymes; peduncle glandular hairy. Flowers scarlet-red. Calyx broad cup-shaped, 2-2.5 cm across, bright crimson. Corolla tube about 2 cm long, slightly curved, glandular pubescent, unequally 5-lobed. Stamens 4, didynamous. Stigma bifid. Drupe obovoid, 4-lobed, subtended by persistent calyx.

**Fl. & Fr.:** October - March

**Distribution:** India (NE India), E & W Himalayas, Myanmar, Nepal

**Specimen examined:** Grows on slopes in open forests. Kikrumba. NLNU 0467.

***Lantana* L., Sp. Pl. 627. 1753**

Shrubs, usually armed with hooked prickles. Leaves opposite, simple, often rugose. Flowers sessile in dense axillary bracteate spikes or heads. Calyx tubular, 2-lobed. Corolla tube long cylindrical, 4-5-lobed. Ovary 2-celled; style short; stigma bilobed. Fruit a fleshy drupe.

***Lantana camara* L., Sp. Pl. 627. 1753; C.B. Clarke in Hook.f., Fl. Brit. Ind. 4: 562. 1885; Sinha in Sinha *et al.*, Fl. Mizo 2: 294. 2012; *L. aculeata* L., Sp. Pl. 627. 1753; Kanjilal *et al.*, Fl. As. 3: 460. 1939.**

Shrubs, upto 1.5 m tall. Stems pubescent with curved prickles. Leaves ovate, 2-7 x 2-4 cm, base cuneate, rounded or cordate, apex acute, margins crenate dentate, scabrous above, pubescent beneath. Flowers in pseudumbellate or subumbellate spikes; peduncles 2-6 cm. Corolla tubular, 4-5-lobed, orange or purple or yellow, fragrant. Stamens 4 in 2 pairs. Drupe globose, black when ripened.

**Fl. & Fr.:** Throughout the year

**Distribution:** Native of tropical America, naturalized in India

**Specimen examined:** Grows in wastelands, roadsides and grown as hedge plant. Kikrumba. NLNU 0469.

***Premna* L., Mant. Pl. 2: 154. 1771**

Shrubs, subshrubs, or trees. Stem erect or rarely climbing. Leaves opposite, simple. Inflorescence in terminal spike-like thyrses or panicles, cymes, paniculate corymbs. Calyx campanulate or funnelshaped, 2-5 teeth, equal, bilabiate. Corolla tubular, tube short, bilabiate, 4-5-lobed. Stamens 4, didynamous, exserted. Ovary 2-4-celled; ovules 2 in each cell; style slender; stigma bifid. Fruit a drupe; 1-4 seeded.

***Premna pinguis*** C.B. Clarke in Hook.f., Fl. Brit. Ind. 4: 579. 1885; Kanjilal *et al.*, Fl. As. 3: 477. 1939; Haridasan & Rao, For. Fl. Megh. 2: 685. 1987.

Shrubs or undershrubs, upto 3 m tall. Leaves ovate, or orbicular, 5-15 x 3-8 cm, bases sub-cordate or rounded, apex acuminate, pubescent beneath and on nerves above, margin serrate, basal nerves 3-5; petioles 1-3 cm long. Inflorescence in terminal corymbs, pubescent. Bracts linear-lanceolate. Calyx funnel-shaped, shortly 5-lobed, pubescent. Corolla greenish white, subequally 5-lobed, pubescent, lobes oblong. Stamens 4, exserted. Drupes obovoid, reddish-brown.

**Fl. & Fr.:** April - July

**Distribution:** India (NE India), Bangladesh, Jawa, Myanmar,

**Specimen examined:** Grows in open forests, along roadsides. Chozuba. NLNU 0351.

***Pseudocaryopteris*** (Briq.) P.D.Cantino, Syst. Bot. 23: 380. 1999

Erect or rambling shrubs, aromatic. Leaves opposite. Flowers in terminal and axillary panicles, shortly pedicellate in dense cymes. Calyx tubular at base, divided to middle into 5-teeth. Corolla tube short, 5-lobed, shortly bilobed. Stamens 4, didynamous, exserted. Style slender; stigma bifid. Fruit a dry capsule.

***Pseudocaryopteris foetida*** (C.B. Clarke) P.D. Cantino, Syst. Bot. 23: 381. 1998; *Caryopteris foetida* (D.Don) Thell., Viert. Naturf. Ges. Zurich 64: 782. 1919; Balakr., Fl. Jowai 2: 366. 1983; Giri *et al.*, Mater. Fl. Aruna. Pradesh 2: 261. 2008; *C.grata* (Schauer) Benth. Gen. Pl. 2: 1158. 1876; C.B. Clarke in Hook.f., Fl. Brit. Ind. 4: 597. 1885.

Rambling shrubs, upto 3 m tall. Branchlets puberulous. Leaves opposite, elliptic-lanceolate, 7-12 x 2.5-5 cm, base rhomboid-rounded, apex acuminate, margin serrate or denticulate; petioles upto 1 cm. Inflorescence in axillary, corymbose cymes, tomentose.

Calyx pubescent, cup-shaped, teeth small. Corolla pale purple or white, glandular pubescent.

Capsule globose, finely ribbed.

**Fl. & Fr.:** May - October

**Distribution:** India (throughout), Nepal, Pakistan

**Specimen examined:** Grows in open forests and along roadsides. Mesulumi. NLNU 0448.

(Pl. 48)

*Rothea* Raf., Novon 8: 206. 1998

Description similar to that of *Clerodendrum* sp.

*Rothea serrata* (L.) Steane & Mabb., Novon 8: 206. 1998; *Clerodendrum serratum* (L.) Spreng. Syst. 2: 758. 1825; C.B. Clarke in Hook.f., Fl. Brit. Ind. 4: 592. 1885; Kanjilal *et al.*, Fl. As. 3: 490. 1939; Balakr., Fl. Jowai 2: 370. 1983; Sinha in Singh *et al.*, Fl. Mizo. 2: 289. 2012.

Shrubs, upto 2 m tall. Stem quadrangular, glabrous at maturity. Leaves opposite, ovate or oblong-ovate, 6-23 x 4-12 cm, base cuneate or attenuate, apex acuminate, margin coarsely serrate, glabrescent; petioles 0.5-2 cm. Inflorescence in terminal erect panicles, upto 25 cm long. Flowers pale blue or greenish white, bracts ovate, serrate along margins. Calyx cup-shaped, shallowly toothed, acute, pubescent. Corolla bilabiate, greenish white or creamish, lip pale blue or light purple, hairy inside, lobes obovate, obtuse. Stamens 4, didynamous, far exserted. Drupes obovoid, black when ripe.

**Fl. & Fr.:** May - October

**Distribution:** India, Bhutan, China, Jawa, Myanmar, Nepal, Pakistan, Thailand, Vietnam

**Specimen examined:** Grows in open forests and along roadsides. Wazeho. NLNU 0642.

(Pl. 48)

*Vitex* L., Sp. Pl.: 638. 1753

Shrubs or trees. Leaves opposite, palmately 3-7-foliolate. Flowers in sessile or pedunculate cymes forming terminal and axillary panicles or corymbs. Calyx campanulate, shortly 5-toothed. Corolla tubular at base, limb 5-lobed, upper lip 2-lobed, lower lip 3-lobed, central lobe largest. Stamens 4, in 2 pairs. Ovary 2-4-celled; style filiform, stigma bifid. Fruit a drupe, subtended by persistent calyx.

*Vitex quinata* (Lour.) F.N. Williams, Bull. Herb. Boissier, ser. 2. 5: 431. 1905; Kanjilal *et al.*, Fl. As. 3: 482. 1939; Grierson & Long, Fl. Bhut. 2.2: 926. 1999; Sinha in Singh *et al.*, Fl. Mizo. 2: 307. 2012; *V. heterophylla* Roxb., Fl. Ind. ed. 3: 75. 1832; C.B. Clarke in Hook.f., Fl. Brit. Ind. 4: 585. 1885.

Trees, 6-10 m tall. Bark grey, corky, reticulately fissured. Branchlets quadrangular. Leaves 3-5 foliolate; leaflets elliptic-oblong to lanceolate, 6-13 x 2-5 cm, base cuneate, apex acuminate, glabrous or sparsely pubescent beneath with yellow gland dots; petioles 3-10 cm long, petiolules 0.5-3 cm. Inflorescence in terminal and axillary dense flowered panicle cymes, upto 25 cm long. Peduncle minutely puberulous. Bracts lanceolate. Calyx campanulate, 5-toothed, pubescent glandular. Corolla pinkish blue, lower middle lip with yellow blotch towards base, puberulous and glandular outside, hairy in throat. Stamens 4, didynamous. Drupes globose, subtended by persistent calyx.

**Fl. & Fr.:** May - September

**Distribution:** India, Bangladesh, Bhutan, China, Myanmar, Tropical and Subtropical Asia

**Specimen examined:** Grows in primary and secondary forest. Sakraba. NLNU 0727. (Pl. 48)

## LAMIACEAE

Martinov, Tekhno-Bot. Slovar 355. 1820

Herbs, shrubs or subshrubs, often aromatic. Stems usually quadrangular. Leaves simple or occasionally pinnately compound, opposite or rarely whorled; stipules absent. Inflorescence compact cymes, axillary, verticillasters, 2-many flowered, subtended by leaves or bracts. Flowers bisexual, zygomorphic, mostly bracteate. Calyx persistent, 5-lobed, bilabiate to regular or oblique. Corolla gamopetalous, usually zygomorphic, 4-5-lobed, usually bilabiate. Stamens epipetalous, 4, didynamous, or only 2 perfect. Ovary superior, 4-lobed; stigma usually bifid. Fruit usually of 4 dry nutlets.

1a. Calyx regular

2a. Verticillasters closely packed

3a. Stem swollen at or above nodes; filaments hairy at middle *Pogostemon*

3b. Stem not swollen; filaments smooth *Elsholtzia*

2b. Verticillasters arranged in distant spikes

4a. Upper lip of corolla hooded villous *Leucas*

4b. Upper lip of corolla hooded, not villous

5a. Nutlets thick or fleshy *Gomphostemma*

5b. Nutlets dry, neither flat nor fleshy

6a. Nutlets subglobose *Craniotome*

6b. Nutlets ellipsoid *Colquhounia*

1b. Calyx bilabiate

7a. Inflorescence terminal *Leucosceptrum*

7b. Inflorescence axillary and terminal

8a. Anthers 2-celled; nutlets globose *Perilla*

8b. Anthers 1-celled or 2-celled; nutlets small, oblong or ovoid

9a. Calyx lips entire, upper lip with a broad plate *Scutellaria*

9b. Calyx upper lip 3-toothed; corolla lower lip concave *Isodon*

***Colquhounia*** Wall., Trans. Linn. Soc. London 13: 608. 1822

Tall, rambling shrub. Stem terete, densely tomentose. Leaves with simple or stellate hairs. Inflorescence verticillasters in axils of upper leaves, sometimes crowded and forming a short terminal spike. Calyx tubular, campanulate, 5-toothed, pubescent. Corolla bilabiate, tube curved, broad at throat, upper lip entire, lower lip 3-lobed. Stamens 4. Fruit a nutlet.

***Colquhounia coccinea*** Wall., Trans. Linn. Soc. London 13: 608. 1822; Hook.f., Fl. Brit. Ind. 4: 674. 1885; Kanjilal *et al.*, Fl. As. 3: 522. 1939; Balakr., Fl. Jowai 2: 382. 1983; Sinha in Singh *et al.*, Fl. Mizo. 2: 315. 2012.

Rambling shrub, upto 3 m tall. Stem terete, tomentose, with white stellate hairs. Leaves opposite, ovate, 3-8 x 2-5.5 cm, apex acute, base rounded, margins dentate-crenate, stellately tomentose above, densely stellately white tomentose beneath; petioles 0.4-2 cm long. Inflorescence verticillasters in axillary and terminal subcapitate racemes. Bracts ovate-lanceolate. Calyx campanulate, stellately white tomentose, 5-toothed, triangular. Corolla orange-red, pubescent. Nutlets ovoid.

**Fl. & Fr.:** August - March

**Distribution:** India (NE India), E Himalaya, Bhutan, China, Myanmar, Nepal, Thailand

**Specimen examined:** Grows in open forests and along roadsides. Tsupfume. NLNU 1003.

**(Pl. 48)**

***Craniotome*** Rchb., Iconogr. Bot. Exot. 1: 39. 1825

Erect perennial herbs, pubescent. Leaves petiolate, villous. Inflorescence in axillary or terminal pedunculate cymes, many flowered. Calyx campanulate, globose in fruit, 5-toothed. Corolla bilabiate; upper lip entire, lower lip 3-lobed, spreading. Stamens 4. Style bifid. Fruit a globose nutlet.

***Craniotome furcata*** (Link) Kuntze; Revis. Gen. Pl. 2: 516. 1891; Balakr., Fl. Jowai 2: 383. 1983; Sinha in Singh *et al.*, Fl. Mizo. 2: 317. 2012; *Ajuga furcata* Link, Enum. Hort. Berol. Alt. 2: 99. 1822; *C. versicolor* Rchb., Iconogr. Bot. Exot. 1: 39. 1825; Hook.f., Fl. Brit. Ind. 671. 1885; Kanjilal *et al.*, Fl. As. 3: 520. 1939.

Softly hirsute perennial plants; 30-150 cm tall. Stem erect, terete. Leaves broadly ovate, 3-9 x 2-6 cm, base cordate, apex acute to acuminate, margin crenate-dentate, densely hirsute on both sides; petioles 1-4 cm. Inflorescence verticillasters in terminal or in axillary paniculate cymes. Bracts subulate. Calyx 5-toothed, densely hirsute. Corolla white or pale purple or pink, tube exserted, upper lip hooded. Nutlets subglobose, minute.

**Fl. & Fr.:** August - November

**Distribution:** India (throughout), E & W Himalaya, Bhutan, China, Myanmar, Nepal, Vietnam

**Specimen examined:** Grows in open forests and along roadsides. Razeba. NLNU 0179. (Pl. 48)

***Elsholtzia*** Willd., Bot. Mag. (Romer & Usteri) 4.11:3. 1790

Herbs, subshrubs or shrubs, often aromatic. Leaves petiolate or subsessile. Inflorescence axillary and terminal, crowded into simple or paniced spikes. Flowers small. Bracts linear, minute. Calyx 5-toothed, often enlarged in fruit. Corolla tube straight or



incurved, bilipped, upper lip entire or emarginated, lower lip 3-lobed. Stamens 4, didynamous. Style subequally 2-lobed. Nutlets ovoid, smooth or tubercled.

1a. Leaves lanceolate; flowers creamy white *E. blanda*

1b. Leaves broadly-ovate; flowers yellow *E. flava*

***Elsholtzia blanda***(Benth.) Benth., Labiat. Gen. Spec.: 162. 1833; Hook.f., Fl. Brit. Ind. 643. 1885; Kanjilal *et al.*, Fl. As. 3: 516. 1939; Balakr., Fl. Jowai 2: 379. 1983; *Aphanochilus blandus* Benth., Wall. Pl. Asiat. Rar. 1: 29. 1830.

Erect herbs, 70-150 cm tall. Branches quadrangular, pubescent. Leaves lanceolate to elliptic lanceolate, 3.5-13 x 0.8-2.5 cm, base cuneate to attenuate, apex acuminate, membranous, puberulous above, gland dotted beneath; petioles 0.2-1.3 cm. Verticillasters in terminal or axillary paniculate spikes. Bracts lanceolate, shorter than flowers. Calyx urceolate. Corolla creamy white, lobes pubescent. Nutlets ellipsoid, smooth.

**Fl. & Fr.:** September - February

**Distribution:** India (NE India), E Himalaya, Bhutan, China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in open forests and along roadsides. Tsupfume. NLNU 1022.

***Elsholtzia flava*** (Benth.) Benth., Labiat. Gen. Spec.: 161. 1833; Hook.f., Fl. Brit. Ind. 642. 1885; Kanjilal *et al.*, Fl. As. 3: 515. 1939; Grierson & Long, Fl. Bhut. 2.2: 980. 1999.

Erect shrubs, 60-200 cm. Branchlets quadrangular, pubescent. Leaves broadly ovate, 7-15 x 4-8 cm, base rounded to shallowly cordate, apex caudate-acuminate, margin crenate-serrate, glabrous above, pubescent beneath; petioles 2.5-6 cm. Inflorescence dense in axillary

and terminal verticillasters spikes. Bracts ovate-acuminate. Calyx tubular, 5-toothed. Corolla yellow, tube twice as long as the calyx, funnellform. Nutlets ellipsoid.

**Fl. & Fr.:** September - November

**Distribution:** India (NE India), E & W Himalaya, Bhutan, China, Myanmar, Nepal

**Specimen examined:** Grows in open forests and along roadsides. Tsupfume. NLNU 1026.

**(Pl. 48)**

*Gomphostemma* Wall.ex Benth., Edwards Bot. Reg. 15:t. 1292. 1830

Perennial herbs or under-shrubs, roots sometimes with tubers. Stem stellately pubescent. Leaves simple, opposite. Inflorescence axillary, few-many flowered in spikes. Calyx tubular, 5-toothed. Corolla bilabiate, tube long, slender, upper lip entire or emarginated, lower lip broadly 3-lobed. Stamens 4, anterior pair longer, included or exserted. Nutlets drupaceous, glabrous or pubescent.

*Gomphostemma strobilinum* Wall. ex Benth., Pl. Asiat. Rar. 2: 12. 1830; Hook.f., Fl. Brit. Ind. 4: 696. 1885; *G. wallichii* Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 59: 314. 1890; Sinha in Singh *et al.*, Fl. Mizo. 2: 324. 2012.

Undershrubs, 50-100 cm tall. Stem tomentose. Leaves elliptic-ovate, 6-15 x 3-8 cm, apex acute, base cuneate, scabrid above, densely tomentose beneath, margin crenate-serrate; petioles 0.4-6 cm long. Inflorescence a dense terminal tomentose spikes, 8-10 cm long; bracts broadly elliptic-ovate, smaller upwards, minutely serrate. Calyx stellate tomentose, tubular, lobes triangular, lanceolate. Corolla yellow, 2.5-3 cm long, tube slender, throat dilated, stellately pubescent outside. Stamens 4. Nutlets rugose.

**Fl. & Fr.:** August - November

**Distribution:** India (NE India), China, Myanmar, Thailand

**Specimen examined:** Grows in dense secondary forest. Thetsumi. NLNU 0781.

*Isodon* (Schrader ex Benth.) Spach, Hist. Nat. Veg. 9: 162. 1838

Herbs, subshrubs or shrubs. Leaves petiolate. Inflorescence terminal and axillary, in lax paniculate cymes or spikes. Calyx tubular or campanulate, 5-lobed or bilabiate with upper lip 3-toothed. Corolla bilabiate, tube exserted, upper lip 4-lobed, usually recurved, lower lip concave. Stamens 4, declinate. Style 2-lobed. Fruit a nutlet, oblong or ovoid.

1a. Calyx tube green, pubescent; corolla white with purple spots *I. lophanthoides*

1b. Calyx tube dark purple, densely woolly; corolla purplish-blue *I. coetsa*

*Isodon lophanthoides* (Buch.-Ham. ex D. Don) H. Hara, J. Jap. Bot. 60: 235. 1985; Sinha in Singh *et al.*, Fl. Mizo. 2: 329. 2012; *Plectranthus striatus* Benth., Pl. Asiat. Rar. 2: 17. 1830; Hook. f., Fl. Brit. Ind. 4: 618. 1885; Kanjilal *et al.*, Fl. As. 3: 507. 1939.

Herbs, often shrubby, 30-150 cm. Stem slender, quadrangular, pubescent. Leaves ovate, 2.5-8 x 1-4 cm, apex acute to caudate-acuminate, base cuneate or attenuate, margin crenate-serrate, villous on both surface, lateral nerves 6-7 pairs; petioles 0.3-2 cm. Inflorescence verticillasters in axillary or terminal panicle cymes. Calyx bilabiate, campanulate, upper lip teeth oblong-obtuse, lower lip teeth rounded, enlarging in fruit. Corolla white with purple spots on lobes, upper lip recurved, lower lip longer. Stamens exserted. Nutlets oblong.

**Fl. & Fr.:** September - February

**Distribution:** India, Himalayas, Bhutan, China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in streamsides, forest edges, thickets. Razeba. NLNU 1051.

*Isodon coetsa* (Buch.-Ham. ex D. Don)) Kudo, Mem. Fac. Sci. Taihoku Imp. Univ. 2: 131. 1929; Sinha in Singh *et al.*, Fl. Mizo. 2: 327. 2012; *Plectranthus coetsa* Buch.-Ham. ex D. Don, Prodr. Fl. Nepal.: 117. 1825; Hook.f., Fl. Brit. Ind. 4: 619. 1885; Kanjilal *et al.*, Fl. As. 3: 507. 1939.

Perennial herbs or subshrub. Stem erect, 1-2 m tall; branches quadrangular, densely pubescent. Leaves ovate, 2.5-5 x 1.5-2.5 cm, base cuneate, apex acuminate, margins crenate-serrate, upper surface pilose, lower surface pilose with glandular hairs; petioles 0.4-1.5 cm. Inflorescences terminal and axillary, paniculate cymes, pubescent. Bracts leaf-like in lower part, upper ones ovate, sessile. Calyx deep purple, tubular-campanulate, bilabiate, densely pubescent with glandular hairs. Corolla purple or blue, 0.6-1 cm, tubular, lower lip boat shape, upper lip reflexed, hairy outside. Stamens almost equaling lower lip. Nutlets ellipsoid.

**Fl. & Fr.:** September - February

**Distribution:** India, Himalayas, Bhutan, China, Myanmar, Nepal, Philippines, Thailand, Vietnam

**Specimen examined:** Grows in streamsides, forests edges, thickets. Razeba. NLNU 1053.

*Leucas* R. Br., Prodr. Fl. Nov. Holland.: 504. 1810

Herbs or subshrubs. Leaves sessile or shortly petiolate, entire or serrate. Inflorescences of few to many flowered verticillasters, crowded or widely spaced. Bracts ovate-lanceolate to subulate. Calyx tubular, 10-nerved, straight or curved, 8-10 toothed. Corolla bilabiate, upper lip entire, densely hirsute on outside; lower lip 3-lobed, longer than upper lip. Stamens 4. Style bifid. Nutlets oblong, trigonous.

*Leucas ciliata* Benth., Wall. Pl. Asiat. Rar. 1: 61. 1830; Hook.f., Fl. Brit. Ind. 4: 687. 1885; Kanjilal *et al.*, Fl. As. 3: 525. 1939; Sinha in Singh *et al.*, Fl. Mizo. 2: 332. 2012.

Annual herbs, with decumbent branches, 30-90 cm. Stem quadrangular, hirsute. Leaves elliptic-lanceolate or ovate, 3-7 x 0.5-2 cm, base cuneate, apex acute, margins distantly serrate, pubescent on both surfaces; petioles 0.4-0.6 cm. Inflorescences verticillasters in axillary and terminal, globose heads. Bracts linear, bristly. Calyx tubular, with ring of hairs at mouth, teeth 10, linear-lanceolate, spinulose. Corolla white, upper lip densely yellow brown hirsute. Nutlets oblong, brown.

**Fl. & Fr.:** June - November

**Distribution:** India(throughout), E & W Himalaya, Bangladesh, Bhutan, China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in grasslands, roadsides, fields. Kapamodzu. NLNU 0295

*Leucosceptrum* Sm., Exot. Bot. 2: 113. 1806

Shrubs or small trees. Bark smooth, stellate tomentose. Leaves petiolate. Inflorescence verticillasters in dense cylindrical terminal spikes. Bracts caducous. Calyx campanulate, densely tomentose, 5-toothed, subequal. Corolla bilabiate, 5-lobed. Stamens 4, exserted, anterior pair longer. Style slender, stigma bifid. Nutlets oblong, triquetrous.

*Leucosceptrum canum* Sm., Exot. Bot. 2: 113. 1806; Hook.f., Fl. Brit. Ind. 4: 699. 1885; Kanjilal *et al.*, Fl. As. 3: 529.1939; Balakr., Fl. Jowai 2: 374. 1983; Sinha in Singh *et al.*, Fl. Mizo. 2: 333. 2012.

Shrub or small tree, 3-10 m tall. Stems white tomentose. Leaves elliptic-lanceolate, 10-19 x 3-6 cm, base cuneate, apex acuminate, margin subentire to crenate-serrate, coriaceous, glabrous above, white tomentose beneath; petioles 1-3 cm. Inflorescence terminal, dense tomentose cylindrical spikes, 8-14 cm long. Bracts broadly ovate, densely

tomentose. Calyx campanulate, white tomentose; teeth triangular. Corolla creamy white, 0.8-1 cm, tubular. Stamens 4, pinkish, exserted. Nutlets trogonous.

**Fl. & Fr.:** May - January

**Distribution:** India (NE India), E & W Himalaya, Bhutan, China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in forests margins, open areas. Tsupfume. NLNU 1028. **(Pl. 49)**

*Perilla* L., Gen. Pl. ed. 6: 578. 1764

Annual herbs, aromatic. Stem erect, with simple glandular hairs. Leaves petiolate, crenate to serrate. Inflorescence verticillasters 2-flowered in terminal and axillary dense spikes. Calyx campanulate, 5-lobed persistent, enlarging in fruit. Corolla campanulate, 5-lobed, throat villous. Stamens 4, subequal. Style equally bifid. Nutlets subglobose.

*Perilla frutescens* (L.) Britton, Mem. Torrey Bot. Club 5: 277. 1894; Sinha in Singh *et al.*, Fl. Mizo. 2: 341. 2012; *Ocimum frutescens* L., Sp. Pl.: 597. 1753; *P. ocymoides* L., Gen. Pl. ed. 6: 578. 1764; Hook.f., Fl. Brit. Ind. 4: 646. 1885; Kanjilal *et al.*, Fl. As. 3: 516. 1939.

Erect herbs, 40-150 cm tall. Stem grooved, pilose. Leaves ovate, 5-11 x 3.5-8 cm, base broadly cuneate to rounded, apex acuminate, margins crenate-serrate, pilose above, villous beneath; petioles 2-2.5 cm, subulate. Inflorescence densely villous verticillasters, in terminal and axillary spicate racemes. Calyx campanulate, villous. Corolla white, slightly hairy. Nutlets globose, brown or grey.

**Fl. & Fr.:** August - November

**Distribution:** India (throughout), E & W Himalaya, Bhutan, China, Japan, Korea, Laos, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Cultivated. Tsupfume. NLNU 1029.

***Pogostemon*** Desf., Mem. Mus. Hist. Nat. 2: 154. 1815

Herbs or subshrubs. Stems often swollen at or above nodes. Leaves opposite, petiolate or subsessile. Inflorescence spike-like, solitary or terminal and axillary, whorls continuous or distant. Bracts persistent. Calyx regular, 5-toothed. Corolla nearly bilabiate, upper lip 3-lobed, lower lip entire. Stamens 4, exserted, filaments hairy at middle. Style 2-lobed, lobes subulate. Nutlets ovoid or subglobose.

1a. Herbs, upto 1 m tall; flower white; calyx teeth about 0.3 cm *P. amaranthoides*

1b. Shrubs, 1-3 m tall; flowers purplish pink; calyx teeth more  
than 0.3 cm *P. elsholtzioides*

***Pogostemon amaranthoides*** Benth., DC. Prodr. 12: 153. 1848; Hook.f., Fl. Brit. Ind. 4: 634. 1885; Sinha in Singh *et al.*, Fl. Mizo. 2: 342. 2012.

Erect herbs, 50-90 cm tall. Stems minutely pubescent when young, otherwise glabrous, swollen at internodes. Leaves opposite, ovate to lanceolate, 5-15 x 3-5 cm, base cuneate, apex acuminate, margins irregularly serrate, sparsely pilose on lower surface with numerous minute glands; petioles 3-6 cm long. Inflorescence verticillasters in terminal and axillary paniced spikes, 4-11 cm, whorls distant, many flowered. Bracts elliptic. Calyx margin pubescent, teeth triangular. Corolla white, lobes acute or obtuse. Stamens exserted, filaments pale purple, straight. Nutlets ovoid.

**Fl. & Fr.:** September - November

**Distribution:** India (NE India), Himalayas, Bhutan, Myanmar, Nepal

**Specimen examined:** Grows in mixed open forest. Tsupfume. NLNU 1031.

***Pogostemon elsholtzioides*** Benth., DC. Prodr. 12: 153. 1848; Hook.f., Fl. Brit. Ind. 4: 634. 1885; Kanjilal *et al.*, Fl. As. 3: 511.1939; Sinha in Singh *et al.*, Fl. Mizo. 2: 346. 2012.

Erect undershrubs, 1-3 m tall. Branchlets pubescent. Leaves opposite, lanceolate, 3-12 x 1-3 cm, base cuneate, apex acuminate, margins serrate to serrulate, sparsely pilose on both surfaces; petioles 0.3-1 cm. Verticillasters in slender, panicled spikes, subsecund, many flowered. Bracts minute, tomentose. Calyx tubular, lobes acute. Corolla purple, lobes ovate. Stamens exserted, filaments hairy, purple, anthers yellow. Style bifid. Mature nutlets not seen.

**Fl. & Fr.:** October - November

**Distribution:** Northeast India, East Himalaya, Bhutan, Tibet

**Specimen examined:** Grows in mixed open forest, roadsides. Mesulumi. NLNU 0447. **(Pl. 49)**

***Scutellaria*** L., Sp. Pl. 2: 598. 1753

Herbs or subshrubs. Leaves sessile or petiolate. Inflorescence terminal or axillary racemes or spikes. Calyx bilabiate, closed in fruit, upper lip with a pouch like scale, deciduous. Corolla bilabiate, tube long and curved near base so that upper corolla held erect; upper lip entire or notched, lower 3-lobed. Stamens 4, didynamous. Style bifid. Nutlets globose.

1a. Leaves grouped at base of stem, dull purple; flower purple *S. discolor*

1b. Leaves arranged along the stem, green; flower violet-blue *S. violacea*

***Scutellaria discolor*** Wall. ex Benth., Wall. Pl. Asiat. Rar. 1: 66. 1830; Hook.f., Fl. Brit. Ind. 4: 667. 1885; Kanjilal *et al.*, Fl. As. 3: 519.1939; Balakr., Fl. Jowai 2: 375. 1983; Sinha in Singh *et al.*, Fl. Mizo. 2: 353. 2012.



Annual herbs, 10-45 cm. Stem tomentose. Leaves mostly radical or sub-radical, elliptic to suborbicular, 2-7 x 1.5-4.5 cm, base cordate, apex obtuse, margins crenate, pubescent on both surface but more on nerves beneath; petioles 1-3 cm. Verticillasters lax in terminal, simple long racemes, 6-14 cm long; bracts linear. Calyx campanulate, pubescent. Corolla purple or pale blue, tube dilated at throat, sharply recurved near base. Nutlets ellipsoid.

**Fl. & Fr.:** May - October

**Distribution:** India, Bhutan, China, Tropical Asia

**Specimen examined:** Grows in forests edges, along roadsides. Khezhakheno. NLNU 0227.

*Scutellaria violacea* B. Heyne ex Benth., Wall. Pl. Asiat. Rar. 1: 66. 1830; Hook.f., Fl. Brit. Ind. 4: 668. 1885; Grierson & Long, Fl. Bhut. 2.2: 951. 1999; Sinha in Singh *et al.*, Fl. Mizo. 2: 353. 2012.

Herbs, 25-65 cm tall. Stem erect, pubescent. Leaves ovate, 3-6 x 1.5-3 cm, base cordate, apex acute, margins crenate, both surfaces hairy; petioles 0.6-3 cm. Inflorescence in terminal raceme; bracts leaflike basally, ovate-lanceolate apically. Calyx bilipped, enlarging in fruit. Corolla violet blue with paler blue lower lip, tube long, slender, 0.8-1.2 cm, curved at base. Stamens 4, didynamous. Nutlets ellipsoid.

**Fl. & Fr.:** May - August

**Distribution:** India, Bhutan, China, Myanmar, Nepal, Sri Lanka, Thailand

**Specimen examined:** Grows in forest edges and along roadsides. Chepoketa. NLNU 0938.

(Pl. 49)

## PLANTAGINACEAE

Juss., Gen. Pl. 89. 1789

Annual or perennial herbs, usually scapigerous, glabrous or hairy. Leaves usually radical, simple, alternate or opposite or whorled, entire, dentate, 3-5 parallel veins. Flowers bisexual, bracteate, spicate. Stamens 4, alternating with petal lobes. Ovary superior, 2-celled; stigma 2-lobed. Fruit a capsule, an achene or small nut enclosed in the persistent calyx.

***Plantago*** L., Sp. Pl. 112. 1753

Herbs, annual, biennial or perennial, acaulescent or infrequently stemmed. Leaves simple, ovate, elliptic, lanceolate, margin entire. Flowers in pedunculate bracteate spikes arising from rosette or leaf axil of stem. Fruit a capsule or nutlet.

***Plantago asiatica*** subsp. ***erosa*** (Wall.) Z. Y. Li, Fl. Reipubl. Popularis Sin. 70: 328. 2002; *P. erosa* Wall., Roxb. Fl. Ind. 1: 423. 1820; Kanjilal *et al.*, Fl. As. 3: 531. 1939; Deb, Fl. Tripura 2: 186. 1983; Balakr., Fl. Jowai 2: 384. 1983; *P. major* L., Hook.f., Fl. Brit. Ind. 4: 705. 1885.

Herbs, erect, with stout rootstock. Leaves radical, long petioles, ovate-oblong to obovate, base cuneate, apex acute, margin sinuate-dentate, 3-7 nerved. Flowers small, sessile, in axillary long spikes, upto 20 cm long. Sepals 4, persistent. Petals 4, ovate, reflexed. Stamens 4. Capsule ovoid, glabrous 4-8 seeded.

**Fl. & Fr.:** April - September

**Distribution:** India (throughout), E Himalaya, Bangladesh, China, Nepal, Myanmar, Sri Lanka

**Specimen examined:** Grows in wastelands, roadsides, fields. Chozuba. NLNU 334.

## AMARANTHACEAE

Juss., Gen. Pl. 87. 1789

Herbs, shrubs or rarely climbers. Leaves opposite or alternate, simple, entire, stipules absent. Flowers bisexual sometimes unisexual, usually in terminal and axillary simple or panicle spikes, cymes or clusters; bracts papery, bracteoles 2. Perianth segments 3-5, free or connate, papery or hyaline. Stamens 3-5, opposite perianth segments. Filaments free or connate. Ovary superior, 1-celled. Fruit a capsule or utricle, rarely a berry.

- |  |                      |
|--|----------------------|
| 1a. Leaves alternate, flowers unisexual                  | <i>Amaranthus</i>    |
| 1b. Leaves opposite, flowers bisexual                    |                      |
| 2a. Leaves sessile                                       | <i>Alternanthera</i> |
| 2b. Leaves petiolate                                     |                      |
| 3a. Flowers arranged singly in spikes; sepals spinescent | <i>Achyranthes</i>   |
| 3b. Flowers in panicle spikes; sepals scarious           | <i>Stilbanthus</i>   |

*Achyranthes* L., Sp. Pl. 1: 204. 1753

Perennial herbs, sometimes woody below. Leaves opposite. Flowers in terminal or axillary elongated spikes, bisexual, soon deflexed. Bracts and bracteoles spinescent. Perianth segments 5, lanceolate, rigid. Stamens 5, filaments connate at base. Ovary oblong, style filiform, stigma capitate. Fruit an oblong utricle, 1-seeded.

- |   |                     |
|---|---------------------|
| 1a. Bracteole with ovate blade, atleast half the length of the awn;<br>staminodes red | <i>A. aspera</i>    |
| 1b. Bracteole reduced to awns with minute auricles at base;<br>staminodes greenish    | <i>A. bidentata</i> |

*Achyranthes aspera* L., Sp. Pl.: 204.1753; Hook.f., Fl. Brit. Ind. 4: 730. 1885; Kanjilal *et al.*, Fl. As. 4: 6. 1940; Balakr., Fl. Jowai 2: 386. 1983; Grierson & Long, Fl. Bhut. 1.2: 227. 1984.

An erect shrubs or undershrubs. Leaves ovate to obovate, base cuneate, apex subacute or acuminate, margin entire, pubescent. Flowers greenish, in simple or paniculate spikes; bracts ovate, awned apex. Perianth segments lanceolate. Utricle oblong, 0.2 cm long.

**Fl. & Fr.:** May-December

**Distribution:** India, Bangladesh, China, Japan, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Vietnam,

**Specimen examined:** Grows in scrublands, forest edges, roadsides. Chozuba. NLNU 0373.

*Achyranthes bidentata* Blume, Bijdr. Fl. Ned. Ind. 11: 545. 1826; Hook.f., Fl. Brit. Ind. 4: 730. 1885; Kanjilal *et al.*, Fl. As. 4: 7. 1940; Balakr., Fl. Jowai 2: 386. 1983; Grierson & Long, Fl. Bhut. 1.2: 227. 1984.

Erect herbs. Stem purplish, with appressed or spreading pubescent, or nearly glabrous. Leaves elliptic-lanceolate or ovate-lanceolate, base cuneate, apex acute to acuminate, margin entire, undulate, pubescent. Flowers in terminal and axillary panicked spikes; bracts ovate, awned, bracteoles a spiny awn with two auricles at base. Utricle oblong.

**Fl. & Fr.:** July-December

**Distribution:** India, Bangladesh, China, Japan, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Taiwan, Vietnam

**Specimen examined:** Grows in forest edges. Razeza. NLNU 1054. (Pl. 49)

*Alternanthera* Forssk., Fl. Aegypt.-Arab. 28. 1775

Annual or perennial herbs. Stem prostrate, decumbent or erect, rooting at nodes. Leaves opposite, entire. Flowers bisexual, axillary, in sessile or peduncled heads; bracts and bracteoles persistent. Perianth 5, free. Stamens 2-5, filaments connate into a tube. Style short, stigma capitate. Utricle globose or ovoid.

*Alternanthera sessilis*(L.) R.Br.ex DC., Cat. Pl. Horti Monsp.:77. 1813; Hook.f., Fl. Brit. Ind. 4: 731. 1885; Balakr., Fl. Jowai 2: 387. 1983; Grierson & Long, Fl. Bhut. 1.2: 228. 1984; Giri *et al.*, Mater. Fl. Aruna. Pradesh 2:301. 2008; *Gomphrena sessilis* L. Sp. Pl. 225. 1753.

Prostrate herbs, stems with two rows of hairs. Leaves sessile, linear-lanceolate, oblong-obovate, base cuneate, apex obtuse, margin entire or slightly crenate, glabrous. Flowers axillary, white or pinkish, cluster sessile, globose. Perianth segments papery. Stamens 5, only 3 bearing anthers. Utricles obovoid.

**Fl. & Fr.:** May-September

**Distribution:** India, Bangladesh, Bhutan, China, Japan, Laos, Malaya, Myanmar, Nepal, Pakistan, Philippines, Thailand, Taiwan, Vietnam

**Specimen examined:** Grows in shallow ditches, moist places, abandoned cultivation. Chozuba. NLNU 0374.

*Amaranthus* L., Sp. Pl. 2: 989. 1753

Annual erect herbs. Leaves alternate, long petiolate. Flowers unisexual, axillary or terminal, densely clustered into spikes, usually males above, females below. Bracts small.

Perianth segments 3-5, free. Stamens 3-5, filaments free. Style short, stigma usually 3-lobed.

Utricles globose, laterally compressed. Seeds black or brown, globose.

*Amaranthus viridis* L., Sp. Pl., ed. 2.2: 1405. 1763; Hook.f., Fl. Brit. Ind. 4: 720. 1885; Balakr., Fl. Jowai 2: 385. 1983; Grierson & Long, Fl. Bhut. 1.2: 224. 1984; Giri *et al.*, Mater. Fl. Aruna. Pradesh 2:303. 2008.

Erect herb, glabrous. Leaves alternate, ovate, ovate-elliptic, base cuneate or obtuse, apex notched or acute, margin entire or undulate; petiole 3-6 cm long. Flowers green, clustered in axillary or terminal paniculate spikes. Tepals oblong or lanceolate. Stamens 3. Stigmas 2-3. Utricles globose, slightly compressed.

**Fl. & Fr.:** June-October

**Distribution:** India, throughout tropical regions

**Specimen examined:** Grows in open fields, abandoned cultivation. Chozuba. NLNU 0375  
(Pl. 49)

*Stilbanthus* Hook.f., Hooker's Icon. Pl. 13: t. 1286. 1879

Large woody climbers, with pendulous branches. Leaves opposite. Flowers in terminal or axillary, pendulous panicle. Perianth segments 5. Stamens 5, filaments shortly connate at base. Ovary oblong, style slender, stigma small. Utricles oblong, indehiscent, 1-seeded.

*Stilbanthus scandens* Hook.f., Hook. Icon. Pl. 13:t. 1286. 1879; Kanjilal *et al.*, Fl. As. 4: 7. 1940; Grierson & Long, Fl. Bhut. 1.2: 226. 1984; Giri *et al.*, Mater. Fl. Aruna. Pradesh 2:305. 2008.

Large climbers, branchlets soft, slightly tomentose. Leaves opposite, broadly elliptic, 4-11 x 3-5 cm, base cuneate, apex acuminate, pubescent. Inflorescence terminal or axillary

spikes. Flowers bisexual, white; bracts persistent. Perianth ovate-lanceolate, scarious, hairy.

Stamens 5. Utricle oblong with villous apex.

**Fl. & Fr.:** June-October

**Distribution:** India (NE India), E Himalaya, Bangladesh, Bhutan, China, Myanmar

**Specimen examined:** Grows among bushes in shaded areas, along roadsides. Wazeho.

NLNU 620. **(Pl. 49)**

## POLYGONACEAE

Juss., Gen. Pl. 82. 1789

Herbs, shrubs or climbers. Stems strait, grooved or prickly, nodes often swollen. Leaves alternate, rarely opposite, simple, stipules often united around stem forming a sheath (ocrea). Flowers bisexual or unisexual, small, in terminal or axillary racemes, panicles or clusters. Perianth segments 3-6, usually connate at base, often enlarged in fruit. Stamens 3-9, filaments free or united at base. Ovary superior, unilocular; styles 2-3. Fruit a trigonous or flattened achene.

1a. Perianth segments 6; stamens 6

*Rumex*

1b. Perianth segments 3-5; stamens 5-8

2a. Lower leaves deltoid, base cordate, hastate

*Fagopyrum*

2b. Lower leaves variously shaped, base attenuate, cuneate or rounded

3a. Stamens 5-8; racemes subglobose or ovoid

*Persicaria*

3b. Stamens 7-8; racemes elongate, spike-like

*Koenigia*

***Fagopyrum*** Mill., Gard. Dict. Abr. ed. 4: s.p. 1754

Erect herbs. Leaves simple, alternate, ovate, base cordate, hastate or deltoid, ocrea oblique. Flowers in dense cymes or racemes. Perianth segments 5, connate at base. Stamens 8. Styles 3, recurved, persistent. Achenes ovoid, trigonous.

***Fagopyrum cymosum*** (Trevir.) Meisn., wall. Pl. Asiat. Rar. 3: 63. 1832; Hook.f., Fl. Brit. Ind. 5: 55. 1886; Kanjilal *et al.*, Fl. As. 4: 22. 1940; *F. dibotrys* (D.Don) H.Hara, Fl. E. Himal. 69. 1966; Sinha in Singh *et al.*, Fl. Mizo. 2: 371. 2012.

Erect herbs, perennial. Stems sparsely pubescent, terete. Leaves triangular or deltoid, 5-12 x 3-10 cm, base cordate or sagitate, apex acuminate; petioles slender, upto 12 cm long, ocrea tubular, brown. Flowers white, in terminal or axillary spikes. Perianth segments 5, persistent. Achenes trigonous, ovoid.

**Fl. & Fr.:** July - November

**Distribution:** India (NE India), E&W Himalaya, Bhutan, China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in open places, forest edges, roadsides. Pfutsero. NLNU 0174.

***Koenigia*** L., Mant. Pl. 3. 1767

Herbs or shrubs. Leaves elliptic-ovate or lanceolate, ocrea tubular. Flowers in terminal panicles. Perianth segments 5, connate near base, usually enlarged in fruit. Stamens 7-8. Styles 2-3, stigma capitate. Achene trigonous or biconvex.

***Koenigia mollis*** (D. Don) T.M.Schust. & Reveal, Taxon 64: 1201. 2015; *Aconogonon molle* (D. Don) Hara, Fl. E. Himal. 68. 1966; Grierson & Long, Fl. Bhut. 1. 1: 156. 1983; *Polygonum molle* D. Don, Prodr. Fl. Nep. 72. 1825; Hook.f., Fl. Brit. Ind. 5: 50. 1886; Kanjilal *et al.*, Fl. As. 4: 19. 1940; Balakr., Fl. Jowai 2: 390. 1983.



Scandent or straggling bushy shrubs. Leaves elliptic-lanceolate, 7-18 x 2-6 cm, base cuneate, apex acuminate, margin entire, finely pubescent on both surfaces; petioles 1-2 cm, ocrea lanceolate, membranous, brown. Flowers white, in branched panicles, axillary or terminal. Stamens 8. Achenes ovoid, trigonous, black.

**Fl. & Fr.:** August - November

**Distribution:** India (throughout), E&W Himalaya, Bhutan, China, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand, Vietnam

**Specimen examined:** Grows in open places, forest edges, roadsides. Pfitsero. NLNU 0175.

*Persicaria* Mill., Gard. Dict. Abr. ed. 4.1754

Herbs or subshrubs, annual or perennial. Stem sometimes bearing short recurved spines. Leaves ovate, elliptic or lanceolate. Flowers in spikes, or capitate heads. Perianth 4-5-partite. Stamens 5-8. Styles 2-3. Achenes compressed, trigonous or convex.

1a. Plants armed with short recurved prickles *P. perfoliata*

1b. Plants unarmed

2a. Inflorescences in slender paniculate racemes

3a. Plant erect; ocrea mouth ciliate with stiff bristles, equaling or

longer than ocrea *P. barata* var. *gracilis*

3b. Plant weak ascending; ocrea mouth ciliate, glabrous *P. hydropiper*

2b. Inflorescences spikes subglobose, ovoid or in capitate heads

4a. Plant erect or decumbent

5a. Perianth accrescent and fleshy in fruit *P. chinensis*

5b. Perianth not accrescent *P. nepalensis*

4b. Plant creeping or prostrate

6a. Leaves runcinate pinnatifid

*P. runcinata*

6b. Leaves entire, with V-shaped blotch in the middle

*P. capitata*

*Persicaria barbata* var. *gracilis* (Danser) H. Hara, Enum. Fl. Pl. Nepal. 3: 175. 1982; Sinha in Singh *et al.*, Fl. Mizo. 2: 373. 2012; Giri *et al.*, Mater. Fl. Aruna. Pradesh 2: 310. 2008; *Polygonum barbatum* L., Sp. Pl. 362. 1753; Hook.f., Fl. Brit. Ind. 5: 37. 1886; Balakr., Fl. Jowai 2: 393. 1983.

Erect perennial herbs, upto 1m tall. Stem stout, strait. Leaves sessile or subsessile, linear-lanceolate, 7-15 x 1-2 cm, base attenuate, apex acuminate, margin entire, glabrous above, appressed setulose beneath and on the margin; petiole auricle at base, ocrea tubular, 1.5 cm long, ribbed, with long cilia at mouth, cilia equaling tube or longer. Flowers in slender paniculate racemes, in terminal and upper leaf axils. Perianth pinkish white. Achenes trigonous, black.

**Fl. & Fr.:** May - November

**Distribution:** India (throughout), Bhutan, Myanmar, Pakistan,, Thailand, Vietnam

**Specimen examined:** Grows in river banks, damp and moist places. Chepoketa. NLNU 0939.

*Persicaria capitata* (Buch.-Ham. ex D. Don) H. Gross, Bot. Jahrb. Syst. 49: 277. 1913; Sinha in Singh *et al.*, Fl. Mizo. 2: 374. 2012; *Polygonum capitatum* Buch.-Ham. ex D. Don, Prodr. Fl. Nepal. 73. 1825; Hook.f., Fl. Brit. Ind. 5: 44. 1886; Kanjilal *et al.*, Fl. As. 4: 18. 1940.

Creeping herbs, with woody rootstock. Stem much branched, rooting at nodes. Leaves ovate-elliptic, 3-5 x 2-3 cm, base cuneate, apex acute or subacute, margins entire, V-shaped blotched in the middle, sparsely hairy on both surfaces; petioles short, with small

auricle at base, ocrea brown, tubular. Flowers pinkish, in dense peduncled capitate head, peduncles glandular hairy. Perianth 5-lobed. Stamens 8. Achenes trigonous, black, enclosed by persistent perianth.

**Fl. & Fr.:** Almost throughout the year.

**Distribution:** India (throughout), E&W Himalaya, Bhutan, China, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand, Vietnam

**Specimen examined:** Grows in open places, forest edges, roadsides. Pfutsero. NLNU 1056.

*Persicaria chinensis* (L.) H. Gross, Bot. Jahrb. Syst. 49: 269. 1913; Sinha in Singh *et al.*, Fl. Mizo. 2: 374. 2012; Giri *et al.*, Mater. Fl. Aruna. Pradesh 2: 312. 2008; *Polygonum chinense* L. Sp. Pl. 363. 1753; Hook.f., Fl. Brit. Ind. 5: 44. 1886; Kanjilal *et al.*, Fl. As. 4: 16. 1940; Balakr., Fl. Jowai 2: 390. 1983.

Scrambling shrubs. Stems woody, angled and grooved. Leaves variable, ovate, oblong-lanceolate, 3-14 x 2-9 cm, base cuneate, apex acuminate, margins entire or crenulate, glabrous above, sparsely pubescent on midrib beneath; petioles 0.5-1 cm. Flowers white or pink, in corymbose heads. Perianth lobes 5, ovate, connate at base. Achenes trigonous, enclosed with fleshy red or black perianth.

**Fl. & Fr.:** April - November

**Distribution:** India (NE India), Tropical & Subtropical Asia

**Specimen examined:** Grows in moist forest slopes, roadsides. Pfutsero. NLNU 1058.

*Persicaria hydropiper* (L.) Delarbe, Fl. Auvergne 2: 518. 1800; Grierson & Long, Fl. Bhut. 1. 1: 162. 1983; Giri *et al.*, Mater. Fl. Aruna. Pradesh 2: 313. 2008; *Polygonum hydropiper* L., Sp. Pl. 361. 1753; Hook.f., Fl. Brit. Ind. 5: 39. 1886; Kanjilal *et al.*, Fl. As. 4: 21. 1940.

Weak ascending herbs. Leaves lanceolate, ovate-lanceolate, 5-12 x 1-3 cm, base attenuate, apex acuminate, glabrous, hairy on margins, ocrea glabrous, ciliate at mouth. Flowers in axillary and terminal, slender racemes, upto 15 cm long. Perianth white or pink. Achenes trigonous, brown.

**Fl. & Fr.:** March - October

**Distribution:** Temperate Eurasia to NW. Africa

**Specimen examined:** Grows in streamsides, moist places. Mesulumi. NLNU 0439.

*Persicaria nepalensis* (Meisn.)H. Gross, Bot. Jahrb. Syst. 49: 277. 1913; Giri *et al.*, Mater. Fl. Aruna. Pradesh 2: 314. 2008; Sinha in Singh *et al.*, Fl. Mizo. 2: 376. 2012; *Polygonum nepalense* Meisn., Monogr. Polyg. 84. t. 7. f. 2. 1826; *P. alatum* Buch.-Ham.ex Spreng., Syst. Veg. 154. 1827; Hook.f., Fl. Brit. Ind. 5: 39. 1886; Balakr., Fl. Jowai 2: 391. 1983.

Erect or creeping annual herbs, glabrous or sparsely hairy, nodes with simple, gland tipped hairs. Leaves ovate or deltoid-ovate, base rounded, apex acute, margins entire, glabrous or sparsely pubescent, glandular beneath; petiole auriculate, ocrea tubular, obliquely truncate. Flowers in axillary or terminal corymbose heads. Perianth pink or white. Achenes trigonous or lenticular.

**Fl. & Fr.:** July - December

**Distribution:** Tropical & Subtropical Asia

**Specimen examined:** Grows in moist places along roadsides, forest edges. Mesulumi. NLNU 0438.

*Persicaria perfoliata* (L.) H. Gross, Beih. Bot. Centralbl. 37.2: 113. 1919; Grierson & Long, Fl. Bhut. 1. 1: 160. 1983; Giri *et al.*, Mater. Fl. Aruna. Pradesh 2: 314. 2008; Sinha in Singh

*et al.*, Fl. Mizo. 2: 380. 2012; *Polygonum perfoliatum* L. Sp. Pl. ed. 2: 521. 1762; Hook.f., Fl. Brit. Ind. 5: 46. 1886; Kanjilal *et al.*, Fl. As. 4: 20. 1940; Balakr., Fl. Jowai 2: 392. 1983.

Climbing herbs, stems woody at base, herbaceous above. Branches and petioles with recurved spines. Leaves peltate, deltoid, 2-8 x 1-7 cm, base cordate or truncate, apex acute, glabrous, basal nerves 3-5; petioles 3-6 cm long, spiny; limb of ocrea orbicular, perfoliate. Flowers in short axillary and terminal racemes, simple or branched, white or pink. Achenes globose, subtrigonal, bluish or purplish.

**Fl. & Fr.:** June - November

**Distribution:** India (throughout), E&W Himalaya, Bangladesh, China, Mongolia, Japan, Nepal, Philippines, Taiwan, Thailand, Vietnam

**Specimen examined:** Grows among bushes, forest edges, wastelands. Enhulumi. NLNU 0436.

*Persicaria runcinata* (Buch.-Ham, ex D. Don) H. Gross, Bot. Jahrb. Syst. 49: 277. 1913; Grierson & Long, Fl. Bhut. 1. 1: 164. 1983; Giri *et al.*, Mater. Fl. Arunachal Pradesh 2: 315. 2008; Sinha in Singh *et al.*, Fl. Mizo. 2: 381. 2012; *Polygonum runcinatum* Buch.-Ham. ex D. Don, Prodr. Fl. Nepal. 73.1825; Hook.f., Fl. Brit. Ind. 5: 43. 1886; Kanjilal *et al.*, Fl. As. 4: 21. 1940.

Suberect or ascending perennial herbs, scabrid. Leaves runcinate-pinnatifid; terminal lobe triangular ovate; lateral lobes 1-3 pairs, smaller, margin ciliate, sometimes with a dark V-shaped blotch on the terminal lobe; petioles auriculate at base, ocrea truncate at apex. Flowers in dense globose heads, solitary or 2-3, in terminal or axillary peduncles. Perianth white or pink. Achene ovoid, trigonal.

**Fl. & Fr.:** April - November

**Distribution:** India (NE India), E&W Himalaya, China, Myanmar, Nepal, Philippines, Taiwan, Thailand, Tibet, Vietnam

**Specimen examined:** Grows in moist forest slopes, roadsides. Enhulumi. NLNU 0433.

*Rumex* L., Sp. Pl. 333. 1753

Erect herbs, annual or perennial. Leaves ovate, lanceolate or hastate; ocrea membranous, caducous. Flowers bisexual or unisexual, simple or panicled racemes, in axillary clusters or in whorls. Perianth segments 6; outer 3 smaller, inner 3 larger, accrescent, enclosing fruit. Stamens 6. Ovary trigonous; styles 3. Achenes angular.

*Rumex nepalensis* Spreng., Syst. Veg. 2: 159. 1825; Hook.f., Fl. Brit. Ind. 5: 60. 1886; Kanjilal *et al.*, Fl. As. 4: 22. 1940; Grierson & Long, Fl. Bhut. 1. 1: 173. 1983.

Herbs, rootstock stout, perennial. Stems erect, ridged. Lower leaves long petioled, oblong or elliptic ovate, base cordate, apex obtuse or acute; upper leaves sessile or subsessile, linear oblong. Flowers small, green, bisexual, in whorls on long racemes. Perianth margins fringed with hooked bristles, persistent. Stamens 6. Ovary trigonous; styles 3. Achene trigonous, brown.

**Fl. & Fr.:** May - November

**Distribution:** India (throughout), Afghanistan, Bhutan, China, Indonesia, Myanmar, Nepal, Pakistan, Vietnam; SW Asia

**Specimen examined:** Grows in grassy mountain slopes, moist places. Pfutsero. NLNU 1071.

## PIPERACEAE

Giseke, Prael. Ord. Nat. Pl. 123. 1792

Herbs or shrubs, climbing, nodes often swollen, usually aromatic. Leaves simple, alternate, opposite or whorled, entire, palmately or pinnately nerved, stipules present or absent, usually adnate to petiole, deciduous. Flowers small, unisexual or bisexual, in terminal or leaf opposed spikes. Sepals and petals absent. Male flowers with 2-4 stamens, sessile or on short filament. Female flowers ovary superior, 1-celled, stigma sessile; ovule 1. Fruit a drupe or nutlet, free or sometimes coherent in a fleshy spikes.

1a. Small herbs; flowers bisexual; stigma 1 *Peperomia*

1b. Erect or scandent shrubs; flowers usually unisexual *Piper*

### *Peperomia* Ruiz & Pav., Fl. Peruv. Prodr. 8. 1794

Herbs, succulent. Leaves alternate, opposite or whorled, pinnately nerved or palmately 3-5-nerved from base, stipules absent. Flowers bisexual, minute, sessile, in terminal or axillary spike. Stamens 2, filaments short. Ovary 1-celled; ovule 1; stigma 1. Fruit a drupe, minute, sessile.

1a. Leaves alternate, ovate-triangular, cordate at base *P. pellucida*

1b. Leaves opposite or whorled, rounded or cuneate at base

2a. Leaves oblanceolate or narrowly obovate, base cuneate *P. heyneana*

2b. Leaves broadly elliptic or sub-orbicular, rounded at base *P. tetraphylla*

*Peperomia pellucida* (L.) Kunth, Nov. Gen. Sp. 1: 64. 1816; Kanjilal *et al.*, Fl. As. 4: 39. 1940; Balakr., Fl. Jowai 2: 395. 1981; Grierson & Long, Fl. Bhut. 1. 2: 345 .1984; Sinha in Singh *et al.*, Fl. Mizo. 2: 386. 2012; *P. pellucidum* L., Sp. Pl. 30. 1753.

Erect or drooping, much branched, succulent herb. Leaves alternate, succulent, ovate, deltoid, 1-2.5 x 0.7-2.3 cm, base cordate, apex acute, glossy above, pale beneath, palmately 5-nerved; petioles 0.5-2 cm long. Spikes solitary or paired, 2.5-5 cm long. Berries globose.

**Fl. & Fr.:** July - December

**Distribution:** Native of Tropical North and South America, naturalized in Asia and Western Australia

**Specimen examined:** Grows in sunny and shaded places, on rocks, and in cultivated land. Zhavame. NLNU 0296.

*Peperomia heyneana* Miquel, Syst. Piperac. 123. 1843; Hook.f., Fl. Brit. Ind. 5: 98. 1886; Kanjilal *et al.*, Fl. As. 4: 39. 1940; Grierson & Long, Fl. Bhut. 1. 2: 344 .1984.

Succulent herbs, bushy, glabrous. Leaves opposite or in whorls, oblanceolate or obovate, 0.7-1.9 x 0.3-0.9 cm, base attenuate, midrib distinct; petioles 0.2-0.5 cm. Spikes terminal, slender, glabrous. Drupes ellipsoid.

**Fl. & Fr.:** May - August

**Distribution:** India (throughout), E Himalaya, Bangladesh, Bhutan, China, Myanmar, Nepal, Sri Lanka, Thailand

**Specimen examined:** Grows on mossy rocks, tree barks in primary and secondary forest. Zhavame. NLNU 0299.

*Peperomia tetraphylla* Hook. & Arn., Bot. Beech. Voy. 97. 1832; Grierson & Long, Fl. Bhut. 1. 2: 344 .1984; Sinha in Singh *et al.*, Fl. Mizo. 2: 386. 2012; *Piper tetraphyllum* G. Forst., Fl. Ins. Austr. 5. 1786; *Peperomia reflexa* (L.f.) A. Dietr., Sp. Pl. ed. 6. 1: 180. 1831; Hook.f., Fl. Brit. Ind. 5: 99. 1886.



Herbs, bushy, succulent, upto 20 cm tall, much branched at base, often epiphytic, rooting at nodes. Leaves in whorls of 4. Stem ribbed, glabrous or sparsely hairy. Leaves broadly elliptic or orbicular, obovate, 0.8-1.5 x 0.7-1 cm, base rounded or broadly cuneate, apex obtuse, base 3-nerved; petioles 0.1-0.4 cm. Spikes terminal solitary, erect, finely hairy. Berries ellipsoid.

**Fl. & Fr.:** May - August

**Distribution:** India (throughout), Bhutan, China, Indonesia, Malaysia, Philippines, Sri Lanka, Thailand; Africa, Central and South America, Oceania

**Specimen examined:** Grows on mossy rocks, tree barks in primary and secondary forest. Pfutsero. NLNU 1072. (Pl. 50)

*Piper* L., Sp. Pl. 28. 1753

Shrubs or climbers, climbing by adventitious roots, aromatic. Stem with swollen nodes. Leaves alternate, entire, usually unequal, stipules present, basal nerves 3 or more. Flowers small, unisexual, sessile, in leaf opposed or terminal spikes, each in axil of peltate bract. Perianth absent. Stamens 2-4; filaments short. Ovary 1-celled; stigmas 2-6. Fruit a drupe, sessile or stalked, globose or ovoid, glabrous.

1a. Fruit coalescing into a fleshy mass *P. pothoides*

1b. Fruit sessile, globose

2a. Leaves elliptic-lanceolate, cuneate or rounded at base *P. mullesua*

2b. Leaves ovate-lanceolate, cordate at base *P. sylvaticum*

***Piper sylvaticum*** Roxb., Fl. Ind. 1: 158. 1820; Hook.f., Fl. Brit. Ind. 5:84. 1886; Kanjilal *et al.*, Fl. As. 4: 38. 1940; Grierson & Long, Fl. Bhut. 1. 2: 348.1984; Sinha in Singh *et al.*, Fl. Mizo. 2: 399. 2012.

Climbing shrub. Stem creeping, rooting at nodes, striated when dried. Leaves alternate, lower leaves broadly ovate-cordate; upper leaves ovate to lanceolate, apex acuminate, base cuneate or rounded, symmetric or slightly oblique, 5-veined at base, sparsely pubescent on nerves beneath. Spikes short peduncled. Fruit a drupe, sessile, globose.

**Fl. & Fr.:** May - September

**Distribution:** India (NE India), E Himalaya, Bangladesh, Bhutan

**Specimen examined:** Grows climbing on trees and rocks in primary or secondary forest. Tsupfume. NLNU 1033.

***Piper mullesua*** Buch.-Ham.ex D. Don, Prodr. Fl. Nepal. 20. 1825; Balakr., Fl. Jowai 2: 396. 1981; Sinha in Singh *et al.*, Fl. Mizo. 2: 395. 2012; *P. brachystachyum* Wall. ex Hook.f., Fl. Brit. Ind. 5: 87. 1886; Kanjilal *et al.*, Fl. As. 4: 36. 1940.

Shrubs, much branched twiggy climbers. Leaves elliptic to elliptic-lanceolate, apex acuminate, base broadly cuneate or rounded, membranous, margin entire, glabrescent above, pubescent beneath, 3-5-nerved at base, 1-2 prominent lateral nerves above the base. Male spikes long and slender, 5-8 cm long. Female spikes short, cylindric or ovoid. Drupes globose, clustered.

**Fl. & Fr.:** May - September

**Distribution:** India (throughout), E&W Himalaya, Bangladesh, Bhutan, China, Myanmar, Nepal, Thailand

**Specimen examined:** Grows in primary or secondary forest. Thetsumi. NLNU 0782. (Pl. 50)

*Piper pothoides* (Miq.) Wall. ex C. DC., Prodr. 16. 1: 390. 1869; *Piper pothiforme* Wall. ex C. DC., Prodr. 16. 1: 351. 1869; Hook.f., Fl. Brit. Ind. 5: 86. 1886.

Large scandent, glabrous, shrub. Leaves ovate-elliptic to lanceolate, base unequal, oblique, cordate, apex acuminate, membranous, glabrous, 5-nerved, of which 3 run to the tip. Fruiting spikes about 8 cm long and fruit coalescing into a fleshy cylindric mass.

**Fl. & Fr.:** February - March

**Distribution:** India (NE India), E Himalaya, Myanmar

**Specimen examined:** Grows in primary or secondary forest. Thetsumi. NLNU 0786. (Pl. 50)

## SAURURACEAE

F. Voigt, Analyse Der Frucht Und Des Saamenkorns: 45. 67. 1811

Perennial herbs, aromatic, stoloniferous. Leaves alternate, entire, palmately nerved, stipules present. Flowers in dense terminal and leaf opposed spikes, subtended by a whorl of showy bracts, regular, bisexual. Perianth absent. Stamens 3-6, filaments adnate to base of ovary. Ovary superior, 1-celled; styles recurved. Fruit a capsule.

*Houttuynia* Thunb., Kongl. Vetensk. Acad. Nya Handl. 4: 149. 1783

Description as for Saururaceae.

*Houttuynia cordata* Thunb., Kongl. Vetensk. Acad. Nya Handl. 4: 149. 1783; Hook.f., Fl. Brit. Ind. 5: 78. 1886; Kanjilal *et al.*, Fl. As. 4: 31. 1940; Balakr., Fl. Jowai 2: 397. 1981; Grierson & Long, Fl. Bhut. 1. 2: 341. 1984; Sinha in Singh *et al.*, Fl. Mizo. 2: 400. 2012.

Herbs, perennial, creeping rootstock. Stem membranous, angular. Leaves broadly ovate, 3-8 x 2-6 cm, base cordate, apex acuminate, margins entire, glabrous above, glandular beneath, palmately nerved; petioles 1-4 cm. Flowers minute in dense flowered spikes, subtended by an involucre bracts of 4-6, white, petaloid, partially connate at base; perianth absent. Stamens 3, adnate to ovary. Stigmas recurved. Fruit subglobose.

**Fl. & Fr.:** April - August

**Distribution:** India (NE India), E & W Himalaya, Bhutan, China, Japan, Korea, Myanmar, Nepal, Taiwan, Thailand, Vietnam

**Specimen examined:** Grows in shaded places in forests and wastelands. Pfitsero. NLNU 0102.

## LAURACEAE

Juss., Gen. Pl. 80. 1789

Trees or shrubs, often aromatic. Leaves alternate, sometimes opposite, usually crowded at the ends of branches, entire, sometimes shallowly lobed near apex, pinnately nerved or strongly 3-nerved, stipules absent. Flowers in axillary or lateral panicles, racemes or umbels, unisexual or bisexual, regular. Perianth segments usually 6, free, in 2 whorls. Stamens in 2-4 series on the perianth tube, in whorls of 3; in female flowers stamens reduced to staminodes. Ovary superior, 1-celled. Fruit a drupe or berry, usually borne on enlarged remains of perianth.

1a. Leaves 3-nerved at or above base

2a. Leaves obovate, clustered at branch ends

*Actinodaphne*

2b. Leaves ovate or elliptic, not clustered at branch ends

*Lindera*

1b. Leaves pinnately nerved throughout

- |  |                 |
|--|-----------------|
| 3a. Flowers unisexual                            | <i>Litsea</i>   |
| 3b. Flowers bisexual                             |                 |
| 4a. Perianth segments not clasping the fruit     | <i>Machilus</i> |
| 4b. Perianth segments closely clasping the fruit | <i>Phoebe</i>   |

***Actinodaphne*** Nees in Wall. Pl. Asiat. Rar. 2: 68. 1831

Evergreen trees. Dioecious. Leaves clustered at branch ends, pinnately nerved, or 3-nerved at base. Flowers unisexual in umbels solitary or arranged in a panicle or racemes in axils of old fallen leaves. Perianth tube short, segments 6, in 2 whorls. Male flowers: fertile stamens 9 in 3 whorls of 3 each. Female flowers: staminodes as many as stamens of male flowers. Fruit ellipsoid, usually borne on enlarged fleshy perianth tube.

***Actinodaphne obovata*** (Nees) Blume, Mus. Bot. 1: 342. 1851; Hook.f., Fl. Brit. Ind. 5: 153. 1886; Kanjilal *et al.*, Fl. As. 4: 77. 1939; Balakr., Fl. Jowai 2: 406. 1983; Giri *et al.*, Mater. Fl. Aruna. Pradesh 2: 331. 2008; Sinha in Singh *et al.*, Fl. Mizo. 2: 407. 2012.

Trees, 10-15 m tall. Branchlets and inflorescence brown pubescent or tomentose. Leaves clustered at branch ends, obovate or elliptic-oblong, 20-35 x 7-15 cm, base cuneate, apex acute or obtuse, glaucous beneath, glabrous above; petioles 2-6 cm. Flowers in axillary racemes composed of umbels. Fruit oblong or ellipsoid, 2-3 cm long.

**Fl. & Fr.:** March - August

**Distribution:** India (NE India), E Himalaya, Bangladesh, China, Myanmar, Nepal, Vietnam

**Specimen examined:** Grows in secondary forests. Chepoketa. NLNU 0941.

***Lindera*** Thunb., Nov. Gen. Pl. 3: 44. 1783

Evergreen or deciduous trees or shrubs, aromatic. Dioecious. Leaves alternate, margin entire 3-lobed, pinnately nerved or 3-nerved at base. Flowers unisexual, in axillary clustered umbels, sessile or pedunculate, enclosed by persistent scales. Perianth segments 6. Fertile stamens 9, arranged into 3 whorls; anthers 2-celled, introrse. Fruit a berry or drupe, globose or ellipsoid, borne in enlarged perianth tube.

1a. Leaves glaucous beneath; fruit globose *L. caudata*

1b. Leaves not glaucous beneath; fruit ellipsoid *L. pulcherima*

***Lindera caudata*** (Nees) Hook.f., Hook.f., Fl. Brit. Ind. 5: 184. 1886; Kanjilal *et al.*, Fl. As. 4: 97. 1940; Balakr., Fl. Jowai 2: 401. 1983; Giri *et al.*, Mater. Fl. Aruna. Pradesh 2: 335. 2008.

Large shrubs or trees, 4-10 m tall. Bark brown, nearly smooth. Young branches brown or rusty villous or tomentose, branchlets slender. Leaves ovate to elliptic-lanceolate, 4-10 x 2-3 cm, base cuneate, apex acuminate, glabrous above, glaucous beneath, 3 basal nerves running to apex. Flowers in solitary, sessile umbels, clustered or spicate; each flower in the axil of a bract and with 2 concave bracteoles. Fruit globose, speckled yellow.

**Fl. & Fr.:** October - July

**Distribution:** India (NE India), Bangladesh, China, Myanmar, Thailand, Vietnam

**Specimen examined:** Grows in open forest. Zelome. NLNU 1059.

***Lindera pulcherrima*** (Nees) Benth. ex Hook.f., Fl. Brit. Ind. 5: 185. 1886; Kanjilal *et al.*, Fl. As. 4: 98. 1940; Sinha in Singh *et al.*, Fl. Mizo. 2: 418. 2012.

Trees or shrubs, upto 10 m tall. Branchlets pubescent, soon glabrate, buds and new shoots silky villous at first. Leaves ovate-lanceolate, elliptic-lanceolate, 5-12 x 2-5 cm, base

rounded-cuneate, apex caudate acuminate, glabrous, 3-nerved at base; petioles 0.5-2 cm long. Flowers yellow in sessile, clustered umbels, unisexual. Perianth lobes 6. Fruit ellipsoid, borne on enlarged perianth.

**Fl. & Fr.:** April - August

**Distribution:** India (NE India), E & W Himalaya, China, Myanmar, Nepal, Vietnam

**Specimen examined:** Grows in open forests, mountain slopes, riversides. Zelome. NLNU 1057. (Pl. 51)

*Litsea* Lam., Encycl. 3: 574. 1792

Trees or shrubs. Leaves alternate, rarely opposite or sub-opposite, pinnately veined. Flowers unisexual. Umbels solitary or clustered in leaf axils; involucre bracts 4-6. Perianth segments 6, in 2 whorls of 3. Male flowers: fertile stamens 9-12. Female flowers: staminodes as many as stamens of male flowers. Fruit ovoid, borne on enlarged perianth tube.

1a. Leaves oblong-obovate, with citrus smell

*L. cubeba*

1b. Leaves lanceolate, not smelling of citrus

*L. monopetala*

*Litsea cubeba* (Lour.) Pers., Syn. Pl. 2: 4. 1806; Sinha in Singh *et al.*, Fl. Mizo. 2: 419. 2012; *Laurus cubeba* Lour., Fl. Cochinch. 1: 252. 1790; *Litsea citrate* Blume, Bijdr. 11: 565. 1826; Hook.f., Fl. Brit. Ind. 5: 155. 1886; Kanjilal *et al.*, Fl. As. 4: 81. 1940; *L. kingii* Hook. f., Fl. Brit. Ind. 5: 156. 1886.

Trees, deciduous, 3-10 m tall. Branches drooping. Leaves alternate, lanceolate to ovate-lanceolate, 5-14 x 1.5-3 cm, base cuneate, apex acuminate, glabrous; petioles 0.8-1.5 cm long. Flowers pale yellow, solitary or in short umbellate corymbs. Fruits globose, borne on 1-2 cm long pedicels.

**Fl. & Fr.:** January - July

**Distribution:** India (NE India), E & W Himalaya, China, Myanmar, Nepal, Southeast Asia

**Specimen examined:** Grows in open forests, mountain slopes, roadsides. Chizami. NLNU 0558. (Pl. 51)

*Litsea monopetala* (Roxb.) Pers., Syn. Pl. 2: 4. 1806; Balakr., Fl. Jowai 2: 404. 1983; Sinha in Singh *et al.*, Fl. Mizo. 2: 423. 2012; *Tetranthera monopetala* Roxb., Pl. Coromandel 2: 26. 1800; *Litsea polyantha* Juss., Ann. Mus. Hist. Nat. 6: 211. 1805; Hook.f., Fl. Brit. Ind. 5: 162. 1886; Kanjilal *et al.*, Fl. As. 4: 83. 1940.

Trees, upto 12 m tall. Branches pubescent. Leaves broadly elliptic, oblong-obovate, 8-20 x 5-10 cm, base cuneate, apex acute or rounded, coriaceous, glabrescent above, rusty pubescent beneath; petioles 1-2.5 cm long. Flowers yellowish green, in axillary umbels, clustered on a short peduncle, tomentose. Fruit ovoid, about 0.6-1 cm.

**Fl. & Fr.:** March - August

**Distribution:** India (NE India), E & W Himalaya, China, Myanmar, Nepal, Southeast Asia

**Specimen examined:** Grows in open forests, mountain slopes. Chizami. NLNU 0534.

*Machilus* Nees in Wallich, Pl. Asiat. Rar. 2: 70. 1831

Evergreen trees or shrubs. Leaves alternate, pinnately nerved. Flowers bisexual, in terminal, sub-terminal or near the base of branchlets. Perianth tube short; lobes 6 in 2 series, often persistent. Fertile stamens 9 in 3 whorls. Fruit fleshy, globose, subtended by persistent and reflexed perianth lobes.

*Machilus duthiei* King ex Hook.f., Hook.f., Fl. Brit. Ind. 5: 861. 1890; *Persea duthiei* (King ex Hook.f.) Kosterm., Reinwardtia 6: 191. 1962; Balakr., Fl. Jowai 2: 408. 1983.



Trees, 8-20 m tall. Branchlets glabrous. Leaves elliptic-lanceolate or oblanceolate, 7-20 x 3-5 cm, base cuneate or attenuate, apex acute, glabrous on both surfaces; petioles 1-3 cm. Flowers yellowish-green, panicles cymose arising from lower part of current year branchlet. Perianth lobes oblong, puberulous. Fruit globose, 0.8 cm across.

**Fl. & Fr.:** February - May

**Distribution:** India (NE India), E & W Himalaya, China, Nepal, Pakistan

**Specimen examined:** Grows in secondary forests. Chepoketa. NLNU 0942 (**Pl. 51**)

*Phoebe* Ness, Syst. Laur. 98. 1836

Evergreen trees or shrubs. Leaves alternate, clustered near branch ends, pinnately veined. Flowers bisexual or unisexual in axillary, paniculate cymes or racemes. Perianth segments 6. Fertile stamens 9, in 3 whorls, outer 6 introrse, inner 3 extrorse. Fruit ellipsoid, enclosed by persistent enlarged perianth segments.

*Phoebe lanceolata* (Nees) Nees, Syst. Laur.: 109. 1836; Hook.f., Fl. Brit. Ind. 5: 141. 1886; Kanjilal *et al.*, Fl. As. 4: 71. 1940; Balakr., Fl. Jowai 2: 408. 1983; Sinha in Singh *et al.*, Fl. Mizo. 2: 430. 2012.

Trees, 7-15 m tall. Leaves alternate, lanceolate to elliptic-lanceolate, 7-18 x 2-5 cm, base cuneate, apex acuminate, glabrous, margin entire; petioles 0.5-2 cm. Flowers greenish-yellow, axillary in lax, long peduncled, corymbiform panicles, usually clustered at the base of new shoots. Perianth glabrous, Fruits ovoid.

**Fl. & Fr.:** April - November

**Distribution:** India (NE India), E Himalaya, Bangladesh, China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in open forests in slopes. Chozuba. NLNU 0302. (**Pl. 51**)

## THYMELAEACEAE

Juss., Gen. Pl. 76. 1789

Shrubs or trees, rarely herbs. Leaves alternate, simple, entire, stipules absent. Flowers in terminal or axillary umbellate or globose head, regular, bisexual. Perianth tubular or campanulate, 4-5-lobed. Stamens as many as or twice as many as the perianth lobes. Disk annular, copular or of scales. Ovary superior, 1-2-celled; stigma capitate. Fruit a capsule, drupe or nut.

*Daphne* Tourn. ex L., Sp. Pl. 356. 1753

Shrubs or small trees, evergreen or deciduous. Leaves alternate. Flowers in terminal or lateral, sessile or peduncled, umbellate or globose heads. Perianth 4-lobed, tubular, scales absent. Stamens 8, in 2 series. Ovary 1-celled, style very short or absent. Fruit fleshy or coriaceous.

*Daphne bholua* Buch.-Ham. ex D. Don, Prodr. Fl. Nepal. 68. 1825; Grierson & Long, Fl. Bhut. 2.1: 212. 1991; Giri *et al.*, Mat. Fl. Aruna Pradesh 2: 347. 2008; *D. cannabina* Lour. ex Wall., Asiat. Res.13: 385. 1820; Hook.f., Fl. Brit. Ind., 5: 193. 1886.

Shrub or small tree. Leaves clustered at branch ends, lanceolate to elliptic-lanceolate, 4-13 x 1.5-3 cm, apex acute or acuminate, base cuneate, glabrous, coriaceous. Flowers strongly fragrant, terminal in clusters of 5-15 flowered. Perianth tube pink or pale purplish, lobes white, spreading. Fruit a drupe, ovoid or ellipsoid.

**Fl. & Fr.:** February - May

**Distibution:** India (NE India), E Himalaya, Bhutan, China, Myanmar, Nepal, Vietnam

**Specimen examined:** Grows in temperate forest. Kapamodzu. NLNU 0261. (Pl. 51)

## LORANTHACEAE

Juss., Ann. Mus. Nat. Paris 12: 293. 1808

Shrubs, parasitic on stems. Leaves opposite or alternate, entire, coriaceous, sometimes leaves absent, stipules absent. Flowers unisexual or bisexual, in racemes, spikes or fascicle, bracteate. Calyx adnate to ovary, reduced or absent. Petals 4-6, free or united into a tube. Stamens as many as petals. Fruit a drupe or berry.

- 1a. Flowers unisexual; leaves usually absent *Viscum*
- 1b. Flowers bisexual; leaves present
  - 2a. Petals divided up to the base *Helixanthera*
  - 2b. Petals fused up to the middle or higher, with corolla tube deeply split on one side
    - 3a. Corolla 6-lobed; fruit globose or ellipsoid *Macrosolen*
    - 3b. Corolla 4-lobed; fruit pyriform *Scurrula*

***Helixanthera*** Lour., Fl. Cochinch. 1: 142. 1790

Shrubs. Leaves opposite or alternate, elliptic to ovate-lanceolate. Flowers shortly pedicellate in racemes or spikes, each with a single bract. Calyx persistent, denticulate, forming a low rim on ovary. Petals free, straight, spreading. Fruit ovoid or globose.

***Helixanthera parasitica*** Lour., Fl. Cochinch. 1: 142. 1790; Kanjilal *et al.*, Fl. As. 4: 120. 1940; Balakr., Fl. Jowai 2: 414. 1983; Sinha in Singh *et al.*, Fl. Mizo. 2: 445. 2012; *Loranthus pentapetalus* Roxb., Fl. Ind. 2: 211. 1824; Hook.f., Fl. Brit. Ind. 5: 206. 1886.

Shrubs, much branched. Branchlets stout, glabrous. Leaves opposite, ovate-lanceolate, 3.5-10 x 1.4-4 cm, base cuneate, apex acute or acuminate, margins entire,

coriaceous, glabrous; petioles 0.7-2 cm long. Flowers bright red, 5-merous, in axillary racemes, upto 15 cm long. Calyx limb narrow, obsolete. Corolla lobes inflated and 5-angled at base; lobes spreading, linear, reflexed. Fruits obovoid-ellipsoid.

**Fl. & Fr.:** March - July

**Distribution:** India (NE India), E Himalaya, Bangladesh, Bhutan, China, Myanmar, Nepal, Philippines, Thailand, Vietnam

**Specimen examined:** Grows parasitic on trees. Khezhakhen. NLNU 0230. (**Pl. 51**)

*Macrosolen* (Blume) Rchb., Deut. Bot. Herb.-Buch: 73. 1841

Shrubs, glabrous. Leaves ovate or elliptic. Flowers bisexual, in racemes or spikes, or peduncled umbels, each subtended by 3 unequal bracts. Calyx limb annular. Corolla 6-lobed, tube inflated, with keels at middle portion, lobes reflexed. Filaments straight, short. Fruit globose or ellipsoid.

*Macrosolen cochinchinensis* (Lour.) Tiegh., Bull. Soc. Bot. France 41: 122. 1895; Kanjilal *et al.*, Fl. As. 4: 127. 1940; Balakr., Fl. Jowai 2: 413. 1983; *Loranthus cochinchinensis* Lour., Fl. Cochinch. 1: 195. 1790; *L. ampullaceus* Roxb., Fl. Ind. 2: 189. 1824; Hook.f., Fl. Brit. Ind. 5: 200. 1886.

Shrubs. Branches stout, terete, lenticellate. Leaves opposite, broadly elliptic to ovate-lanceolate, base cuneate or rounded, apex acuminate, coriaceous, margin entire. Flowers in axillary racemes, single or in pairs or sometimes clustered. Calyx truncate. Corolla tube greenish yellow, dark red or brown neck, tube 6-angled, campanulate, lobes 6, reflexed at the middle. Fruit ellipsoid.

**Fl. & Fr.:** April - July

**Distribution:** India (NE India), E Himalaya, Tropical and Subtropical Asia

**Specimen examined:** Grows parasitic on trees. Chozuba. NLNU 0310. (Pl. 52)

*Scurrula* L., Sp. Pl.: 110. 1753

Shrubs. Leaves ovate to elliptic, mealy or tomentose. Flowers in axillary racemes, solitary or clustered, each with a single bract. Corolla tubular, curved, deeply split on one side, shortly 4-lobed, lobes all reflexed to one side away from the split. Stamens inserted at base of corolla lobes. Style long and slender. Fruit a berry, turbinate or pyriform.

*Scurrula parasitica* L., Sp. Pl. 1: 110. 1753; Kanjilal *et al.*, Fl. As. 4: 124. 1940; Sinha in Singh *et al.*, Fl. Mizo. 2: 447. 2012; *Loranthus scurrula* L., Sp. Pl. ed. 2: 472. 1762; Hook.f., Fl. Brit. Ind. 5: 208. 1886.

Shrub, branches lenticellate. Branchlets rusty-tomentose. Leaves opposite, ovate, elliptic, 5-10 x 2-5 cm, base cuneate or rounded, apex acute, margin entire, glabrescent above, tomentose beneath; petioles 0.6-1.2 cm. Flowers in axillary fascicles or in short racemes. Calyx turbinate. Corolla united into tube, tube yellowish red, split on one side, tomentose outside, lobes 4, greenish, linear. Stamens 4, filaments dark purple or dark red, anthers yellow. Styles filiform, dark purple, stigma subcapitate. Fruit pyriform.

**Fl. & Fr.:** July - October

**Distribution:** India, E Himalaya, Tropical and Subtropical Asia

**Specimen examined:** Grows parasitic on trees. Wazeho. NLNU 0621. (Pl. 52)

*Viscum* L., Sp. Pl.: 1023. 1753

Parasitic shrubs, stem terete. Leaves opposite, flat and thick or reduced to scales. Dioecious or monoecious. Flowers small, solitary or fascicled in axillary or terminal, subtended by small bracts. Perianth 3-4-lobed, male perianth tube solid; female flower

adnate to the ovary; anthers sessile, adnate to the perianth lobes. Ovary inferior, stigma sessile or sub-sessile. Fruit globose or ellipsoid.

***Viscum articulatum*** Burm.f., Fl. Ind. 311. 1768; Hook.f., Fl. Brit. Ind. 5: 226. 1886; Kanjilal *et al.*, Fl. As. 4: 119. 1940; Balakr., Fl. Jowai 2: 412. 1983; Sinha in Singh *et al.*, Fl. Mizo. 2: 452. 2012.

Shrubs, much branched, branches pendulous, semiparasitic, 2- or 3-chotomously branched, upto 1m long; internodes flattened, disarticulating at nodes. Leaves bracts like. Inflorescence lateral, sessile, cymes, 1-6-flowered in connate cupular bracts. Male flowers sessile, globose, perianth 4-lobed, free; bracteoles absent; stamens 4; pistillode absent. Female flowers sessile, perianth as in male; staminodes absent; bracts 2. Fruit a berry, sessile, globose.

**Fl. & Fr.:** July - March

**Distibution:** India (throughout), Tropical & Subtropical Asia to S. Pacific

**Specimen examined:** Grows parasitic on trees. Wazeho. NLNU 0629. **(Pl. 52)**

## SANTALACEAE

R. Br., Prodr. Fl. Nov. Holland. 350. 1810

Herbs, shrubs or trees, sometimes parasites. Leaves alternate, sometimes opposite, simple, entire, petiolate or sessile, stipules absent. Flowers unisexual or hermaphrodite, regular, in axillary racemes, cymes or panicles, clustered or solitary. Perianth tubular, 3-6-lobed. Stamens 3-6. Ovary unilocular, inferior; ovules 1-3. Fruit a nut or drupe, indehiscent.

***Dendrotrophe* Miq., Ned. Ind. 1.1: 779. 1856**

Shrubs, parasitic. Leaves alternate, petiolate or sessile, leathery, palmately 3-9 nerved, margin entire. Inflorescence axillary, fasciculate, cymose or umbellate. Flowers unisexual or bisexual. Perianth 5-6-lobed. Female flowers slightly larger than male, usually sessile, staminodes present. Ovary inferior, ovules 3. Fruit a drupe, ovoid, ovoid-ellipsoid, or subglobose.

***Dendrotrophe umbellata* (Blume) Miq., Fl. Ned. Ind. 1.1: 779. 1856; Balakr. Fl. Jowai 2: 415. 1983; *Viscum umbellatum* Blume, Bijdr. Fl. Ned. Ind. 666. 1826; *Henslowia umbellata* Blume, Mus. Bot. 1: 243. 1851; *H. heterantha* (DC.) DC. Prodr. 14: 632. 1857; Hook.f. Fl. Brit. Ind. 5: 233. 1886; Kanjilal *et al.*, Fl. As. 4: 130. 1940.**

Scandent or erect shrubs. Leaves obovate to suborbicular, base cuneate or attenuate, apex obtuse or rounded, basal nerves 3-5, palmately nerved; petiole 0.3-0.6 cm. Male flowers umbellate, sessile. Female flowers subsessile, perianth lobes 5, triangular. Fruit a drupe, obovoid.

**Fl. & Fr.:** February - June

**Distibution:** India (NE India), China, Cambodia, Malaysia, Vietnam

**Specimen examined:** Grows parasitic on trees. Sakraba. NLNU 0726.

**BALANOPHORACEAE**

Rich., Mem. Mus. Hist. Nat. 8: 429. 1822

Fleshy herbs with tuberous rootstocks, lacking chlorophyll, parasitic on roots of other trees, monoecious or dioecious. Stem stout, short, erect, naked or bearing scales, with a terminal club-shaped flower head. Flowers minute, numerous. Male flowers perianth 0 or 3-

8-lobed, regular or irregular, stamens 3-many, united into a column. Female flowers perianth absent or shortly 2-lipped, adnate to ovary. Fruit a small nut-like achene.

***Balanophora*** J.R.Forst. & G. Forst., Char. Gen. Pl.: 99. 1776

Glabrous fleshy herbs with waxy rootstock. Stems bearing scale leaves. Flowers minute, monoecious or dioecious. Male flowers, perianth 3-5-lobed, stamens many united into an ovoid, globose column. Female flowers perianth absent, ovary ellipsoid, bearing a single slender style.

***Balanophora dioica*** R. Br. ex Royle, Ill. Bot. Himal. Mts. 330. 1836; Hook.f., Fl. Brit. Ind. 5: 237. 1886; Kanjilal *et al.*, Fl. As. 4: 132. 1940; Balakr., Fl. Jowai 2: 416. 1983.

Fleshy root parasitic herbs, rootstock tuberous, rhizome simple or branched. Shoots red-purple or yellowish, stout, covered with sessile scale like leaves, glabrous. Inflorescence fleshy, club shaped. Bracts reddish, linear-lanceolate, surrounding flowers. Male heads ovoid. Female heads ellipsoid. Fruit minute, drupaceous.

**Fl. & Fr.:** October - February

**Distribution:** India (throughout), Bhutan, China, Myanmar, Nepal, Tibet

**Specimen examined:** Grows in shaded moist rich soil in primary forest. Tsupfume. NLNU 1034. (Pl. 52)

## **EUPHORBIACEAE**

Juss., Gen. Pl. 384. 1789

Trees, shrubs or herbs, often with milky sap, indumentum of simple or stellate hairs. Leaves simple or palmate, alternate, opposite or whorled, stipulate. Flowers unisexual, small, regular, solitary or in clusters, spikes, racemes, panicles or cymes, or in cup like cyathia. Perianth with 3-6 segments. Stamens 1-many. Ovary superior, styles 2-4, free or united, simple or bifid. Fruit a capsule or a drupe.



- 1a. Flowers enclosed in an involucre cup *Euphorbia*
- 1b. Flowers not enclosed in an involucre cup
  - 2a. Ovary with 1 ovule in each cell
    - 3a. Petals present
      - 4a. Inflorescence axillary, flowers in slender lax racemes or panicles *Ostodes*
      - 4b. Inflorescence terminal, flowers in spikes or racemes *Croton*
    - 3b. Petals absent
      - 5a. Shrubs or subshrubs; perianth lobes imbricate *Baliospermum*
      - 5b. Trees or shrubs; perianth lobes valvate
        - 6a. Indumentum of simple hairs; leaves usually peltate;  
stamens 1-30 *Macaranga*
        - 6b. Indumentum of simple and stellate hairs; leaves sometimes  
peltate; stamens numerous *Mallotus*
  - 2b. Ovary with 2-many ovule in each cell
    - 7a. Large trees; leaves 3-foliolate, margin distinctly serrate;  
styles entire *Bischofia*
    - 7b. Trees or shrubs; leaves simple, margin entire; styles bifid
- 8a. Petals present *Bridelia*
- 8b. Petals absent
  - 9a. Disc absent
    - 10a. Male flowers in catkin-like spikes *Aporosa*
    - 10b. Male flowers not like above *Breynia*
  - 9b. Disc present

11a. Ovary 1-celled	<i>Antidesma</i>
11b. Ovary 2-3 celled	
12a. Sepals 4; stamens 3-12	<i>Drypetes</i>
12b. Sepals 4-6; stamens 3-5	<i>Phyllanthus</i>

***Antidesma* L., Sp. Pl. 1027. 1753**

Trees or shrubs. Leaves alternate, without glands, entire, stipulate. Flowers dioecious, in slender racemes or spikes. Male flowers: calyx cup shaped, 3-5 lobed, petals absent, disc present, stamens 2-5, free. Female flowers: calyx as in male, ovary ovoid, 1-celled, 2 ovules in each cell, stigmas 2, bifid. Fruit a drupe, compressed, ellipsoid, with persistent terminal or subterminal stigmas.

*Antidesma buniis* (L.) Spreng. Syst. Veg. 1: 826. 1825; Hook.f., Fl. Brit. Ind. 5: 358. 1887; Brandis, Ind. Trees 564.1906; Kanjilal *et al.*, Fl. As. 4: 166. 1940; Balakr., Fl. Jowai 2: 423. 1983; Haridasan & Rao, For. Fl. Megh. 2: 770. 1987; *Stilago buniis* L. Mant. Pl. 122. 1767.

Small or medium sized trees, branchlets pubescent. Leaves oblong-lanceolate, elliptic-oblong, 5-16 x 2.5-5 cm, base subcordate or cuneate, apex obtuse, acute or shortly acuminate, coriaceous, stipules caducous. Flowers small, in terminal or axillary racemes, spikes tomentose. Male flowers sessile, calyx very shortly toothed, stamens 3. Female flowers shortly pedicelled, calyx persistent in fruit, disk glabrous, stigmas 3 or 4. Fruit globose or ellipsoid, red turning to black.

**Fl. & Fr.:** April - September

**Distribution:** India, Indonesia, Bangladesh, Bhutan, China, Laos, Malaysia, Myanmar, Nepal, Thailand, Sri Lanka, Vietnam, NE Australia

**Specimen examined:** Grows in open secondary forest. Khezhakhen. NLNU 00231. (Pl. 52)

*Aporosa* Bl., Bijdr. Fl. Ned. Ind.: 514. 1826

Trees. Leaves alternate, pinnately nerved, entire or shallowly dentate; stipules minute; petioles with 2 glands at apex. Dioecious. Flowers in axillary, solitary or clustered spikes or racemes, male flowers longer than female, bracteate. Male flowers sessile in clustered axillary catkin-like spikes; sepals 3-6, stamens 1-5; pistillode minute. Female flowers sessile in short bracteate spikes, sepals 3-6, styles 2, stigmas papillose. Fruit a drupe, 1-2 seeded.

*Aporosa octandra* (Buch.-Ham. ex D.Don) Vickery, Enum. Fl. Pl. Nepal 3: 193. 1982; Shukla & Sinha in Fl. Mizo. 2: 469. 2012; *Myrica octandra* Buch.-Ham. ex D.Don, Prodr. Fl. Nepal. 56. 1825; *Aporosa roxburghii* (Wall. ex Lindl.) Baill., Etude Euphorb. 645. 1858; Hook.f., Fl. Brit. Ind. 5: 347. 1887; Kanjilal *et al.*, Fl. As. 4: 162. 1940.

Trees, 6-12 m tall. Branches glabrous. Leaves elliptic-oblong to elliptic-lanceolate, 6-15 x 2.5-5 cm, base rounded or cuneate, apex acute to acuminate, glabrous, margin shallowly dentate, lateral nerves 7-9 pairs; petioles 1-2 cm long. Male flowers in axillary catkin-like, 2-4 cm long spikes, 1-4 per axil. Female flowers axillary, in short spikes or rarely solitary, 0.5-1 cm. Capsule ovoid-oblong.

**Fl. & Fr.:** March - July

**Distribution:** India, Bhutan, China, Laos, Malaysia, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in shady places in secondary forest. Chozuba. NLNU 0312.

***Baliospermum*** Bl., Bijdr. Fl. Ned. Ind. 603. 1826

Shrubs or subshrubs. Leaves simple, alternate, crenate or serrate, with 2 glands at the base, long petioled. Flowers monoecious or dioecious, clustered in racemes or panicles. Male flowers: sepals 4-6, petals absent, stamens 10-30, free. Female flowers: sepals 5-6, often accrescent, ovary 3-celled, style long, bifid. Fruit a capsule of 3-valved.

***Baliospermum calycinum*** Muell. Arg., Flora 47: 470. 1864; Hook.f., Fl. Brit. Ind. 5: 462. 1887; Brandis, Ind. Trees 583.1906; Kanjilal *et al.*, Fl. As. 4: 203. 1940; Balakr., Fl. Jowai 2: 430. 1983; Haridasan & Rao, For. Fl. Megh. 2: 775. 1987.

Shrubs, upto 2.5 m. Leaves broadly oblong-lanceolate, 13-25 x 4-9 cm, apex acuminate, base rounded or cuneate, margin serrate, sinuate-dentate, finely pubescent on nerves beneath. Flowers white or greenish white. Male flowers in 15-25 cm long panicles, bracts minute or absent, sepals 5, orbicular, membranous, disk glands fleshy, stamens 20. Female flower panicles shorter, corymbiform, bracts leafy, sepals 5, linear-lanceolate, accrescent in fruit. Ovary puberulent, styles 3, bifid at apex. Capsule subglobose, 3-lobed.

**Fl. & Fr.:** June - December

**Distribution:** India, Bangladesh, Bhutan, China, Myanmar, Nepal, Thailand

**Specimen examined:** Grows in primary or secondary forest as undergrowth. Pfutsero.

NLNU 0113. (Pl. 52)

***Bischofia*** Bl., Bijdr. Fl. Ned. Ind. 1168. 1827

Large trees. Leaves alternate, usually crowded at stem apex, palmately 3-foliolate, stipules small, caducous, petiole long. Flowers dioecious, in axillary or lateral panicles or racemose, pendent, produced with young leaves, each bracts with 1 flower. Male flowers: sepals 5, free, petals and disk absent, stamens 5, free, inserted at base of sepals, pistillode

peltate. Female flowers: sepals free, petals and disk absent, staminodes minute or absent; ovary 3 or 4 celled, ovules 2 per locule, styles 3-4, linear. Fruit globose, baccate, 3-6 seeded.

***Bischofia javanica*** Blume, Bijdr. Fl. Ned. Ind. 1168. 1827; Hook.f., Fl. Brit. Ind. 5: 345. 1887; Brandis, Ind. Trees, 558. 1906; Kanjilal *et al.*, Fl. As. 4: 141. 1940; Grierson & Long, Fl. Bhut. 2: 1. 130. 1991

Large trees, bole straight and crown spreading. Leaves 3-foliolate; leaflets elliptic or ovate-oblong, 7-14 x 5-8 cm, apex acuminate, base cuneate, glabrous, margin crenate. Flowers green, dioecious, axillary in paniculate racemes. Male flowers shortly pedicellate; sepals 5, stamens 5. Female flowers pedicelled, longer than male; styles linear, entire, ovary 3 or 4-celled, ovules 2 in each cell. Fruit globose, fleshy, brown when ripened.

**Fl. & Fr.:** April - October

**Distribution:** India, Bhutan, China, Indonesia, Laos, Malaysia, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam, Australia

**Specimen examined:** Grows in open primary and secondary forest. Khuza. NLNU 0815.

***Breynia*** J. R. Forst. & G. Forst., Char. Gen. Pl. 145. 1776

Shrubs or trees. Leaves simple, alternate, pinnately nerved, entire, stipules present. Flowers minute, monoecious, solitary or in axillary clusters. Male flowers calyx 6-lobed, united into turbinate tube, petals absent; stamens 3, filaments united into a short column. Female flowers perianth 6-lobed, persistent, accrescent in fruit; ovary 3-celled, styles 3, short, bifid. Fruit usually fleshy berry, globose or depressed.

***Breynia retusa*** (Dennst.) Alston, Ann. Roy. Bot. Gard. (Peradeniya) 11: 204. 1929; Balakr., Fl. Jowai 2: 424. 1983; Haridasan & Rao, For. Fl. Megh. 2: 776. 1987; Giri *et al.*, Mater. Fl.

Aruna. Pradesh, 2: 365. 2008; *Phyllanthus retusus* Dennst., Schlüssel Hortus Malab. 31. 1818; *P. patens* Roxb. Fl. Ind. 3: 667. 1832; *Breynia patens* (Roxb.) Rolfe, J. Bot. 20: 359. 1882; Hook.f., Fl. Brit. Ind. 5: 329. 1887; Brandis, Ind. Trees 568.1906; Kanjilal *et al.*, Fl. As. 4: 174. 1940.

Shrubs or small trees, glabrous. Leaves elliptic to ovate-oblong, 1.5-3 x 0.6-1.7 cm, base rounded or cuneate, apex acute to obtuse, glaucous beneath, stipules minute, acute. Flowers axillary, solitary or fascicled. Male flowers pale yellow, drooping, fascicled; calyx 6-lobed, turbinate. Female flowers greenish, solitary, calyx 6-lobed, deeply cleft, style 3, bifid. Fruit globose, orange yellow or reddish, subtended by enlarged persistent calyx.

**Fl. & Fr.:** March - July

**Distribution:** India, Indonesia, Bangladesh, Bhutan, Cambodia, China, Laos, Malaysia, Myanmar, Nepal, Thailand, Sri Lanka, Vietnam

**Specimen examined:** Grows in open secondary forest. Khezhakheno. NLNU 0233. **(Pl. 53)**

*Bridelia* Willd., Sp. Pl. ed. 4: 978. 1806

Shrubs or trees, sometimes climbing. Leaves alternate, distichous, entire with parallel lateral nerves; stipules present, early deciduous. Flowers small, monoecious or dioecious, surrounded by scarious bracts in axillary clusters or short spikes. Male flowers: calyx 5-lobed, persistent; petals 5, small, alternating with calyx lobes; stamens 5, filaments fused below into a column; pistillode present. Female flowers same as male, except with disc enclosing ovary; styles 2, stigma deeply bifid. Fruit a drupe, 1-2 seeded.

*Bridelia glauca* Blume, Bijdr. Fl. Ned. Ind.: 597. 1826; Shukla & Sinha in Singh *et al.*, Fl. Mizo. 2: 477. 2012; *B. pubescens* Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 42: 241. 1873;

Hook.f., Fl. Brit. Ind. 5: 270. 1887; Kanjilal *et al.*, Fl. As. 4: 145. 1940; Balakr., Fl. Jowai 2: 419. 1983.

Small trees, 6-15 m tall. Branchlets pubescent, with linear lenticels. Leaves elliptic-obovate, 5-12 x 3-5 cm, base cuneate, apex acute, glabrous above, pilose beneath; lateral nerves 7-11 pairs; stipules linear-lanceolate, 0.5 cm; petioles 0.4-1 cm. Flowers in axillary clusters, pubescent. Fruit a drupe, ellipsoid, with persistent calyx.

**Fl. & Fr.:** March - July

**Distribution:** India, Tropical and Subtropical Asia

**Specimen examined:** Grows in open secondary forest. Chozuba. NLNU 0314. (**Pl. 53**)

***Croton*** L., Sp. Pl.: 1004. 1753

Trees, shrubs, subshrubs or climbers. Leaves alternate, opposite or whorled near branch ends, with 2 glands at lamina base, pinnately or palmately veined, serrate, stipules minute or absent. Monoecious, flowers solitary or clustered in terminal or axillary, simple or branched raceme. Male flowers: calyx 5-lobed, petals 5-6, stamens many, reflexed in bud, filaments free. Female flowers: sepals as in males, petals minute or absent, disk annular or dissected. Ovary 3-celled, style slender, bifid. Fruit a capsule, 3-seeded, 3-lobed.

***Croton caudatus*** Geiseler, Croton Monogr. 73. 1807; Hook.f., Fl. Brit. Ind. 5: 388. 1887; Brandis, Ind. Trees 577.1906; Kanjilal *et al.*, Fl. As. 4: 194. 1940; Balakr., Fl. Jowai 2: 428. 1983; Haridasan & Rao, For. Fl. Megh. 2: 782. 1987; Grierson & Long, Fl. Bhut. 1: 3. 793. 1987.

Large scandent shrubs, young parts stellately hairy. Leaves ovate, 5-15 x 3-9 cm, base cordate or subcordate, apex acuminate, margin irregularly serrate-dentate, stellately hairy on both surface, more densely beneath, basal nerves 3-5, basal glands 2, stalked,

petiole 2-5 cm, stipules pinnatisect into filiform segments. Inflorescence in terminal racemes, 10-25 cm. Flowers in dense fascicles along rachis. Male flowers: petals as long as sepals, stamens numerous. Female flowers: sepals ovate, oblong, petals small. Ovary woolly, style bifid. Fruit a subglobose or ovoid, densely tomentose.

**Fl. & Fr.:** April - September

**Distribution:** India, Indonesia, Bangladesh, Bhutan, China, Laos, Malaysia, Myanmar, Nepal, Pakistan, Thailand, Sri Lanka, Vietnam, N Australia

**Specimen examined:** Grows on slopes in sparse forest and along roadsides. Chepoketa. NLNU 0945. (Pl. 53)

*Drypetes* Vahl, Eclog. Amer. 3: 49. 1807

Trees. Leaves simple, alternate, pinnately veined, base usually oblique, margin entire or minutely serrate. Flowers unisexual, in axillary fascicles or racemes, or solitary. Male flowers: sepals 4, stamens 3-12, free. Female flowers: sepals as in male, ovary 2-3-celled, styles short, stigma dilated, ovules 2 in each cell. Fruit a drupe, globose or ovoid, indehiscent.

*Drypetes indica* (Mull.Arg.) Pax & K.Hoffm., Pflanzenr. (Engler) Euphorb.-Phyllanthoid.-Phyllanth. 278. 1922; Grierson & Long, Fl. Bhut. 1: 3. 785. 1987; Shukla & Sinha in Singh *et al.*, Fl. Mizo. 2: 490. 2012; *Cyclostemon indicus* Mull. Arg., Linnaea 32: 81. 1863; Hook.f., Fl. Brit. Ind. 5: 340. 1887.

Evergreen trees, 10-15 m tall. Leaves alternate, oblong-lanceolate or ovate-lanceolate, 7-11 x 2-3.5 cm, base cuneate, oblique, apex caudate-acuminate, margin entire, membranous, glabrous; petioles 0.8-1.5 cm long. Male flowers: axillary, subsolitary, sepals 4; stamens 4-8, included. Female flowers on long pedicels of 2.5-3.5 cm, sepals 4; stigma



borne on short style. Drupe oblong, 1-2.5 cm long, covered with short white hairs, indehiscent.

**Fl. & Fr.:** October - April

**Distribution:** India (NE India), E Himalaya, Bangladesh, Bhutan, China, Myanmar, Thailand

**Specimen examined:** Grows in primary or secondary forest. Mesulumi. NLNU 0445. (**Pl. 53**)

*Euphorbia* L., Sp. Pl. 1: 450. 1753

Herbs, shrubs or trees, with milky juice; stem sometimes succulent. Leaves alternate or opposite, usually entire. Flowers monoecious, solitary, clustered or umbellate cyathia, each cyathium is composed of a cup like involucre, each cup contain a single central female flower surrounded by several minute male flowers. Female flowers pedicellate, ovary 3-celled, styles 3. Male flower reduced to a single stamen. Fruit a capsule, 3-valved.

*Euphorbia hirta* L. Sp. Pl. 454. 1753; Hook.f., Fl. Brit. Ind. 5: 250. 1887; Kanjilal *et al.*, Fl. As. 4: 141. 1940; Balakr., Fl. Jowai 2: 419. 1983; Grierson & Long, Fl. Bhut. 1: 3. 766. 1987.

Erect or decumbent annual herbs, 15-50 cm, densely pubescent. Leaves opposite, ovate-lanceolate or elliptic lanceolate, 2-4 x 1-1.5 cm, apex acute to subobtuse, base rounded at one side, cuneate at the other, margin serrate. Cyathia axillary, clustered in globose head, subsessile. Capsule globose, minutely pubescent.

**Fl. & Fr.:** January - December

**Distribution:** Cosmopolitan

**Specimen examined:** Grows in wastelands, cultivated fields, roadsides. Chepoketa. NLNU 0951.

***Macaranga*** Thouars, Gen. Nov. Madagasc. 26. 1806

Trees. Leaves alternate, usually peltate, palmately 5-13 nerved, sometimes pinnately nerved to base, gland dotted beneath, stipules small or large, often caducous. Flowers dioecious, in axillary racemes or panicles. Male flowers minute, clustered in axils of bracts; calyx 2-4-lobed, petals absent, stamens 2-30, free. Female flowers few in axil of bract, calyx 2-4-lobed, petals absent, ovary 1-3-celled, styles 1-3, simple. Fruit a capsule, simple or deeply 2-3-lobed.

***Macaranga denticulata*** (Blume) Mull. Arg., DC. Prodr. 15.2: 1000. 1866; Hook.f., Fl. Brit. Ind. 5: 446. 1887; Brandis, Ind. Trees 591.1906; Kanjilal *et al.*, Fl. As. 4: 218. 1940; Balakr., Fl. Jowai 2: 431. 1983; Haridasan & Rao, For. Fl. Megh. 2: 793. 1987; Grierson & Long, Fl. Bhut. 1: 3. 804. 1987.

Trees, upto 10 m tall. Leaves broadly ovate-deltoid, 14-27 x 11-22, apex shortly acuminate, base peltate, cordate or truncate, margins sinuate-denticulate, densely gland-dotted beneath, basal nerves 9-11, petioles 6-20 cm, stipules caducous. Inflorescence in axillary panicles. Male flowers minute, sessile, sepals 2-3, stamens 6-30. Female flowers on short pedicels, sepals 3-4. Capsule subglobose, with waxy orbicular glands.

**Fl. & Fr.:** March - July

**Distribution:** India, Bangladesh, Bhutan, China, Laos, Malaya, Myanmar, Nepal, Sumatra, Thailand

**Specimen examined:** Grows in secondary forest. Chepoketa. NLNU 0955.

***Mallotus*** Lour., Fl. Cochinch. 2: 635. 1790

Trees or shrubs. Leaves alternate or subopposite, entire or 3-lobed, palmately 3-9 veined, sometimes peltate at base, with discoid glands near base, stipules minute. Flowers

dioecious, in terminal or axillary, simple or branches racemes or spikes. Male flowers: sepals 3-4, petals absent, stamens 25-50, free. Female flowers: petals 3-6, ovary 2-3-celled, style 2-3, simple, papillose or entire. Capsule glandular, smooth or bristly.

1a. Leaves orbicular or broadly ovate, membranous; capsule tomentose *M. nepalensis*

1b. Leaves not orbicular, coriaceous; capsule covered by crimson powder *M. philippensis*

*Mallotus nepalensis* Mull. Arg., Linnaea 34: 188. 1865; Hook.f., Fl. Brit. Ind. 5: 428. 1887; Brandis, Ind. Trees 588.1906; Kanjilal *et al.*, Fl. As. 4: 215. 1940; Haridasan & Rao, For. Fl. Megh. 2: 795. 1987; Grierson & Long, Fl. Bhut. 1: 3. 800. 1987.

Small or medium sized tree, upto 10 m tall, bark shallowly reticulately fissured. Leaves alternate or subopposite, broadly ovate or suborbicular, 10-22 x 7-16 cm, apex acuminate, base rounded or truncate, margin entire, stellate tomentose and gland-dotted beneath, basal nerve 3 or 5, petioles 5-15 cm, tomentose, stipules minute, caducous. Male racemes upto 25 cm, stamens numerous. Female racemes shorter than male. Capsule bristly tomentose.

**Fl. & Fr.:** May - September

**Distribution:** India (NE India), Bhutan, China, Myanmar, Nepal

**Specimen examined:** Grows in open secondary forest. Tsupfume. NLNU 1040. **(Pl. 53)**

*Mallotus philippensis* (Lam.) Muell. Arg. Linnaea 34: 196. 1865; Hook.f., Fl. Brit. Ind. 5: 442. 1887; Brandis, Ind. Trees 590.1906; Kanjilal *et al.*, Fl. As. 4: 216. 1940; Haridasan & Rao, For. Fl. Megh. 2: 796. 1987; Grierson & Long, Fl. Bhut. 1: 3. 802. 1987.

Small or medium sized tree, young branches rusty tomentose. Leaves coriaceous, ovate-lanceolate or ovate-oblong, 5-18 x 2.5-9 cm, acuminate, base cuneate or rounded, 3-

nerved at base, margin subentire, puberulous beneath with red glands. Flowers dioecious, in terminal spikes, paniculate, sessile or subsessile. Male flowers clustered, very shortly pedicelled, stamens numerous. Female flowers not clustered, subsessile, ovary tomentose with crimson glands, styles 3, plumose. Capsules covered densely with crimson powder. Seeds subglobose.

**Fl. & Fr.:** September - April

**Distribution:** India, Bhutan, China, Myanmar, Nepal, Philippines, Thailand, Vietnam, N Australia

**Specimen examined:** Grows in open secondary forest. Khuza. NLNU 0821. (Pl. 53)

*Ostodes* Blume, Bijdr. Fl. Ned. Ind. 12: 619. 1826

Shrubs or trees. Leaves alternate, 3-nerved at base, 2 glands at base, stipule caducous. Inflorescence axillary or subterminal, in lax panicles or racemes in axils of fallen leaves. Male flowers: sepals 5, petals 5-6, stamens 8-35, free. Female flowers: sepals as in male, ovary 3-celled, styles 3, bifid. Capsule subglobose, 6-ribbed, 3-seeded.

*Ostodes paniculata* Blume, Bijdr. Fl. Ned. Ind. 12:620. 1826; Hook.f., Fl. Brit. Ind. 5: 400. 1887; Brandis, Ind. Trees 580.1906; Kanjilal *et al.*, Fl. As. 4: 197. 1940; Haridasan & Rao, For. Fl. Megh. 2: 797. 1987. Grierson & Long, Fl. Bhut. 1: 3. 795. 1987.

Trees, upto 15 m tall, bark grey or dark brown. Leaves often clustered at the end of branches, ovate, ovate-elliptic, 11-26 x 5-11 cm, apex acuminate, base rounded or broadly cuneate, margin distantly serrate, lateral nerves 7-8. Male panicles 15-30 cm long, pendulous, sepals 3, petals 4-5, pinkish white, stamens 20-35. Female panicles shorter than male, sepals and petals as in male; disk annular, ovary tomentose, styles 3, bifid. Capsule subglobose, 3-lobed.

**Fl. & Fr.:** March - September

**Distribution:** India, Bhutan, China, Malaysia, Myanmar, Nepal, Vietnam,

**Specimen examined:** Grows in open secondary forest. Chozuba. NLNU 0360. (Pl. 54)

*Phyllanthus* L., Sp. Pl. 981. 1753

Herbs, shrubs or trees. Leaves simple, alternate, entire, distichous, stipules present. Flowers monoecious, axillary, solitary or in fascicles or clusters. Male flowers: sepals 4-6, petals absent; stamens 3-5, filaments free or connate. Female flowers: sepals 4-6, petals absent; ovules 2 in each cell, styles free or connate, bifid. Fruit a capsule, globose or depressed globose, smooth or warty, fleshy berry or drupe.

1a. Herbs, 10-50 cm; sometimes woody at base *P. urinaria*

1a. Shrubs or trees

2a. Leaves linear, oblong, 0.1-0.3 cm broad; fruit fleshy *P. emblica*

2b. Leaves ovate, broadly elliptic, 2-5 cm broad; fruit a woody capsule *P. velutinus*

*Phyllanthus emblica* L., Sp. Pl. 982. 1753; Hook.f., Fl. Brit. Ind. 5: 289. 1887; Giri *et al.*, Mater. Fl. Aruna. Pradesh, 2: 380. 2008; *Emblica officinalis* Gaertn., Fruct. Sem. Pl. 2: 122. 1790; Kanjilal *et al.*, Fl. As. 4: 159. 1940.

Shrubs or tree, deciduous, bark grayish brown. Leaves appearing with flowers, distichous, numerous, linear-oblong, 0.5-1.2 x 0.1-0.3 cm, glabrous. Flowers yellowish, in axillary clusters at the base of leaves, towards the lower portion of the branchlets. Male flowers: perianth 6, pedicelled, stamens 3, filaments connate into short column. Female flowers subsessile, perianth 6, ovary 3-celled, ovules 2 in each cell. Fruit a drupe, globose, fleshy, yellowish on ripening.

**Fl. & Fr.:** April - December

**Distribution:** India, Bangladesh, Bhutan, Cambodia, China, Indonesia, Laos, Myanmar, Nepal, Thailand, Sri Lanka

**Specimen examined:** Grows in open secondary forest, on sunny slopes. Thetsumi. NLNU 0732. (Pl. 54)

*Phyllanthus velutinus* (Wight) Mull. Arg., Flora 48: 387. 1865; *Glochidion velutinum* Wight, Icon. Pl. Ind. Orient. 5: t. 1907. 1852; Hook.f., Fl. Brit. Ind. 5: 322. 1887; Brandis, Ind. Trees 574.1906; Kanjilal *et al.*, Fl. As. 4: 185. 1940; Haridasan & Rao, For. Fl. Megh. 2: 792. 1987; Giri *et al.*, Mater. Fl. Aruna. Pradesh, 2: 374. 2008.

Shrubs or small trees, branchlets tomentose, bark brownish. Leaves ovate, elliptic to oblong-lanceolate, 4-10 x 2-5 cm, apex acute or shortly acuminate, base cuneate or rounded, glabrescent above, tomentose beneath. Flowers in axillary clusters; male and female usually together. Male flowers shortly pedicelled, sepals 6, stamens 3. Female flowers subsessile, sepals 6, ovary globose, tomentose. Capsule depressed globose, 4-10 lobed.

**Fl. & Fr.:** April - October

**Distribution:** India, Bangladesh, Bhutan, Cambodia, China, Laos, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in open secondary forest. Thetsumi. NLNU 0734. (Pl. 54)

*Phyllanthus urinaria* L., Sp. Pl. 982. 1753; Hook.f., Fl. Brit. Ind. 5: 293. 1887; Kanjilal *et al.*, Fl. As. 4: 155. 1940; Balakr., Fl. Jowai 2: 426. 1983; Grierson & Long, Fl. Bhut. 1: 3. 772. 1987; Giri *et al.*, Mater. Fl. Aruna. Pradesh, 2: 381. 2008.

Erect or procumbent herbs, upto 50 cm tall, stem much branched at base, ridged. Leaves distichous, subsessile, linear oblong, apex acute to apiculate, base rounded or oblique, glabrous, glaucous beneath, margin ciliate. Flowers solitary or in 2-3 flowered

axillary clusters. Male flowers in distal parts of branchlets, female in middle and lower parts of branchlets. Fruit globose, tuberculate, brownish when dried.

**Fl. & Fr.:** April - October

**Distribution:** India, Bhutan, China, Indonesia, Laos, Malaysia, Nepal, Sri Lanka, Thailand, Vietnam, South America

**Specimen examined:** Grows in wastelands, moist shady places. Thetsumi. NLNU 0788.

## ULMACEAE

Mirbel, Elem. Phys. Veg. Bot. 2: 905. 1815

Trees or shrubs. Leaves alternate, simple, base oblique. Flowers in axillary clusters, racemes or cymes. Perianth segments 4-8, free or united. Stamens equal and opposite to perianth segments. Ovary superior, styles 2. Fruit a samara or drupe.

*Trema* Lour., Fl. Cochinch. 562. 1790

Shrubs or trees, evergreen or deciduous. Leaves simple, alternate, strongly 3 veined at base, stipules deciduous. Flowers unisexual, cymes axillary, 4-5 merous, perianth segments free. Male flowers, perianth incurved, sometimes pistillode. Female flowers with sessile ovary. Fruit a drupe, elliptic to globose.

*Trema orientale* (L.) Blume, Mus. Bot. 2: 62. 1856; Hook.f., Fl. Brit. Ind. 4: 484. 1888; Kanjilal *et al.*, Fl. As. 4: 230. 1940; Balakr., Fl. Jowai 2: 433. 1983; Haridasan & Rao, For. Fl. Megh. 2: 808. 1987; *Celtis orientalis* L., Sp. Pl. 1044. 1753.

Small trees. Bark thin, with numerous lenticels, branches drooping. Leaves ovate-lanceolate, 8-15 x 3-7 cm, apex caudate-acuminate, base cordate, subcordate or oblique, margin serrate, scabrid above, white tomentose beneath; petiole 0.5-1.5 cm. Flowers in

axillary cymes, white. Male cymes dense, female cymes lax, perianth pubescent. Drupe ovoid, black when matured.

**Fl. & Fr.:** March-October

**Distribution:** India, SE Asia, Africa

**Specimen examined:** Grows in open slopes, forest margins. Thetsumi NLNU 0790. **(Pl. 54)**

## CANNABACEAE

Endl. Gen. Pl. 286. 1837

Herbs, shrubs or trees, dioecious. Leaves alternate, opposite, simple, palmately compound, stipulate. Inflorescence axillary, racemes or cymes. Flowers unisexual or bisexual. Perianth segments 4-5, free or united. Stamens as many as perianth segments. Carpels 2, styles 2-fid, ovule solitary, apical, pendulous. Fruit a samara or drupe, or an achene.

*Cannabis* L., Sp. Pl. 1027. 1753

Herbs, annual, erect. Leaves alternate, palmately compound, stipulate. Flowers dioecious, male flowers in cymes, perianth 5. Female flowers sessile, in compact cymes, perianth not lobed. Style bifid, ovule solitary. Fruit an achene, enclosed by persistent perianth.

*Cannabis sativa* L., Sp. Pl. 1027. 1753; Hook.f., Fl. Brit. Ind. 5: 487. 1888; Kanjilal *et al.*, Fl. As. 4: 278. 1940; Haridasan & Rao, For. Fl. Megh. 2: 810. 1987.

Erect herbs, aromatic. Leaves palmately compound, leaflets lanceolate, serrate, apex acuminate, base attenuate, stipulate; petioles upto 7 cm long. Male flowers in panicked cymes. Female flowers in apical leaf axils, green, sessile. Achene ovoid, compressed.

**Fl. & Fr.:** July-November



**Distribution:** India, Bhutan, China, Central Asia

**Specimen examined:** Grows in wastelands, in moist shaded areas. Tsupfume NLNU 1041.

(Pl. 54)

## MORACEAE

Gaudich., Gen. Pl. 13. 1835

Trees, shrubs or herbs, often with milky latex. Leaves alternate, rarely opposite, simple or lobed, pinnately nerved but often palmately nerved at base; stipules 2, deciduous leaving annulate scar. Flowers unisexual or bisexual, small, in heads, racemes or catkinete spikes. Perianth segments (2-) 4 (-6), united or free, sometimes absent, often becoming fleshy in fruit. Stamens 1-4. Ovary 1-locular; style bifid or simple. Fruit an achene.

- 1a. Flowers borne on inner walls of hollow, globose, fleshy receptacle *Ficus*
- 1b. Flowers partially sunk into surface of solid, globose or oblong receptacles,  
or borne on catkins or globose heads
  - 2a. Stipules small, leaving no annular scar on branches *Morus*
  - 2b. Stipules leaving annular scar on branches *Artocarpus*

*Artocarpus* J.R.Forst. & G. Forst., Char. Gen. Pl. 101. 1776

Trees, deciduous or evergreen, with milky latex. Leaves alternate, coriaceous, simple, young leaves sometimes lobed, stipules usually leaving annular scars. Flowers unisexual, crowded into densely subglobose or oblong head, axillary, or on main branches of trunk. Male flowers: perianth 2-4-lobed; stamen 1; pistillode absent. Female flowers: immersed in receptacle perianth tubular, style central or lateral. Fruit an enlarged fleshy oblong, cylindric globose syncarp.

*Artocarpus lacucha* Buch.-Ham., Mem. Wern. Nat. Hist. Soc. 5: 333. 1826; Grierson & Long, Fl. Bhut. 1. 1: 100. 1983; *A. lakoocha* Roxb., Fl. Ind. 3: 524. 1832; King in Hook.f., Fl. Brit. Ind. 5: 543. 1888; Kanjilal *et al.*, Fl. Assam 4: 268. 1940; Shukla & Sinha in Singh *et al.*, Fl. Mizo. 2: 565. 2012.

Large trees, young parts tomentose, bark dark brown. Leaves broadly elliptic-oblong or ovate, 10-25 x 5-15 cm, base broadly cuneate, apex short acuminate, margins entire or shallowly denticulate; petioles 2-5 cm; stipules ovate-lanceolate. Flowers axillary, solitary. Male heads ovoid to ellipsoid, spongy, yellow. Female heads with style exserted. Syncarp subglobose, irregularly lobed, yellow or orange red when ripened.

**Fl. & Fr.:** February - May

**Distribution:** India (throughout), E & W Himalaya, Bangladesh, Bhutan, China, Myanmar, Nepal, New Guinea, Philippines, Thailand, Vietnam

**Specimen examined:** Grows in primary and secondary forests. Chepoketa. NLNU 0960.

*Ficus* Tourn. ex L., Sp. Pl. 1059. 1753

Trees or shrubs, climbers or sometimes epiphytic, with milky latex. Leaves alternate, rarely opposite, lobed or unlobed; stipules enclosing terminal bud, caducous and leaving a scar. Flowers enclosed within fleshy receptacles, borne in axils on branches or on leafless shoots arising from the main stem and branches. Male flowers: perianth 2-6; stamens 1-2, rarely 3-6, erect in bud. Female flowers: perianth as in male or imperfect; ovary free. Fruit an achene, usually enclosed within syncarp formed from an enlarged hollow fleshy receptacle.

1a. Receptacle sessile or subsessile

2a. Branchlets glabrous, leaves lanceolate

*F. neriifolia*

- 2a. Branchlets hirsute or pubescent
  - 3a. Receptacle paired axillary or from axil of fallen leaves *F. fulva*
  - 3b. Receptacle axillary, crowded towards stem apices *F. hirta*
- 1a. Receptacle distinctly pedunculate
  - 4a. Receptacle 4-5 cm across *F. auriculata*
  - 4b. Receptacle 0.5-3 cm across
    - 5a. Leaves opposite *F. hispida*
    - 5b. Leaves alternate
      - 6a. Leaves asymmetric, base unequal or oblique
        - 7a. Receptacles borne on leafy branches *F. cyrtophylla*
        - 7b. Receptacles borne on leafless branches *F. semicordata*
      - 6b. Leaves symmetric, base equal or slightly oblique
        - 8a. Scandent shrubs, margins entire *F. hederacea*
        - 8b. Erect shrubs or trees; margins coarsely toothed above middle *F. subincisa*

***Ficus auriculata*** Lour., Fl. Cochinch. 666. 1790; Balakr., Fl. Jowai 2: 439. 1983 ; Shukla & Sinha in Singh *et al.*, Fl. Mizo. 2: 570. 2012; *F. roxburghii* Wall. ex Steud., Nomencl. Bot., ed. 2. 1: 637. 1840; King in Hook.f., Fl. Brit. Ind. 5: 534. 1888; Kanjilal *et al.*, Fl. As. 4: 262. 1940.

Trees, young branches hollow. Leaves alternate, broadly ovate-orbicular, 12-30 x 10-25 cm, base cordate or rounded, apex acute or short acuminate, margins entire or dentate, glabrous above, puberulous beneath, 5-7 nerved at base; petioles upto 15 cm; stipules large, ovate-lanceolate, pubescent. Receptacles solitary or fascicled, on short leafless branches and at trunk bases; turbinate, 5-7 cm across, often depressed tuberculate.

**Fl. & Fr.:** August - May

**Distribution:** India (throughout), E & W Himalaya, China, Myanmar, Nepal, Pakistan, Thailand, Vietnam,

**Specimen examined:** Grows in primary or secondary open forests. Lozaphuhu. NLNU 0481. **(Pl. 54)**

*Ficus cyrtophylla* (Miq.) Miq., Ann. Mus. Bot. Lugduno-Batavi 3: 282; Grierson & Long, Fl. Bhut. 1. 1: 90. 1983; Deb & R.M. Dutta in J. Econ. Taxon. Bot. 10(1): 55. 1987; Shukla & Sinha in Singh *et al.*, Fl. Mizo. 2: 574. 2012; *F. obscura* Blume, Bijdr. 9: 474. 1825; King in Hook. f., Fl. Brit. Ind. 5: 521. 1888; Kanjilal *et al.*, Fl. Assam 4: 250. 1940.

Trees, about 7 m tall, densely brown pubescent. Leaves asymmetric, elliptic-lanceolate, or oblanceolate, 8-18 x 4-7 cm, base obliquely rounded or cordate, apex acuminate, margin subentire or serrate, hispid on both surfaces; petioles 1-1.5 cm, hairy; stipules lanceolate. Receptacle axillary in pairs, solitary or in clusters, ellipsoid or globose, 0.5-0.7 cm in diameter, borne mostly on leafy branches, red when ripe.

**Fl. & Fr.:** April – June

**Distribution:** India (NE India), E Himalaya, Bhutan, China, Myanmar, Thailand, Vietnam

**Specimen examined:** Grows in open forests. Sakraba. NLNU 0661. **(Pl. 55)**

*Ficus fulva* Reinw. ex Blume, Bijdr. Fl. Ned. Ind. 478. 1825; King in Hook.f., Fl. Brit. India 5: 531. 1888; Balakr., Fl. Jowai 2: 440. 1983; Shukla & Sinha in Singh *et al.*, Fl. Mizo. 2: 576. 2012.

Trees or shrubs, 2-10 m tall, branchlets and young leaves densely brown hirsute. Leaves elliptic to ovate-oblong, 10-15 x 4-7 cm, base subcordate or rounded, apex acute or short apiculate, margins serrate; petioles 2-5 cm, densely hirsute; stipules ovate. Receptacles

sessile, crowded towards stem apex, axillary, solitary or paired, ovoid, about 1.5 cm across, densely brown pilose, basal bracts 3, ovate.

**Fl. & Fr.:** July - March

**Distribution:** India (NE India), Bangladesh, Bhutan, Myanmar, Sumatera, Thailand, Vietnam

**Specimen examined:** Grows in open forests. Chizami. NLNU 0554. **(Pl. 55)**

*Ficus hederacea* Roxb., Fl. Ind., ed. 1832, 3: 538. 1832; Grierson & Long, Fl. Bhut. 1. 1: 98. 1983; Haridasan & Rao, Forest Fl. Megh. 2: 826. 1987; *F. scandens* Roxb., Fl. Ind. 3: 536. 1832; King in Hook, f., Fl. Brit. Ind. 5: 526. 1888; Kanjilal *et al.*, Fl. As. 4: 260. 1940.

Scandent shrubs, pubescent when young, often rooting at nodes. Leaves alternate, ovate-elliptic, 5-10 x 3-5 cm, base broadly cuneate, apex acute, coriaceous, scabrid above, pubescent beneath, margins entire. Receptacles axillary on leafy or on leafless branchlets, solitary or paired, pedunculate, globose, about 1 cm across, yellowish green to red when matured; apical pore navel-like; bracts 3, persistent.

**Fl. & Fr.:** May - December

**Distribution:** India (NE India), E & W Himalaya, Bangladesh, Bhutan, China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in open forests. Sakraba. NLNU 0664. **(Pl. 55)**

*Ficus hispida* L.f., Suppl. Pl. 442. 1782; King in Hook.f., Fl. Brit. Ind. 5: 522. 1888; Brandis, Ind. Trees 606. 1906; Kanjilal *et al.*, Fl. As. 4: 252. 1940; Balakr., Fl. Jowai 2: 438. 1983; Shukla & Sinha in Singh *et al.*, Fl. Mizo. 2: 580. 2012.

Shrubs or small trees; branchlets hollow, pubescent. Leaves opposite, obovate, or elliptic-obovate, 10-25 x 6-16 cm, base subcordate or rounded, apex acute-apiculate, margin

dentate-serrate, scabrous above, hispid pubescent beneath, 3-5 nerved at base; petioles 1-5 cm. Receptacles solitary or paired or fascicled on short tubercles from old wood or on leafy branches, obovoid or turbinate, hispid.

**Fl. & Fr.:** February - September

**Distribution:** India (throughout), China, Tropical Asia, N Australia

**Specimen examined:** Grows in open forests. Sakraba. NLNU 0658.

*Ficus neriifolia* Sm., Rees. Cycl. 14: n. 21. 1810; Grierson & Long, Fl. Bhut. 1. 1: 95. 1983; Haridasan & Rao, Forest Fl. Megh. 2: 830. 1987; Shukla & Sinha in Singh *et al.*, Fl. Mizo. 2: 582. 2012.

Small trees or shrubs, leaf traces and stipular scar conspicuous, branches glabrous. Leaves lanceolate or elliptic-lanceolate, 6-12 x 2-4 cm, base cuneate, apex acuminate, margins entire, glabrous on both surfaces, basal nerves 3; petioles 1-5 cm long, pale reddish pink. Receptacles sessile or subsessile, axillary on leafy or axils of fallen leaves, paired, ellipsoid or clavate, 0.8 cm across.

**Fl. & Fr.:** February - September

**Distribution:** India (NE India), E & W Himalaya, China, Bhutan, Myanmar, Nepal, Thailand

**Specimen examined:** Grows in open forests. Pfutsero. NLNU 01075. (**Pl. 55**)

*Ficus semicordata* Buch.-Ham. ex Sm., Rees, Cycl. 14: n. 71. 1810; Balakr., Fl. Jowai 2: 438. 1983 ; Shukla & Sinha in Singh *et al.*, Fl. Mizo. 2: 587. 2012; *F. cunia* Roxb., Fl. Ind. 3: 561. 1832; King in Hook.f., Fl. Brit. Ind. 5: 523. 1888; Kanjilal *et al.*, Fl. As. 4: 253. 1940.

Small trees. Leaves alternate, oblong to elliptic-lanceolate, 10-30 x 3-12 cm, base oblique or unequal subcordate, apex acuminate, margins distantly serrate, scabrid hispid on both surfaces; petioles upto 2.5 cm long; stipules linear lanceolate. Receptacles in pairs or in clusters on long leafless stolons arising from trunk base and running on the ground, globose or pyriform, pubescent, reddish-brown when ripe.

**Fl. & Fr.:** August - May

**Distribution:** India (throughout), E & W Himalaya, Bangladesh, Bhutan, China, Myanmar, Nepal, Pakistan, Thailand, Vietnam,

**Specimen examined:** Grows in open forests. Kikrumba. NLNU 0470. (Pl. 55)

*Ficus simplicissima* Lour., Fl. Cochinch. 667. 1790; *F. hirta* Vahl, Enum. Pl. 2: 201. 1805; King in Hook.f., Fl. Brit. Ind. 5: 531. 1888; Brandis, Ind. Trees 608. 1906; Kanjilal *et al.*, Fl. As. 4: 255. 1940; Balakr., Fl. Jowai 2: 439. 1983; Shukla & Sinha in Singh *et al.*, Fl. Mizo. 2: 579. 2012.

Shrubs or small trees, branches hollow; young parts pubescent. Leaves alternate, 3-5-lobed, oblong-lanceolate or elliptic-oblong, 8-25 x 3-13 cm, base obtuse or rounded, apex acuminate, margin serrate-dentate, 3-7-nerved at base, petioles 2-10 cm long, hispid. Receptacle axillary or in axils of fallen leaves, in pairs, sessile to subsessile, subglobose, bristly hairy.

**Fl. & Fr.:** October - May

**Distribution:** India (NE India), E Himalaya, Bangladesh, China, Myanmar, Nepal, Sumatera, Thailand, Vietnam

**Specimen examined:** Grows in open forests. Sakraba. NLNU 0690.

***Ficus subincisa*** Buch.-Ham. ex Sm., Rees, Cycl. 14: n. 91. 1810; Grierson & Long, Fl. Bhut. 1. 1: 98. 1983; Haridasan & Rao, Forest Fl. Megh. 2: 833. 1987; Shukla & Sinha in Singh *et al.*, Fl. Mizo. 2: 589. 2012; *F. clavata* Wall. ex Miq., London J. Bot. 7: 431. 1848; King in Hook. f., Fl. Brit. Ind. 5: 520. 1888; Kanjilal *et al.*, Fl. As. 4: 248. 1940.

Shrubs or small trees, young parts scabrid, Leaves oblong-lanceolate or oblanceolate, 4-13 x 2-4 cm, base attenuate, apex caudate-acuminate, margin coarsely toothed near apex, coriaceous, glabrous; petioles upto 0.8 cm. Receptacles axillary, solitary, borne on leafy branchlets, globose or obovoid, tuberculate and lenticellate, glabrescent at maturity.

**Fl. & Fr.:** September - June

**Distribution:** India (throughout), E & W Himalaya, Bhutan, Bangladesh, China, Myanmar, Nepal, Thailand, Vietnam,

**Specimen examined:** Grows in primary or secondary forests. Tsupfume. NLNU 1045. (**Pl. 55**)

***Morus*** L., Sp. Pl. 2: 986. 1753

Trees or shrubs, deciduous. Leaves alternate, simple to palmately lobed, 3-5-nerved at base; stipules linear lanceolate, lateral, caducous. Male inflorescence axillary, many flowered in catkinate spikes; perianth 4-lobed; stamens 4. Female inflorescence shortly spicate; perianth 4, becoming fleshy in fruit; ovary 1-loculed; stigma bifid. Fruit aggregated into juicy syncarp.

1a. Female catkins cylindric, 6-12 cm long

*M. macroura*

1b. Female catkin ovoid or globose, about 1 cm long

*M. indica*

***Morus indica*** L., Sp. Pl. 2: 986. 1753; Hook.f., Fl. Brit. Ind. 5: 492; Brandis, Ind. Trees 612. 1906; Kanjilal *et al.*, Fl. As. 4: 248. 1940.



Shrubs or small trees. Bark grayish brown. Leaves ovate to broadly ovate-lanceolate, 4-13 x 3-8 cm, base cordate, apex caudate-acuminate, margins unequally serrate, simple or 3-5-lobed, membranous; petioles 2-4 cm long. Male spikes 2-3 cm long, laxly flowered. Female spikes about 1 cm long, globose. Syncarp red to dark purple when ripened, shortly cylindric.

**Fl. & Fr.:** March - August

**Distribution:** India (throughout), E Himalaya, Bhutan, Bangladesh, China, Japan, Korea, Laos, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in secondary forests and also cultivated . Sakraba.NLNU 0699.

**(Pl. 56)**

*Morus macroura* Miq., Pl. Jungh. 42. 1851; Shukla & Sinha in Singh *et al.*, Fl. Mizo. 2: 594. 2012; *M. laevigata* Wall. ex Brandis, Forest Fl. N.W. India: 409. 1874; Hook.f., Fl. Brit. Ind. 5: 492. 1888; Kanjilal *et al.*, Fl. As. 4: 274. 1940.

Large trees, young parts pubescent. Leaves ovate to broadly ovate, 6-17 x 5-10 cm, base cordate, oblique, apex caudate-acuminate, membranous, margins serrate, sparsely pubescent when young; petioles upto 3.5 cm long. Flowers in axillary, elongated drooping spikes, 6-12 cm long. Male spikes hairy, female spikes almost glabrous. Syncarp yellowish, fleshy.

**Fl. & Fr.:** March - June

**Distribution:** India (NE India), E Himalaya, Bhutan, Bangladesh, China, Myanmar, Nepal, Thailand, Vietnam,

**Specimen examined:** Grows in primary or secondary forests. Khuza. NLNU 0830. **(Pl. 56)**

## URTICACEAE

Juss., Gen. Pl. 400. 1789

Herbs or shrubs, rarely trees, sometimes with stinging hairs. Leaves simple, opposite or alternate, 3 nerved at base, presence of punctate cystoliths on the surface, stipules present. Inflorescence usually cymose, sometimes aggregated into cymes or panicles. Flowers small, greenish, unisexual, actinomorphic, 3-5 merous. Male flowers with deeply lobed perianth, 4-5-lobed; stamens opposite to the lobes. Female flowers perianth connate, 4-5-lobed; ovary superior, 1-celled, style simple, stigma sessile and brush-like, ovule 1. Fruit an achene or a fleshy drupe.

### 1a. Plants with stinging hairs

2a. Leaves opposite, unlobed

*Urtica*

2b. Leaves alternate, palmately lobed

*Girardinia*

### 1b. Plants without stinging hairs

3a. Leaves pinnately nerved to base

*Poikilospermum*

3b. Leaves 3-nerved at base

4a. Leaf asymmetric, base oblique

5a. Leaves alternate, sometimes with minute opposite leaves

*Elatostema*

5b. Leaves opposite, minute opposite leaves absent

6a. Flowers borne in axillary dichotomous cymes or panicles

*Pilea*

6b. Flowers borne in fleshy, plate-like receptacles

on long peduncles

*Lecanthus*

4b. Leaf symmetric, base not oblique

7a. Calyx of female flowers membranous or dry in fruits

- 8a. Flower clusters borne on leafless spikes; style  
persistent in fruit *Boehmeria*
- 8b. Flower clusters usually axillary; style deciduous *Pouzolzia*
- 7b. Calyx of female flowers fleshy in fruits
- 9a. Flower clusters densely capitate *Oreocnide*
- 9b. Flowers clusters sessile or in cymes *Debregeasia*

***Boehmeria*** Jacquin, Enum. Syst. Pl. 9. 1760

Shrubs or small trees. Leaves alternate or opposite, strongly 3-nerved at base, stipules free. Flowers unisexual in axillary clusters, forming spikes or panicles. Male flowers 4-5-merous, perianth segments free. Female perianth tubular, 2-4-lobed; style filiform, persistent. Achenes covered by persistent dry perianth.

- 1a. Flower clusters sessile and often distantly spaced
  - 2a. Leave margin bluntly serrulate, rugose and glabrous above *B. depauperata*
  - 2b. Leave margin strongly serrulate, appressed pilose above *B. clidemioides*
- 1b. Flower clusters crowded into simple or panicled spikes
  - 3a. Leaves narrowly lanceolate, rigid and rugose *B. penduliflora*
  - 3b. Leaves ovate to orbicular, subcoriaceous or membranous
    - 4a. Leaves ovate to elliptic or suborbicular, spikes slender and stout *B. macrophylla*
    - 4b. Leaves orbicular or suborbicular, spikes slender and flexuous *B. ternifolia*

***Boehmeria clidemioides*** Miq., Pl. Jungh. 34. 1851; Giri *et al.*, Mater. Fl. Aruna. Pradesh. 2: 407. 2008; Sinha in Sinha *et al.*, Fl. Mizo 2: 528. 2012; *B. sidaefolia* Wedd., Ann. Sci. Nat.,

Bot. ser. 4.1: 203. 1854; Hook.f., Fl. Brit. Ind. 5: 576. 1888; Kanjilal *et al.*, Fl. As. 4: 287. 1940.

Slender, diffuse, shrubs; stems pilose, whitish. Leaves alternate, elliptic-lanceolate to ovate, 2-7 x 1-3 cm, apex acuminate, base obtuse or rounded, margins serrulate, pilose above, pubescent beneath; petioles hispid, stipules lanceolate. Flower minute, sessile, clustered on leafless axillary branchlets, terminating by clusters of leaves. Achenes oblong-ellipsoid, covered with hispid hairs.

**Fl. & Fr.:** March - June

**Distribution:** India (throughout), E Himalaya, Bhutan, China, Malaysia, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in secondary forest. Kikrumba. NLNU 0475. **(Pl. 56)**

*Boehmeria depauperata* Wedd., Ann. Sci. Nat., Bot., ser. 4. 1: 202. 1854; *B. glomerulifera* Miq., H. Zollinger, Syst. Verz. Ind. Archip. 2: 101. 1854; Haridasan & Rao, Forest Fl. Megh. 2: 840. 1987; Sinha in Sinha *et al.*, Fl. Mizo 2: 529. 2012; *B. malabarica* Wedd., arch. Mus. Hist. Nat. 8: 355. 1856; Hook.f., Fl. Brit. Ind. 5: 575. 1888.

Erect shrubs, upto 3 cm high. Branches terete, pubescent. Leaves opposite, alternate, ovate to elliptic-lanceolate, 5-18 x 2.5-8 cm, apex caudate acuminate, base rounded, margin bluntly serrulate, 3-nerved at base; petioles pubescent, 0.6-8 cm. Flowers small sessile, clustered on leafless axillary branchlets. Male clusters towards base, females above. Perianth 4-lobed. Achenes ovoid, enclosed in persistent perianth.

**Fl. & Fr.:** April - July

**Distribution:** India (throughout), E Himalaya, Bhutan, China, Malaysia, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam

**Specimen examined:** Grows in primary and secondary forest. Chizami NLNU 0570 (**Pl. 56**)

*Boehmeria macrophylla* Hornem., Hort. Reg. Bot. Hafn. 2: 890. 1815; Giri *et al.*, Mater. Fl. Aruna. Pradesh. 2: 408. 2008; Sinha in Sinha *et al.*, Fl. Mizo 2: 530. 2012; *B. platyphylla* D. Don, Prodr. Fl. Nepal. 60. 1825; Hook.f., Fl. Brit. Ind. 5: 578. 1888; Kanjilal *et al.*, Fl. As. 4: 288. 1940.

Shrubs, upto 3 m high. Leaves ovate or elliptic to suborbicular, 7-17 x 5-11 cm, base rounded or oblique, or subcordate, pilose above, sparsely pilose beneath, margin coarsely toothed, entire at base, 3-5 lateral nerves above base, basal nerves 3; petioles 3-15 cm, stipules lanceolate. Flowers axillary spike, drooping, solitary or clustered. Male spikes paniculately branched at base. Female spikes usually simple, solitary, pendulous, drooping, 10-15 or up to 30 cm. Achenes compressed, ellipsoid, beaked at apex.

**Fl. & Fr.:** June - November

**Distribution:** India (throughout), Bhutan, China, Indonesia, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam

**Specimen examined:** Grows in primary and secondary forest. Wazeho. NLNU 0630.

*Boehmeria penduliflora* Wedd. ex D.G. Long, Notes Roy. Bot. Gard. Edinburgh 40: 130. 1982; Grierson & Long, Fl. Bhut. 1.1: 125. 1983; Giri *et al.*, Mater. Fl. Aruna. Pradesh. 2: 408. 2008; *B. macrophylla* D. Don, Prodr. Fl. Nep. 60. 1825; Hook.f., Fl. Brit. Ind. 5: 577. 1888; Kanjilal *et al.*, Fl. As. 4: 288. 1940.

Large shrubs or small trees, 3-6 m. Leaves narrow-lanceolate, elliptic-lanceolate, 10-30 x 2-8 cm, base obtuse or rounded, apex caudate-acuminate, margin serrulate. Spikes axillary. Male spikes borne below, clusters few-flowered, 5-15 cm. Female spikes borne above, flowers dense globose, 15-35 cm. Achenes ovoid, cuneate, compressed.

**Fl. & Fr.:** August - February

**Distribution:** India (throughout), Bhutan, China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in primary and secondary forest. Thestumi. NLNU 0795. (**Pl. 56**)

*Boehmeria ternifolia* D. Don, Prodr. Fl. Nepal. 59. 1825; Grierson & Long, Fl. Bhut. 1.1: 127. 1983; *B. platyphylla* var. *rotundifolia* Weddell, Hook.f., Fl. Brit. Ind. 5: 579. 1888; Giri *et al.*, Mater. Fl. Aruna. Pradesh. 2: 409. 2008.

Shrubs, upto 3 m tall. Leaves broadly ovate to elliptic or sub-orbicular, 6-17 x 4-13 cm, base rounded, apex cuspidate, margin coarsely serrate or dentate, teeth usually becoming larger towards leaf apex, tomentose or hispid pubescent. Flowers small, in closely packed clusters on slender and flexuous spikes. Achenes globose.

**Fl. & Fr.:** August - February

**Distribution:** India (throughout), E & W Himalaya, Bhutan, Nepal

**Specimen examined:** Grows in primary and secondary forest. Pfutsero. NLNU 1077.

*Debregeasia* Gaudich., Voy. Bonite, Bot. 3: t. 90. 1844

Shrubs or trees. Leaves alternate, 3-nerved at base, finely white tomentose beneath, stipules bifid. Flowers monoecious or dioecious, forming axillary cymes. Male flowers usually 4-merous, deeply divided. Female flowers with ovoid or obovoid perianth enclosing ovary, stigma sessile. Fruit an achene, enclosed by fleshy, adnate perianth.

*Debregeasia longifolia* (Burm. f.) Wedd., DC. Prodr. 16. 1: 235. 1869; Kanjilal *et al.*, Fl. As. 4: 295. 1940; Balakr., Fl. Jowai. 2: 453. 1983; Giri *et al.*, Mater. Fl. Aruna. Pradesh. 2: 411. 2008. *Urtica longifolia* Burm. f., Fl. Indica 197. 1768; *D. velutina* Gaudich., Bot. Bonite Voy. t. 1843; Hook.f., Fl. Brit. Ind. 5: 590. 1888.

Shrubs or small trees upto 7 m tall. Leaves elliptic-lanceolate, 6-20 x 1.5-6 cm, apex acute to acuminate, base acute to subcordate, margin finely serrate, densely white tomentose beneath; 3-5 pairs of lateral nerves above the basal 3-nerves. Inflorescence in lateral, short stalked dichotomous cymes. Flowers small, white. Male flower clusters forming compact cymes, 0.5-1 cm across. Female flowers clusters forming cymes 1-1.5 cm across. Achenes orange-yellow, fleshy.

**Fl. & Fr.:** May - December

**Distribution:** India (throughout), E Himalaya, Bhutan, China, Nepal, South East Asia

**Specimen examined:** Grows in primary and secondary forest. Tsupfume. NLNU 1047.

*Elatostema* J.R.Forst. & G.Forst., Char. Gen. Pl. 105. 1776

Herbs or undershrubs. Stem decumbent or creeping, without stinging hairs. Leaves alternate or sometimes with minute leaf sub-opposite to the normal leaf, distichous, 3-nerved or pinntaely nerved; stipules membranous. Flowers minute, monoecious or dioecious, crowded in heads on peduncles or sessile borne on a fleshy receptacles, surrounded by involucre of bracts. Male flowers perianth 4-5, usually tubercled or spurred at back. Female flowers perianth 3-5; stigma in tuft of hairs. Fruit an achene, minute, ellipsoid or ovoid, usually ribbed.

1a. Leaf oblong lanceolate, base obliquely cuneate

*E. lineolatum*

1b. Leaf broadly elliptic, base auriculate or cordate

*E. platyphyllum*

*Elatostema lineolatum* Wight., Icon. Pl. Ind. Orient. 6:t. 1984. 1853; Hook.f., Fl. Brit. Ind. 5: 565. 1888; Kanjilal *et al.*, Fl. As. 4: 284. 1940; Giri *et al.*, Mater. Fl. Aruna. Pradesh. 2: 413. 2008; Sinha in Sinha *et al.*, Fl. Mizo 2: 539. 2012.

Herbs or undershrubs, upto 1 m tall. Stem branched, strigose. Leaves alternate, oblong-lanceolate, 3-11 x 1-3 cm, base obliquely cuneate, apex slightly curved caudate acuminate, glabrous with numerous distinct large cystoliths on both surfaces, margin crenate or serrate above the middle and entire towards the base. Inflorescence sessile, solitary. Achenes minute, ovoid, ribbed.

**Fl. & Fr.:** March - August

**Distribution:** India (throughout), E & W Himalaya, Bhutan, China, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam

**Specimen examined:** Grows in moist shady places near streams in dense forest. Tsupfume. NLNU 1049.

*Elatostema platyphyllum* Wedd., Arch. Mus. Nat. 9: 301. 1856; Hook.f., Fl. Brit. Ind. 5: 566. 1888; Kanjilal *et al.*, Fl. As. 4: 285. 1940; Sinha in Sinha *et al.*, Fl. Mizo 2: 541. 2012.

Undershrubs, upto 1.5 m tall. Leaves obliquely rhomboid to oblong-lanceolate, 12-25 x 6-16 cm, apex cuspidate, base auricled, margin crenulate, glabrescent beneath; stipules linear lanceolate. Heads crowded on the surface of fleshy receptacles, mostly in axils of upper leaves, borne on short peduncles. Achenes ovoid, ribbed.

**Fl. & Fr.:** March - August

**Distribution:** India (NE India), E & W Himalaya, Bhutan, China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in moist shady places near streams in forest. Tsupfume NLNU 1050.



***Girardinia*** Gaudich., Voy. Uranie: 498. 1830

Perennial herb, bearing stinging hairs throughout. Leaves alternate, palmately 3-7-lobed, lower leaves sometimes unlobed, 3-nerved at base, coarsely serrate, stipules connate, caducous. Flowers dioecious or monoecious, clusters in simple or paniced spikes, armed with stinging hairs. Male panicles spreading, axillary. Female panicles condensed. Fruit a compressed, suborbicular achene.

***Girardinia diversifolia*** (Link) Friis, Kew Bull. 36: 145. 1981; Giri *et al.*, Mater. Fl. Aruna. Pradesh. 2: 416. 2008; Sinha in Sinha *et al.*, Fl. Mizo 2: 542. 2012; *Urtica diversifolia* Link, Enum. Hort. Berol. Alt. 2: 385. 1822; *G. heterophylla* (Vahl) Decne., Jacquem, Voy. Inde 4: 151. t. 153. 1844; Hook.f., Fl. Brit. Ind. 5: 550. 1888; Kanjilal *et al.*, Fl. As. 4: 282. 1940.

Herbs, upto 2 m tall. Stem armed with numerous slender stinging hairs. Leaves alternate, broadly ovate, shallowly or deeply 3-7 lobed, 10-20 x 7-20 cm, base rounded or cordate, apex acuminate, margins coarsely dentate, serrate, petioles 3-10 cm long. Male flowers subsessile or pedicellate, perianth lobes 4, ovate. Female flowers in compact capitate panicles, axillary or terminal, perianth 3-lobed. Achenes compressed, blackish, ovoid.

**Fl. & Fr.:** September - December

**Distribution:** India (throughout), South East Asia, Africa

**Specimen examined:** Grows in shaded moist places in forest. Tsupfume. NLNU 1007.

***Lecanthus*** Wedd., Ann. Sci. Nat., Bot., ser. 4. 1: 187. 1854

Herbs, stems creeping with erect leafy shoots. Leaves opposite, usually asymmetric, strongly 3-nerved from base, stipules connate, caducous. Flowers borne on fleshy plate-like receptacle on long peduncle. Male flowers 4-5-merous. Female flowers with 3 unequal lobes; stigma sessile. Achenes ovoid, compressed.

*Lecanthus peduncularis* (Royle) Wedd., DC. Prodr. 16.1:164. 1869; Grierson & Long, Fl. Bhut. 1.1: 1217. 1983; Giri *et al.*, Mater. Fl. Aruna. Pradesh. 2: 417. 2008; *L. wightii* Wedd., An. Sci. Nat., Bot., ser. 4.1: 187. 1854; Hook.f., Fl. Brit. Ind. 5: 559. 1888.

Succulent herbs, leafy shoots 20-40 cm. Leaves ovate, apex acuminate, base cuneate or rounded, margins subentire or serrate, scattered pilose hairs above and on veins beneath, petioles slender. Flowers pinkish in long stalked axillary clusters, arising from basal parts of stem. Achenes ellipsoid-ovoid, verrucose.

**Fl. & Fr.:** June - October

**Distribution:** India (throughout), Bhutan, China, Indonesia, Nepal, Pakistan, Philippines, Sri Lanka, Vietnam, Africa

**Specimen examined:** Grows in shaded moist places in forest, along streams. Tsupfume. NLNU 1009.

*Oreocnide* Miq., Pl. Jungh. 39. 1851

Shrubs or small trees. Leaves alternate, borne at branch-ends, pinnately nerved or 3-nerved, entire or serrate, stipules lanceolate, caducous. Flowers in clusters, solitary or forming short cymes, borne in axils of fallen leaves. Male flowers, perianth lobes 3 or 4, stamens 3 or 4. Female flowers perianth tube adnate to ovary; staminodes absent, stigma sessile. Fruit an achene, compressed-ovoid, borne on a fleshy receptacle.

1a. Leaves entire, glabrous above; achenes white when ripened *O. integrifolia*

1b. Leaves serrate, pubescent above; achene orange when ripened *O. frutescens*

*Oreocnide frutescens* (Thunb.) Miq., Ann. Mus. Bot. Lugduno-Batavi 3: 131. 1867; Kanjilal *et al.*, Fl. As. 4: 293. 1940; Haridasan & Rao, Forest Fl. Megh. 2: 845. 1987; Giri *et al.*,

Mater. Fl. Aruna. Pradesh. 2: 417. 2008; *Villebrunea frutescens* (Thunb.) Bl. Mus. Bot. Lugd.-Bat. 2: 168. 1856; Hook.f., Fl. Brit. Ind. 5: 590. 1888; Balakr., Fl. Jowai. 2: 452. 1983.

Shrubs, upto 3 m tall. Leaves ovate or elliptic to oblong-lanceolate, 3-12 x 0.5-5 cm, apex acute or acuminate, base rounded or obtuse, margin serrate, grey white tomentose beneath. Flowers small, appearing with new leaves in axils of fallen leaves or older branches. Achenes ovoid, aggregated into clusters, orange yellow when riped.

**Fl. & Fr.:** April - October

**Distribution:** India (NE India), Bhutan, China, Malaysia, Myanmar, Thailand, Vietnam

**Specimen examined:** Grows in along roadsides, forest margins. Tsupfume. NLNU 1037.

*Oreocnide integrifolia* (Gaudich.)Miq., Ann. Mus. Bot. Lugduno-Batavi 4: 306. 1869; Kanjilal *et al.*, Fl. As. 4: 293. 1940; Haridasan & Rao, Forest Fl. Megh. 2: 846. 1987; Giri *et al.*, Mater. Fl. Aruna. Pradesh. 2: 418. 2008; Sinha in Sinha *et al.*, Fl. Mizo 2: 545. 2012; *Villebrunea integrifolia* Gaud., Voy. Bonite, Bot. t. 91. 1844; Hook.f., Fl. Brit. Ind. 5: 589. 1888; Balakr., Fl. Jowai. 2: 453. 1983.

Shrubs or small trees, upto 7 m tall. Leaves elliptic-oblong, obovate oblong, 9-25 x 3-10 cm, base obtuse, apex caudate acuminate, glabrous above, tomentose beneath, margin entire, petioles 1-10 cm long, tomentose; stipules lanceolate, connate at base of each petiole, deciduous. Flowers small, clustered in globose heads in dichotomously branched cymes. Male flowers perianth 3-4. Female flowers stigma plumose. Achenes ovoid, aggregated into a clustered head, white when ripe, adnate to the base of fleshy perianth.

**Fl. & Fr.:** March - August

**Distribution:** India (NE India), Bhutan, China, Indonesia, Myanmar, Thailand, Vietnam

**Specimen examined:** Grows in along roadsides, forest margins. Tsupfume. NLNU 1038.

***Pilea*** Lindl., Coll. Bot. t. 4. 1821

Herbs or shrubs. Stems usually succulent. Leaves opposite in equal or unequal pairs, entire or serrate, basal nerves 3, rarely pinnately nerved; stipules membranous, 2 at each node, axillary, deciduous. Flowers monoecious or dioecious, minute in axillary long or short peduncled dichotomously branched cymes. Male flowers sepals 2-4, free or connate, stamens 2-4. Female flowers sepals 3, unequal, stigma sessile. Fruit an achene, ovoid or oblong, compressed.

***Pilea symmeria*** Wedd., Arch. Mus. Hist. Nat. 9: 246. 1856; Hook.f., Fl. Brit. Ind. 5: 554. 1888; Giri *et al.*, Mater. Fl. Aruna. Pradesh. 2: 419. 2008; Sinha in Sinha *et al.*, Fl. Mizo 2: 549. 2012.

Herbs, upto 90 cm tall. Stem succulent, swollen between nodes. Leaves ovate-oblong or ovate-lanceolate, 5-8 x 2.5-4 cm, base rounded or notched, apex acuminate, margin coarsely serrate, pubescent above, glabrous beneath, 3-nerved at base. Male flowers pedicellate, perianth 4-lobed, connate at base, stamens 4. Female flowers subsessile, perianth 3-lobed, staminodes 3. Achene ovoid, flattened.

**Fl. & Fr.:** June - September

**Distribution:** India (NE India), Bhutan, China, Nepal

**Specimen examined:** Grows in shady places in forest. Tsupfume. NLNU 1036.

***Poikilospermum*** Zipp. ex Miq., Ann. Mus. Bot. Lugduno-Batavi 1: 203. 1864

Woody climbers. Leaves alternate, entire, pinnately veined, long petioled; stipules connate, axillary, deciduous. Flowers in globose heads borne in axillary cymes. Male

flowers perianth deeply 4-lobes. Female flowers perianth short 4-lobes, ovary bearing short simple style. Fruit an achene, ovoid, surrounded by fleshy persistent perianth.

***Poikilospermum suaveolens*** (Blume) Merr., Contr. Arnb. Arb. 8: 47. 1934; Balakr., Fl. Jowai. 2: 446. 1983; Giri *et al.*, Mater. Fl. Aruna. Pradesh. 2: 421. 2008; *Conocephalus suaveolens* Bl., Bijdr. 483. 1825; Hook.f., Fl. Brit. Ind. 5: 545. 1888; Kanjilal *et al.*, Fl. As. 4: 272. 1940.

Large scandent, shrubs or lianas, upto 25 m. Leaves broadly ovate or oblong-ovate, apex acute, base rounded or subcordate, or obtuse, lateral nerves 13-15 pairs. Flower heads 0.5-0.7 cm across, in axillary cymose heads, fragrant. Achenes oblong-lanceolate, enclosed in thin fleshy perianth.

**Fl. & Fr.:** Jan - September

**Distribution:** India (throughout), Bhutan, China, Indonesia, Malaysia, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in primary forest. Chepoketa. NLNU 0970.

***Pouzolzia*** Gaudich., Voy. Uranie: 503. 1830

Herbs or shrubs, without stinging hairs. Leaves alternate or rarely opposite, leaf blade 3-nerved, margin serrate, dentate or entire, stipules often persistent. Glomerules axillary or rarely at nodes along rachis of spikes. Fruit an achene, covered by persistent dry perianth.

1a. Leaves opposite, margin entire

*P. hirta*

1b. Leaves alternate, margin crenate or serrate

*P. sanguinea*

***Pouzolzia hirta*** (Bl.) Hassk., Cat. Hort. Bogor. 80. 1844; Hook.f., Fl. Brit. Ind. 5: 586. 1888; Kanjilal *et al.*, Fl. As. 4: 291. 1940; Balakr., Fl. Jowai. 2: 451. 1983.

Herbs, erect-ascending. Stem tetragonous. Leaves opposite, ovate-elliptic or lanceolate, 1-5 x 0.5-3 cm, apex acute or acuminate, base acute or rounded, margin entire. Flowers in sessile, globose clusters around the nodes, consisting of both male and female flowers. Male flowers 5-merous, sub-globose with truncate, hairy apex. Female flowers ovoid, hairy. Achenes ellipsoid, black, distinctly ribbed.

**Fl. & Fr.:** May - October

**Distribution:** India (throughout), Bhutan, China, Malaysia, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in rocky slopes, streamsides, damp forest areas. Kikrumba. NLNU 0480. **(Pl. 56)**

*Pouzolzia sanguinea* (Blume) Merr., J. Straits Branch Roy. Asiat. Soc. 84: 1921; Sinha in Sinha *et al.*, Fl. Mizo 2: 552. 2012; Giri *et al.*, Mater. Fl. Arunachal Pradesh. 2: 422. 2008; *P. viminea* (Wedd.) Wedd., DC. Prodr. 16. 1: 228. 1869; Hook.f., Fl. Brit. Ind. 5: 581. 1888.

Shrubs, upto 2m tall. Leaves alternate, oblong-lanceolate, ovate, 4-10 x 1-3.5 cm, apex acuminate, base rounded or cuneate, margin serrate or crenate, glabrescent above, hispid beneath, 3-nerved at base; stipules lanceolate. Flower clusters unisexual or with male and female flowers mixed, globose, reddish, axillary. Perianth 4-lobed. Stamens 4. Achenes ovoid, hispid at apex.

**Fl. & Fr.:** February - September

**Distribution:** India (throughout), Bhutan, China, Malaysia, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in edges of forest, thickets. Kikrumba. NLNU 0473. **(Pl. 57)**

***Urtica* L., Sp. Pl. 983. 1753**

Herbs, rarely undershrubs, with stinging hairs. Stems often quadrangular, woody at base. Leaves opposite, serrate or crenate, pinnately nerved above, palmately 3-5-nerved at base; stipules often persistent, free or connate. Flowers in axillary clusters of spike-like racemes, panicles. Perianth lobes 4. Fruit an achene, enclosed by persistent enlarged perianth.

***Urtica ardens*** Link, Enum. Hort. Berol. Alt. 2: 385. 1822; Giri *et al.*, Mater. Fl. Aruna. Pradesh. 2: 424. 2008; *U. parviflora* Roxb., Fl. Ind.3: 581. 1832; Hook.f., Fl. Brit. Ind. 5: 548. 1888.

Herbs or shrubs, upto 3 m tall. Stem and leaves with stinging hairs. Leaves ovate to lanceolate, 5-14 x 4-7 cm, apex acuminate, base rounded to truncate, puberulous with stinging hairs on both surfaces, margin serrate or crenate. Flowers in short peduncled cymes. Achenes ovoid, compressed, enclosed in hispid perianth.

**Fl. & Fr.:** June - September

**Distribution:** India (NE India), Nepal, Tibet

**Specimen examined:** Grows in edges of forest, thickets. Tsupfume. NLNU 1023.

**JUGLANDACEAE**

DC. ex Perleb, Vers. Arzneikr. Pfl.: 143. 1818

Trees. Leaves alternate, even or odd-pinnate, exstipulate. Flowers unisexual. Male flowers in pendulous catkins, in the twigs of previous years; perianth 3-6 lobed; stamens 6-40. Female flowers sessile on the stem of the current year, sub-solitary or spicate; perianth segments 4; style short, stigma 2. Fruit a drupe or nut.

1a. Female flowers in pendulous spike; bracts enlarged in fruit *Engelhardtia*

1b. Female flowers solitary; bracts not enlarged in fruit *Juglans*

***Engelhardtia*** Lesch. ex Blume, Bijdr. Fl. Ned. Ind.: 528. 1826

Trees or shrubs. Leaves pinnate; leaflets entire or serrate, often glandular. Flowers monoecious. Male flowers in lateral, slender spikes or bracteate erect spikes; perianth connate with lobed, unequal scales, sometimes irregularly 4-lobed, resembling calyx; stamens 4-12, subsessile on the scales. Female flowers in pendulous spikes; perianth adnate to ovary, 4-lobed, sessile on a 3-4 lobed bract; stigma 2, lacinate. Fruit a globose nut, borne on membranous 3-lobed bracts.

***Engelhardtia spicata*** Lechen ex Blume, Bijdr. Fl. Ned. Ind.: 528. 1826; Hook. f., Fl. Brit. Ind. 5: 595. 1888; Kanjilal *et al.*, Fl. As. 4: 299. 1940; Balakr., Fl. Jowai 2: 454. 1983; Sinha in Singh *et al.*, Fl. Mizo. 2: 596. 2012.

Trees, deciduous, about 30 m tall. Leaves alternate, pinnate; leaflets 4-6 pairs, sub-opposite, oblong-lanceolate or elliptic-lanceolate, 8-16 x 4-5 cm, apex acute or obtuse, base obliquely acute, margin sub-entire, glabrescent above, pubescent and glandular beneath; lateral veins 8-14 pairs; petiolules short upto 0.7 cm. Male flowers slender catkin, 5-18 cm long. Female flowers in pendulous spikes, 15-40 cm long. Bracts 3, oblanceolate, middle one enlarges in fruit. Fruit a globose villous nut.

**Fl. & Fr.:** September - March

**Distribution:** India (throughout), Bangladesh, Bhutan, China, Tropical Asia

**Specimen examined:** Grows in open forests and along roadsides. Khuza. NLNU 0820. (Pl. 57)



***Juglans* L., Sp. Pl.: 997. 1753**

Trees, monoecious. Leaves odd-pinnate. Male flowers in simple raceme-like catkins, from the scars of last year's leaves. Female flowers 1-3 in short terminal racemes, at the end of branches, perianth segments 4; style plumose. Fruit a drupe, ovoid, fleshy outside, hard shelled within; cotyledons lobed.

***Juglans regia* L., Sp. Pl.: 997. 1753; Hook.f., Fl. Brit. Ind. 5: 595. 1888; Kanjilal *et al.*, Fl. As. 4: 298. 1940; Grierson & Long, Fl. Bhut. 1.1: 57. 1983; Sinha in Singh *et al.*, Fl. Mizo. 2: 596. 2012.**

Deciduous trees. Leaves imparipinnate; leaflets opposite or subopposite, subsessile, 2-5 pairs, oblong-lanceolate, 6-16 x 3-8 cm, apex acute or acuminate, base oblique rounded, margin entire, glabrous, pubescent along the nerves beneath; lateral nerves 15-20 pairs. Male flowers green, catkin 5-12 cm long, often in pairs; bracts lobed, oblong; stamens many. Female flowers green, 1-3; perianth minutely 4-toothed. Fruit ovoid, glabrous or pubescent, green with yellow dots.

**Fl. & Fr.:** March - September

**Distribution:** India (NE India), West Himalaya, Bhutan, China, Tropical Asia

**Specimen examined:** Grows in primary and secondary forests and along roadsides. Thetsumi. NLNU 0754. **(Pl. 57)**

**MYRICACEAE**

Rich. ex Kunth, Nov. Gen. Sp. 2: 16. 1817

Evergreen trees or shrubs, aromatic. Leaves alternate, simple, entire, stipules absent. Flowers unisexual, in dense spikes or heads, in axils of each bract. Male flowers with 2-4 stamens; female uni-locular. Fruit a drupe.

*Myrica* L., Sp. Pl. 1024. 1753

Description as of Myricaceae.

*Myrica esculenta* Buch.-Ham. ex D. Don, Prodr. Fl. Nepal. 56. 1825; Balakr., Fl. Jowai 2: 455. 1983; Haridasan & Rao, Forest Fl. Megh. 2: 851. 1987; Sinha in Singh *et al.*, Fl. Mizo. 2: 598. 2012; *M. nagi auct., non* Thunb: Hook.f., Fl. Brit. Ind. 5: 597. 1888; *M. farquhariana* Wall., Tent. Fl. Nep. 61. 1825; Kanjilal *et al.*, Fl. As. 4: 302. 1940.

Trees, 3-10 m tall, young parts pubescent. Leaves alternate, lanceolate, oblong-lanceolate or oblanceolate, 4-10 x 1.5-3 cm, base cuneate or attenuate, apex acute, margin serrate, coriaceous, glabrous above, resinous dots beneath; petioles short. Inflorescence a spike or racemes, axillary, solitary. Male racemes 3-8 cm, rachis hairy. Female spikes 1-5 cm. Drupe ellipsoid or ovoid, tuberculate, red when ripe.

**Fl. & Fr.:** October - May

**Distribution:** India (NE India), E Himalaya, Bangladesh, Bhutan, China, Myanmar, Nepal, Philippines, Sumatera, Thailand, Vietnam

**Specimen examined:** Grows in open forests and also cultivated. Khezhakhen. NLNU 0235. (Pl. 57)

**BETULACEAE**

Gray, Nat. Arr. Brit. Pl. 2: 222, 243. 1822

Deciduous trees or shrubs, monoecious. Leaves simple, alternate, usually serrate, stipulate but often deciduous. Flowers monoecious. Male flowers in pendulous bracteate catkin, perianth small, stamens 2-20. Female flowers in long or short bracteate spikes or in clusters, perianth absent or adnate to the ovary; ovule 1 in each cell, pendulous. Fruit a nut, enclosed in a bract borne in spikes or clusters.

*Alnus* Mill., Gard. Dict. Abr., ed. 4. 1754

Trees. Leaves serrate or dentate, rarely incised or entire. Male inflorescence elongate, pendulous, cylindric, bracts numerous, each bract subtending 3 flowers, perianth 4 lobed, stamens 4. Female inflorescence few to many in a raceme or panicle, ovoid-ellipsoid, conelike, bracts numerous, overlapping, woody, persistent, each bract subtending 2 flowers. Nutlets 2, with minute wings.

*Alnus nepalensis* D. Don, Prodr. 58. 1825; Hook.f., Fl. Brit. Ind. 5: 600. 1888; Kanjilal *et al.*, Fl. As. 4: 327. 1940; Brandis, Ind. Trees 623. 1906; Grierson & Long, Fl. Bhut. 1.1: 72. 1983; Haridasan & Rao, For. Fl. Megh.2: 853. 1987.

Deciduous medium sized trees. Bark compact, grayish brown, warty, lenticellate. Leaves alternate, elliptic, ovate lanceolate, 8-15×3-9 cm, apex acute, base rounded to cuneate, margin entire or sub entire, coriaceous, glabrous above, glaucescent and dotted with resinous minute dots beneath; petiole 1-2 cm. Male flowers in catkins in long terminal, drooping, panicle; stamens 4. Female flowers in spikes. Fruiting spikes in ovoid or cylindrical cone. Nuts with membranous wings.

**Fl. & Fr.:** September-March

**Distribution:** India (NE India), E & W Himalaya, Bangladesh, China, Myanmar, Nepal, Thailand, Tibet, Vietnam.

**Specimen examined:** Grows in open forest, in jhum fields. Tsupfume. NLNU 1024. (**Pl. 57**)

## FAGACEAE

Dumort., Anal. Fam. Pl. 11. 12. 1829

Deciduous or evergreen trees, rarely shrubs. Leaves simple, alternate, stipulate. Flowers monoecious. Male flowers in spikes, or pendulous catkin; perianth united at base, stamens as many or twice as many as the perianth segments, pistillode obsolete. Female flowers solitary in an involucre, perianth tube adnate to ovary, limb minutely toothed; staminodes minute or obsolete. Fruit a nut, enclosed partially or completely by an involucre bract.

- |   |                    |
|---|--------------------|
| 1a. Stamens 6; pistillode and staminode absent                    | <i>Quercus</i>     |
| 1b. Stamens 12; pistillode and staminode present                  |                    |
| 2a. Cupules completely covering the nut, cupule spiny             | <i>Castanopsis</i> |
| 2b. Cupules not completely enclosing the nut, cupule lobed, scaly | <i>Lithocarpus</i> |

***Castanopsis*** Spach, Hist. Nat. Veg. 11: 185. 1842

Evergreen trees. Leaves alternate, margin entire or serrate. Inflorescence unisexual, spikes erect, simple or paniculate. Male flowers in fascicles of 3-7; perianth 5-6 lobed; stamens 9-12; pistillode small, pilose. Female flowers solitary or in clusters of 3-7 per cupule; staminodes present or absent; ovary 3-celled, styles 3. Cupules solitary on rachis, completely or partially enclosing nut. Nuts 1-3 per cupule.

***Castanopsis tribuloides*** A. DC., J. Bot. 1: 182. 1863; Hook.f., Fl. Brit. Ind. 5: 622. 1888; Kanjilal *et al.*, Fl. As. 4: 324. 1940; Balakr., Fl. Jowai 2: 459. 1983; Giri *et al.*, Mater. Fl. Aruna. Pradesh, 2: 429. 2008; *Quercus tribuloides* Sm. Rees. Cyclop. 29: no. 13. 1819.

Medium sized trees. Leaves coriaceous, elliptic to ovate-lanceolate, 5-15×3-5 cm, apex acuminate, base cuneate, margin entire or bluntly serrate near apex, glabrous above, glabrescent beneath; petioles 1-2 cm. Male spikes paniculate or fascicled. Female spikes

solitary. Cupules globose to ellipsoid, covered with waxy scalelike trichomes; bracts spinelike, covering whole of the nut. Nut 1 per cupule, ovoid, 1.5-2 cm, glabrous.

**Fl. & Fr.:** August - February

**Distribution:** India (NE India), E & W Himalaya, Bangladesh, Bhutan, China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in secondary forests, forest trails. Lozaphuhu. NLNU 0519.

**(Pl. 57)**

*Lithocarpus* Blume, Bijdr. 526. 1825

Evergreen trees or rarely shrubs. Leaves alternate, entire. Inflorescence unisexual, erect, simple, spikes in leaf axils toward base of branchlets or in dense panicle cluster on subterminal shoots. Male flowers 3-7 in dichasial cluster, perianth 4-6 lobed; stamens 10-12, pistillode present. Female flowers solitary or in clusters of 2-3, perianth 6-lobed; staminodes 10-12; ovary 3-6 celled; styles 3. Cupules often united in cymes or rachis, corky or crustaceous. Nut solitary, partly or almost enclosed by scaly cupules.

1a. Cupules enclosing the whole nut *L. xylocarpus*

1b. Cupules not enclosing the whole nut

2a. Leaves ovate-lanceolate; cupule enclosing half to most of nut *L. dealbatus*

2b. Leaves elliptic or elliptic-lanceolate

3a. Leaf apex caudate acuminate, base cuneate; cupules cover

half of the nuts

*L. pachyphyllus*

3b. Leaf apex acuminate, base often oblique; cupules cover

three fourth or more of the nuts

*L. fenestratus*

***Lithocarpus dealbatus*** (Hook.f. & Thomson ex Miq.) Rehder, J. Arnold Arbor. 1: 124. 1919; Balakr., Fl. Jowai 2: 460. 1983; Giri *et al.*, Mater. Fl. Aruna. Pradesh, 2: 429. 2008; Sinha in Singh *et al.*, Fl. Mizo. 2: 607. 2012; *Quercus dealbata* Miq., Ann. Mus. Bot. Lugd.-Bat. 1: 107. 1864; Hook.f., Fl. Brit. Ind. 5: 609. 1888; *Pasania dealbata* (Miq.) Oerst., Kjoeb. Vid. Med. 84. 1866; Kanjilal *et al.*, Fl. As. 4: 317. 1940.

Medium sized trees, crown compact. Leaves ovate-lanceolate, 6-19 x 1.5-5 cm, apex acute to acuminate, base cuneate, margins entire, glabrous above, pubescent beneath; petioles 0.5-1 cm long. Inflorescence in spikes paniced, 10-20 cm. Male flowers in clusters of 3-6. Female flowers in clusters of 10-20. Cupules sessile, woody, almost covering the nut. Nuts obovoid, pyriform, 1.5-2 cm.

**Fl. & Fr.:** February-December

**Distribution:** India (NE India), E Himalaya, Bangladesh, Bhutan, China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in secondary forests. Lozaphuhu. NLNU 0522.

***Lithocarpus fenestratus*** (Roxb.) Rehder, J. Arnold Arbor. 1: 126. 1919; Balakr., Fl. Jowai 2: 460. 1983; *Quercus fenestrata* Roxb., Fl. Ind., ed. 2, 3: 633. 1832; Hook.f., Fl. Brit. Ind. 5: 608. 1888; *Pasania fenestrata* (Roxb.) Oerst., Kjoeb. Vid. Med.: 84. 1866; Kanjilal *et al.*, Fl. As. 4: 317. 1940.

Large trees. Leaves elliptic, ovate-lanceolate, 9-20 x 3-6 cm, base cuneate, often oblique, apex acuminate, margins entire, coriaceous, glabrous; lateral nerves 7-13 pairs. Flowers crowded in paniculate or fasciculated spikes. Cupules united in groups of 3 when young, often only one developing, covering three fourth or more of the nut; scale ovate, acute connate at base. Nuts ovoid, glabrous.

**Fl. & Fr.:** September-May

**Distribution:** India (NE India), E Himalaya, Bangladesh, China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in primary and secondary forests. Lozaphuhu. NLNU 0525.

*Lithocarpus pachyphyllus* (Kurz) Rehder, J. Arnold Arbor. 1: 129. 1919; Giri *et al.*, Mater. Fl. Aruna. Pradesh, 2: 430. 2008; Sinha in Singh *et al.*, Fl. Mizo. 2: 610. 2012 *Quercus pachyphylla* Kurz in J. Asiat. Soc. Bengal 2: 197, t. 14, f. 1-4. 1875; Hook.f., Fl. Brit. Ind. 5: 608. *Pasania pachyphylla* (Kurz) Schottky, Engl., Bot. Jahrb. 47: 671. 1912; Kanjilal *et al.*, Fl. As. 4: 316. 1940.

Evergreen trees. Leaves elliptic or elliptic-lanceolate, 10-17 x 3- 4.5 cm, base cuneate, apex caudate-acuminate, margins entire, glabrous above; lateral nerves 9-16 pairs; petioles 0.8-1.5 cm long. Flowers in axillary or terminal spikes. Female flowers usually in group of 3s. Cupules woody, completely fused together, covering half of the nut. Nuts globose, 2.5 cm across, turbinate, glabrous.

**Fl. & Fr.:** May-March

**Distribution:** India (NE India), E Himalaya, Bangladesh, China, Myanmar, Nepal

**Specimen examined:** Grows in primary and secondary forests. Tsupfume. NLNU 1027.

*Lithocarpus xylocarpus* (Kurz) Markgr., Bot. Jahrb. Syst. 59: 66. 1924; Giri *et al.*, Mater. Fl. Aruna. Pradesh, 2: 431. 2008; *Quercus xylocarpa* Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 44: 196. 1875; Hook.f., Fl. Brit. India 5: 618. 1888.

Medium sized trees. Bark whitish with vertical fissures. Leaves elliptic-oblong, 8-16x2.5-5 cm, base cuneate, apex caudate acuminate, entire, coriaceous, glabrous; petiole 0.6-1 cm. Flowers clustered. Cupules connate, entirely enclosing the nuts, woody spiny.

**Fl. & Fr.:** June-December

**Distribution:** India (NE India), Bangladesh, China, Myanmar, Thailand, Vietnam

**Specimen examined:** Grows in primary and secondary forests. Tsupfume. NLNU 1035.

*Quercus* L., Sp. Pl.: 994. 1753

Evergreen or deciduous trees or shrubs. Bark deeply splitting, longitudinally. Leaves dentate or serrate, rarely entire. Flowers monoecious. Male flowers in pendulous spikes, often clustered catkins; stamens 6-12; pistillode absent. Female flowers solitary or in few-flowered erect spikes, perianth 5-6 lobed; staminodes sometimes present; styles 3, thick, recurved. Nuts solitary, ovoid, globose or turbinate, enclosed by hardened involucre.

1a. Cupules bearing concentric lamellate ring-like scales *Q. lamellosa*

1b. Cupules bearing linear or lanceolate scales united at base

2a. Leaves long petioled, 2-4 cm; cupule scales free and recurved in

upper half *Q. acutissima*

2b. Leaves shortly petioled, up to 1 cm; cupule scales free only at apex *Q. griffithii*

*Quercus acutissima* Carruth., J. Proc. Linn. Soc., Bot. 6: 33. 1862; Sinha in Singh *et al.*, Fl. Mizo. 2: 612. 2012; *Q. serrata* Thunb., Hook.f., Fl. Brit. India 5: 601. 1888; Kanjilal *et al.*, Fl. Assam 4: 307. 1940; Balakr., Fl. Jowai 2: 456. 1983.

Medium sized tree, with spreading crown. Leaves oblong-elliptic, 6-16 x 2-5 cm, base cuneate or rounded, apex acute or acuminate, margin serrate, pubescent when young, glabrous and shining when matured; petioles 2-4 cm. Male flowers in elongated, tomentose spikes, bracts ovate. Female flowers in axillary spikes. Cupules grey tomentose, covering more than half of the ripe nut; scales recurved in upper half. Nuts ovoid, 1.5-2 cm.



**Fl. & Fr.:** March-September

**Distribution:** India (NE India), E Himalaya, Bhutan, China, Japan, Korea, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in open secondary forests. Lozaphuhu. NLNU 0527.

*Quercus griffithii* Hook.f. & Thomson ex Miq., Ann. Mus. Bot. Ludg.-Bat. 1: 104. 1864; Hook.f., Fl. Brit. Ind. 5: 602. 1888; Kanjilal *et al.*, Fl. As. 4: 307. 1940; Sinha in Singh *et al.*, Fl. Mizo. 2: 613. 2012.

Deciduous trees. Leaves clustered at branch tips, coriaceous, obovate to oblanceolate, 7-18×4-10 cm, base cuneate, apex acute, margin coarsely serrate, glabrous above, glaucous beneath; petioles 0.6 cm long. Male flowers in slender spikes, 5-10 cm long, drooping. Female flowers clustered at tip. Cupules 1.2-1.5 cm, covering half or more of nuts; scales ovate. Nuts ovoid, 1-1.5 cm.

**Fl. & Fr.:** March-September

**Distribution:** India (NE India), E Himalaya, Bhutan, China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in open secondary forests. Thetsumi. NLNU 0763.

*Quercus lamellosa* Sm., Rees, Cycl. 29: no. 23. 1814; Hook.f., Fl. Brit. Ind. 5: 606. 1888; Kanjilal *et al.*, Fl. As. 4: 311. 1940; Grierson & Long, Fl. Bhut. 1.1: 76. 1983.

Large trees, upto 40 m tall. Leaves coriaceous, oblong-lanceolate, 15-25 x 6-8 cm, base cuneate, apex acute or acuminate, margin serrate, glabrous above, glaucous beneath, lateral nerves 10-20 on either half; petiole 2-3.5 cm. Male spikes solitary, axillary. Female spikes short, axillary, 3-4 flowered. Cupules large, oblate, semi-globose, 2-3 x 3-4 cm,

enclosing half or all of the nut. Bracts 7-10 rings, thinly lamellate, margin subentire. Nut oblate, tomentose, glabrescent, apex flat, rounded.

**Fl. & Fr.:** April-November

**Distribution:** India (NE India), E Himalaya, Bhutan, China, Myanmar, Nepal, Thailand

**Specimen examined:** Grows in primary forests. Thevopisu. NLNU 081.

## MONOCOTYLEDONS

### ORCHIDACEAE

Juss., Gen. Pl. 49. 1789

Perennial, terrestrial, epiphytic or lithophytic herbs, with rhizomes, tubers, or rootstocks with mycorrhizal fungi. Stems either sympodial or monopodial, usually leafy often with one or more swollen internodes forming pseudobulbs. Leaves alternate or occasionally opposite, 1 to many, often distichous. Inflorescence erect to pendulous, spicate, racemose or paniculate, 1- to many flowered. Flowers small to large, often quite showy, zygomorphic, bisexual, sessile or variously pedicellate, resupinate or non- resupinate. Sepals usually free but sometimes variously adnate, dorsal sepal often dissimilar to lateral sepals, lateral sepals sometimes adnate to the column to form a saccate, conic or spurlike mentum. Petals free or partly adnate to sepals, often showy, lip entire or variously lobed. Column long or short, with or without a basal foot, winged or wings absent. Pollen borne in a sac or pollinia. Fruit a capsule, opening laterally by 3 or 6 slits. Seeds numerous, dustlike, endosperm absent.

1a. Lip with a large pouch; fertile stamens 2

*Paphiopedilum*

1b. Lip not as above; fertile stamen 1

2a. Plants without chlorophyll

*Epipogium*

2b. Plant chlorophyllous

3a. Terrestrial herbs

4a. Pollinia 8

5a. Leaves distichous; not plicate

6a. Inflorescence from base of psuedobulb

*Thelasis*

- 6b. Inflorescence terminal
  - 7a. Lip spurred *Thunia*
  - 7b. Lip not spurred *Arundina*
- 5b. Leaves not distichous; plicate
  - 8a. Leaves solitary *Tainia*
  - 8b. Leaves 1-many
    - 9a. Petals narrower than the sepals; spur present *Calanthe*
    - 9b. Petals broader than the sepals; spur absent *Spathoglottis*
- 4b. Pollinia 2 or 4
  - 10a. Pollinia 4
    - 11a. Leaves plicate *Anthogonium*
    - 11b. Leaves not plicate *Liparis*
  - 10b. Pollinia 2
    - 12a. Lip not spurred
      - 13a. Flowers white; lip 3-lobed, margin fimbriate or laciniate *Cheirostylus*
      - 13b. Flowers green; lip 2-5 lobed, margin not fimbriate *Herminium*
    - 12b. Lip spur
      - 13a. Spur 2 *Satyrium*
      - 13b. Spur 1
        - 14a. Lip petaloid *Brachycorythis*
        - 14b. Lip not petaloid
          - 15a. Stigma lobe arising from a stigmaphore *Habenaria*
          - 15b. Stigma lobe sessile, stigmaphore absent
            - 16a. Flowers small, not showy, less than 2 cm across *Peristylus*

- 16b. Flowers large, showy, more than 5 cm across *Pecteilis*
- 3b. Epiphytes, rarely terrestrial or lithophytes
- 17a. Plants without pseudobulbs
- 18a. Leaves linear or terete
- 19a. Leaves terete; inflorescences shorter than the leaves *Papilionanthe*
- 19b. Leaves semi terete; inflorescence longer than the leaves *Holcoglossum*
- 18b. Leaves flat or sulcate or subterete
- 20a. Pollinia 8 or 4
- 21a. Pollinia 8 *Ceratostylus*
- 21b. Pollinia 4
- 22a. Flowers tiny, numerous in long dense racemes *Oberonia*
- 22b. Flowers showy, few to many flowered
- 23a. Stem long, 100 cm or more; flowers red *Renanthera*
- 23b. Stem short, 10-20 cm; flowers yellowish green with  
coloured spots *Hygrochilus*
- 20b. Pollinia 2
- 24a. Lip saccate; sac formed by a wide pouch like  
protrusion of almost entire lip, margin fimbriate *Gastrochilus*
- 24b. Lip not forming a pouch
- 25a. Leaf apex premorse, keeled; inflorescence longer  
than the leaves, densely many flowered *Rhynchostylis*
- 25b. Leaf apex obtusely 2-lobed; inflorescence erect or pendent,  
laxly flowered
- 26a. Stem long; flower large and showy, usually long lasting;

spur present	<i>Vanda</i>
26b. Stem short; flower medium to large, lip not spurred	
27a. Stem decumbent or pendulous, sometimes branched;	
lip gibbose	<i>Vandopsis</i>
27b. Stem short, unbranched; lip clawed, saccate or subsaccate	<i>Phalaenopsis</i>
17b. Plants with pseudobulbs	
28a. Pseudobulbs arising from stems or rhizomes	
29a. Pollinia 8	<i>Eria</i>
29b. Pollinia 4	
30a. Floral bracts distichous, large, concave	<i>Pholidota</i>
30b. Floral bracts not distichous	
31a. Sepals and petals recurved	<i>Liparis</i>
31b. Sepals and petals not recurved	
32a. Sepals unequal in length, dorsal shorter, lip mobile	<i>Bulbophyllum</i>
32b. Sepals equal in length, lip mobile	
33a. Pseudobulbs 1-leaved; lip entire	<i>Sunipia</i>
33b. Pseudobulbs 2-leaved; lip 3-lobed	<i>Coelogyne</i>
28b. Pseudobulbs directly rooting on host	
34a. Pseudobulbs formed by leaf bases; pollinia 2	<i>Cymbidium</i>
34b. Pseudobulbs distinct from the leaf; pollinia 4	
35a. Pseudobulbs two or more noded; lateral sepals	
united at base of column foot forming a mentum	
36a. Petals equal to or broader than the sepals; pollinia 4	<i>Dendrobium</i>
36b. Petals narrower than the sepals; pollinia 8	<i>Eria</i>

35b. Psuedobulbs single noded; sepals all united into a tube or free

37a. Leaves and flowers not appearing together *Pleione*

37b. Leaves and flowers appearing together

38a. Psuedobulbs forming a chain or articulated, branched *Otochilus*

38b. Psuedobulbs not articulated or branched *Bulbophyllum*

***Anthogonium*** Wall. ex Lindl. Intr. Nat. Syst. Bot., ed. 2:341, 1836.

Herbs, terrestrials or sometimes lithophytic. Pseudobulb small, ovoid. Stem arising from pseudobulb apex. Leaves 2 or 3, sessile, sheathing. Inflorescence lateral or basal from pseudobulb, racemose to sub-paniculate, slender, erect. Sepals connate into a tube, gibbous at base, apically free. Petals elongate, spatulate; lip adnate to the base of column, apex 3-lobed. Column long, slender, apex abruptly incurved; pollinia 4.

***Anthogonium gracile*** Lindl. Intr. Nat. Syst. Bot. 2:341, 1836; Hook.f., Fl. Brit. Ind. 5: 822. 1890; Balakr., Fl. Jowai 2: 489. 1983; Kataki, Orch. Megh., 108. 1986; Chowdhery, Orch. Fl. Aruna. Pradesh 65. 1998.

Pseudobulbs underground, about 0.7cm across. Stems 2-5 cm long. Leaves lanceolate, 14-24 x 0.9-1.5cm, 5-nerved. Inflorescence a terminal raceme, 18-38 cm, bracts ovate 0.2-0.3 x 0.1-0.2 cm. Flowers about 2cm long, pale to dark pink, pedicels with ovary 1.0-1.2 cm. Sepals connate, forming a long slender tube, lobes oblong, obtuse, about 0.7cm. Petals falcate, clawed at base, about 1.5cm, pale pink with whitish patches; lip dark pink with red spots at apex.

**Fl. & Fr.:** August - September

**Distribution:** India (NE India), Bangladesh, Cambodia, China, Myanmar, Thailand, Vietnam

**Specimen examined:** Grows in grasslands and open hill slopes. Lozaphuhu. NLNU 0492.

*Arundina* Blume, Bijdr. Fl. Ned. Ind.: 401. 1825

Terrestrial. Stem erect, terete, leafy. Leaves distichous, membranous, acuminate. Inflorescence terminal, few to many flowered. Flowers large. Sepals similar, elliptic or lanceolate, apex acute; lateral sepals usually connivent. Petals spreading, ovate-elliptic, apex acute; lip adnate to base of column, not spurred, 3-lobed. Column long, straight, narrowly winged toward apex. Pollinia 8, in fours attached to an appendage.

*Arundina graminifolia* (D. Don) Hochr. in Bull. Bot. New York Bot. Gard. 6: 270. 1910; Seidenf. & Smitnd. Orch. Thailand 2(1): 184. 1959; Hook.f., Fl. Brit. Ind. 5: 857. 1890; Chowdhery, Orch. Fl. Aruna. Pradesh 74. 1998; Hynniewta *et al.*, Orch. Nagaland, 47. 2000.

Stems 60-150 cm long. Leaves sessile, oblong-lanceolate, 15-25 x 2.0-2.5 cm, distichous. Inflorescence 15-20 cm long, racemose, panicle branched, few to many flowered. Flowers purplish-white, 3-5 cm across; sepals lanceolate, acute, 3.0-3.5 x 0.8-1.2 cm; petals orbicular-ovate, 3.2-3.5 x 1.3-1.6 cm; lip pink with dark pink spots, 3-lobed; sidelobes broad, round; midlobe dark pink oblong, apex crisped, bifid; disk 2-ridged; ridges fleshy, undulate.

**Fl. & Fr.:** July - September

**Distribution:** India (throughout), E Himalaya, Myanmar, Nepal, Philippines, Sri Lanka, Taiwan, Thailand, Tibet, Vietnam

**Specimen examined:** Grows in open forest, grasslands. Thetsumi. NLNU 0411.

*Brachycorythis* Lindl., Gen. Sp. Orchid. Pl. 363. 1838.

Terrestrials, rarely epiphytic. Tubers fusiform to ellipsoid. Stems erect, leafy, seldom covered in scales. Leaves many, alternate, sheathing at base. Inflorescence terminal,



racemose, usually many flowered, floral bracts leaf-like. Flowers resupinate, purple to white, spotted. Sepals free, erect, lateral sepals spreading, oblique. Petals entire, adnate to column base; lip protruding, bipartite, hypochile spurred, epichile 2- or 3- lobed. Column erect, slender, short, anther locules parallel; pollinia 2, granular, caudicles short, naked viscidium, rostellum 3-lobed.

***Brachycorythis obcordata*** (Lindl.) Summerh., Kew Bull. 10. 2: 243. 1955; Pearce & Cribb, Fl. Bhut., 3.3: 132. 2002.

Plant upto 25cm tall, tuber globose to cylindric. Stem sheaths at base, glandular or pubescent, overlapping, tubular. Leaves numerous, oblong or lanceolate to elliptic or lanceolate, sessile. Inflorescence few-to many-flowered, rachis minutely pubescent, 2-8cm long, floral bracts oblong to lanceolate. Flowers 0.7-1.2cm across, pink to pale purple; pedicel and ovary fusiform, puberulous, 0.8-1cm long. Petals ovate or lanceolate; lip obscurely 3-lobed, broadly triangular to obcordate, mucronate, surface papillose, spur short, 0.3cm long, wide mouth. Column very short, staminodes curved.

**Fl. & Fr.:** August - September

**Distribution:** India (throughout), E & W Himalaya, Bangladesh, Myanmar

**Specimen examined:** Grows in grasslands and open hill slopes. Pfitsero. NLNU 0251.

***Bulbophyllum*** Thouars, Hist. Orchid. t. 3. 1822

Herbs, epiphytic. Rhizome short to long, creeping or hanging, scale covered. Pseudobulbs uninodal, distant or clustered on rhizome. Leaves 1 or 2, arising from pseudobulb apex, oblong or oblong-lanceolate, obtuse or notched at apex. Inflorescence erect or arched, lateral, usually racemose or umbellate, 1- many flowered. Flowers small to

large, sometimes showy. Sepals oblong or lanceolate, lateral sepal longer than dorsal sepal, connate at tip. Petals free, usually smaller than sepals; lip simple to 3-lobed, mobile, usually fleshy and recurved. Column short, winged; pollinia 4.

1a. Inflorescence densely many flowered *B. odoratissimum*

1b. Inflorescence laxly 3-6 flowered

2a. Lateral sepals oblong below, tapering to long

filiform -caudate apex *B. rothschildianum*

2b. Lateral sepals ovate lanceolate,

not tapering to long filiform -caudate apex *B. umbellatum*

***Bulbophyllum odoratissimum*** (Sm.) Lindl., Numer. List:n. 1987. 1829; Gen. & Sp. Orch. 55 1830; Hook.f., Fl. Brit. Ind. 5: 758. 1890; Katakai, Orch. Megh., 74. 1986; Chowdhery, Orch. Fl. Aruna. Pradesh 123. 1998.

Herbs, epiphytic or lithophytic; rhizome creeping or straggling, woody, 0.1-0.2cm thick; roots clustered at nodes, filiform. Pseudobulbs erect, subcylindric, smooth to rigid, 2-3cm high, distant on a stout rhizome. Leaf 1, subsessile, oblong, apex obtuse, slightly emarginated. Petiole 0.1-0.3 cm. Inflorescence an umbel, basal from pseudobulb, densely many flowered; peduncle about 9cm long, sheathed imbricate, lanceolate; floral bracts lanceolate, apex acuminate. Flowers fragrant, 0.4-0.6cm across; sepals and petals white, lip tangerine. Petals spreading, ovate, thinly textured, apex subobtusely; lip simple, fleshy, glandular- pubescent, margin glandular. Column about 0.1cm.

**Fl. & Fr.:** June - July

**Distribution:** India (NE India), Bhutan, China, Nepal, Myanmar

**Specimen examined:** Grows on tree trunks. Thetsumi. NLNU 0412.

***Bulbophyllum rothschildianum*** (O'Brien) J.J.Sm., Bull. Jard. Bot. Buitenzorg, ser. 2, 8: 27. 1912.

Plant epiphytic; rhizome stout, sheathed. Pseudobulbs ovoid, with 1 leaf at apex. Petiole about 1cm; leaf blade subelliptic, thickly leathery, apex obtuse. Inflorescence erect, umbellate, 4-6 flowered, floral bracts lanceolate, apex acuminate. Flowers large, purplish red. Dorsal sepal ovate, hooded, margins fimbriate, apex caudate; lateral sepals lanceolate, tapering to long filiform caudate apex. Petals ovate triangular, falcate, margins fimbriate. Lip adnate to apex of column foot, ovate-oblong, apex obtuse, margin erect and pilose-pubescent. Column stout, enlarged wings at middle. Foot curved; stelidia suboblong.

**Fl. & Fr.:** June - July

**Distribution:** India (NE India), China

**Specimen examined:** Grows on tree trunks. Wazeho. NLNU 0804.

***Bulbophyllum umbellatum*** Lindl., Gen. Sp. Orchid. Pl.: 56. 1830; King & Pantl., Ann. Roy. Bot. Gard. Calcutta 8: 95. t. 132. 1898; *Cirrhopetalum umbellatum* (Lindl.) Linden, Ill. Hort. 28: 80. 1881.

Pseudobulbs 2.5-3 x 0.9-1.4 cm, ovoid. Leaf 1, coriaceous, pendent, oblong-lanceolate, obtuse. Inflorescence 3-4 flowered; peduncle sheathed; sheaths distant, lanceolate, acute; floral bracts narrowly lanceolate, acute. Flowers upto 1.5 cm long; sepals and petals yellowish green, mottled with pinkish, lip purplish. Dorsal sepal ovate-lanceolate, acute to acuminate; lateral sepals narrowly lanceolate, acute. Petals broadly ovate, obtuse. Lip oblong. Column stout.

**Fl. & Fr.:** April - June

**Distribution:** India (throughout), E & W Himalaya, China, Myanmar, Nepal, Taiwan, Thailand, Tibet, Vietnam

**Specimen examined:** Grows on tree trunks. Zelome. NLNU 0260.

*Calanthe* R.Br., Bot. Reg. 7: t. 573. 1821

Plants terrestrial; roots thick, long, pubescent. Stems pseudobulbous, long or short; pseudobulbs small, ovoid, covered by leaves. Leaves 2 to several, often clustered, persistent, narrowly elliptic to linear-elliptic, plicate, petiolate to subsessile. Inflorescence axillary, terminal or arising from base of pseudobulb, erect, long or short, few- to many-flowered, racemose. Flowers resupinate, small to large and showy. Sepals and petals similar, free, spreading, rarely connivent. Lip entire, 3- or 4-lobed, adnate to column base, usually spurred; mid-lobe often deeply bifid; disc with basal warty calluses or lamellae. Column short, fleshy, truncate; pollinia 8.

1a. Spur more than 5 mm long

*C. odora*

1b. Spur less than 3mm long

2a. Flowers brick-red to purple, more than 3cm across, spreading;

lip with 3 lamellae on mid lobe

*C. brevicornu*

2b. Flowers pale green to dull brown, less than 1 cm across,

pendent; lip with 3 lamellae from base to apex

*C. mannii*

*Calanthe brevicornu* Lindl., Gen. Sp. Orchid. Pl. 251. 1833; Hook.f., Fl. Brit. Ind. 5: 848. 1890; Chowdhery, Orch. Fl. Arun. Pradesh 162. 1998; Hynniewta *et al.*, Orch. Nagaland, 84. 2000.

Pseudobulbs conic, short, with 3 or 4 sheaths. Leaves blade elliptic or obovate-lanceolate, apex acute; petiole-like base sheathing, usually forming a stout pseudostem.

Scape arising from leaf axil, densely puberulent; rachis to 30 cm, laxly 5–13-flowered. Flowers brick red to purple striped. Sepals similar, oblong, abaxially puberulent, apex acute. Petals oblong-lanceolate, glabrous, 3-veined, apex acute; lip adnate, base shortly clawed, 3-lobed; lateral lobes falcate-oblong, apex obliquely truncate; disk pinkish red, with 3 tall yellow lamellae; spur very short, outside puberulent, attenuate toward apex. Column slightly dilated toward apex; rostellum 2-lobed; anther cap beaked; pollinia narrowly obovoid, subequal in size.

**Fl. & Fr.:** May - June

**Distribution:** India (NE India), E & W Himalaya, Myanmar, Nepal, Tibet

**Specimen examined:** Grows on forest floors. Tsupfume. NLNU NLNU 0263. (**Pl. 58**)

*Calanthe mannii* Hook.f., Fl. Brit. India 5: 850. 1890; King & Pantl in. Ann. Roy. Bot. Gard. Calcutta, 8: 167. t. 225. 1898; Katak, Orch. Megh., 139. 1986.

Pseudobulbs short, cylindric. Leaves narrowly elliptic-oblong to oblanceolate-oblong, petiolate, the lower 2 sheathing at base; petiole 8-9cm. Inflorescence terminal, laxly 10- to 20-flowered; peduncle pubescent; rachis pubescent; floral bracts glabrous, small, lanceolate, acute. Flowers deflexed, pale green to dull brown, lip yellow; pedicel and ovary pubescent, clavate. Sepals similar, ovate-oblong, acute, pubescent externally. Petals ovate-ob lanceolate, acute, glabrous. Lip 3-lobed, shortly spurred, adnate to column base; spur pubescent, conical. Column short, stout. Fruit fusiform, pendant.

**Fl. & Fr.:** May - July

**Distribution:** India (NE India), E & W Himalaya, China, Myanmar, Nepal, Tibet, Vietnam

**Specimen examined:** Grows on forest floors. Phukhungri. NLNU 0808.

*Calanthe odora* Griffith, Not. Pl. Asiat. 3: 365. 1851; *C. angusta* Lindl., Fol. Orchid. 6: 7. 1855; Hook.f., Fl. Brit. India 5: 849. 1890; King & Pantl in. Ann. Roy. Bot. Gard. Calcutta, 8: 171. t. 232. 1898.

Pseudobulbs ovoid-conical, caespitose. Leaves from pseudobulb, narrowly elliptic to oblong-elliptic, acute, bases sheathing, subsessile. Inflorescence terminal, densely to subdensely few- to many-flowered; peduncle sheathed, puberulous; floral bracts broadly elliptic, acute to subacute, minutely puberulous at base. Flowers sweetly fragrant, uniformly white; pedicel and ovary puberulous. Sepals similar, elliptic-ovate, subacute, spreading. Petals narrowly oblong, obtuse. Lip 3-lobed, spurred; spur slender, cylindric, curved-clavate. Column 0.3 cm.

**Fl. & Fr.:** April-July

**Distribution:** India (NE India), E Himalaya, Bangladesh, China, Nepal, Thailand, Vietnam

**Specimen examined:** Broad-leaved forests, shaded and damp places on grassy slopes. Letsam. NLNU 0812.

*Ceratostylis* Blume, Bijdr. Fl. Ned. Ind.: 304. 1825

Plants epiphytic; roots fibrous. Stems simple or branched, caespitose, sometimes terete and rush-like, with thin brown, reticulate basal sheaths. Leaves narrow, coriaceous, fleshy to subterete, rarely thin. Flowers resupinate, small, solitary to few within a small cluster of bracts. Sepals erect, connivent; lateral sepals forming a saccate or spur-like mentum with the column foot. Petals narrow. Lip adnate to column foot. Column short, dilated above, 2-lobed or with 2 spatulate, erect arms; foot long; pollinia 8, sessile.

*Ceratostylis himalaica* Hook.f., Fl. Brit. Ind. 5: 826. 1890; Lucksom, Orch. Sikk & NE Himal. 427. 2000.

Stems puberulous, branched, clothed with scarious sheaths; leaves linear-lanceolate, acuminate, fleshy; flowers solitary or paired, terminal, pubescent outside; bracts reflexed; sepals oblong-lanceolate to ovate; lip oblong-ovate; midlobe suborbicular, notched at apex.

**Fl. & Fr.:** May-August

**Distribution:** India (NE India), E Himalaya, China, Myanmar, Nepal, Tibet, Vietnam

**Specimen examined:** Epiphytic in primary forests. Sakraba. NLNU 0662.

*Cheirostylis* Blume, Bijdr. Fl. Ned. Ind.: 413. 1825

Plants small, terrestrial; rhizome decumbent, roots nodal. Leaves soft, few, petiolate. Inflorescence terminal, loosely few-flowered, racemose. Flowers small, resupinate. Sepals slender, connate halfway to form a sepaline tube with the petals. Lip erect, channelled. Column short with 2 stylidia at apex; bifid rostellum; stigmas 2, lateral; pollinia 2, on a short tube.

*Cheirostylis griffithii* Lindl., J. Proc. Linn. Soc., Bot. 1: 188. 1857; Hook.f., Fl. Brit. Ind. 6: 105. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calcutta. 8: 299. t. 397. 1898; Lucksom, Orch. Sikk & NE Himal. 427. 2000.

Stem decumbent below, glabrous, bearing scarious sheaths. Leaves withering at flowering, ovate, subacute, base cuneate; petiole short. Inflorescence 1- or 2-flowered at apex; peduncle slender, pubescent. Flowers uniformly white; pedicel and ovary pubescent. Sepals connate and forming a tube, pubescent towards the base, free point acute, spreading. Petals linear-oblong, falcate, acute. Lip with an elongate, concave base, slightly saccate; sac with 2 parallel rows of short, glandular setae within; apex orbicular, margins fimbriate, epichile broad, deeply fimbriate. Column elongate, with 2 linear processes.

**Fl. & Fr.:** September-December

**Distribution:** India (NE India), E & W Himalaya, China, Myanmar, Nepal, Thailand

**Specimen examined:** Damp places in forest. Thetsumi. NLNU 0413.

*Coelogyne* Lindl., Coll. Bot.: t. 33. 1824

Plants epiphytic or lithophytic. Pseudobulbs ovoid, conical or cylindric, close or distant on rhizome, 1 or 2-leaved from apex. Leaves narrow to broad, elliptic to lanceolate, plicate, usually petiolate. Inflorescence erect or pendent, 1- to many-flowered. Flowers resupinate, small to large and showy, opening simultaneously or one at a time. Sepals free, often concave. Petals free, usually narrower than the sepals. Lip 3-lobed, concave at base; lateral lobes erect on either side of the column; mid-lobe spreading; disc keeled, lamellae often extending onto mid-lobe. Column long; anther ventral at column apex; rostellum large; pollinia 4.

1a. Inflorescence 2 or more racemes; rachis with sheaths

at base and at top of the raceme

*C. corymbosa*

1b. Inflorescence 1 racemes; rachis with sheaths at base of the raceme

2a. Margin of lip entire; lamellae 5

*C. griffithii*

2b. Margin of lip deeply fimbriate; lamellae 3

*C. barbata*

*Coelogyne barbata* Lindl.ex Griff., Itin. Pl. Khasyah Mts.: 72. 1848; Hook.f., Fl. Brit. India 5: 839. 1890; Katak, Orch. Megh., 119. 1986; Chowdhery, Orch. Fl. Arun. Pradesh 216. 1998; Hynniewta *et al.*, Orch. Nagaland, 107. 2000.

Pseudobulbs clustered, ovoid, angular, enclosed within sheaths at base. Leaves 2, oblong-lanceolate, acuminate, margins undulate, coriaceous; petiole long. Inflorescence hysteranthous, erect to arching. Sepals and petals white, lip fringed with sepia-brown projections, column white; pedicel and ovary slender. Dorsal sepal ovate-oblong, acute,



margins reflexed, veined; lateral sepals similar, apices acute to acuminate. Petals linear-lanceolate, acute, apex reflexed. Lip 3-lobed; lateral lobes short, ovate, erect, margin fimbriate; mid-lobe triangular, margins with dense fimbriate; disc 3-keeled, fimbriate.

**Fl. & Fr.:** September - November

**Distribution:** India (NE India), E Himalaya, Bangladesh, China, Myanmar, Nepal, Tibet

**Specimen examined:** On trees in forests or on cliffs. Thetsumi. NLNU 0414. **(Pl. 58)**

*Coelogyne corymbosa* Lindl., Fol. Orchid. Coelogyne 5: 7. 1854; Hook.f., Fl. Brit. Ind. 5 : 831. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calcutta 8: 134. t. 185. 1898; Katakai, Orch. Megh., 125. 1986.

Pseudobulbs clustered, ovoid. Leaves 2, erect, elliptic-lanceolate, acute, coriaceous, 5-veined; petiole grooved. Inflorescence erect to pendent, 2- to 4-flowered; peduncle covered by overlapping sheaths; rachis 2-3cm long. Flowers fragrant, fleshy, white with 4 large yellow eyes bordered with orange-red on lip. Sepals similar, lanceolate, acute. Petals narrowly lanceolate, acute, 1-veined. Lip 3-lobed; lateral lobes rounded; mid-lobe ovate to ovate-lanceolate, acute to acuminate. Column curved, broadly winged, apex 3-lobed.

**Fl. & Fr.:** February-June

**Distribution:** India (NE India), E Himalaya, China, Myanmar, Nepal, Tibet

**Specimen examined:** Epiphytic on trees. Mesulumi. NLNU0381. **(Pl. 58)**

*Coelogyne griffithii* Hook.f., Fl. Brit. Ind. 5 : 838. 1890; Chowdhery, Orch. Fl. Arun. Pradesh 226. 1998; Hynniewta *et al.*, Orch. Nagaland, 112. 2000.

Epiphytic herbs. Pseudobulbs on scaly rhizome, oblong, 5-9.5 x 1.5-3 cm, ridged. Leaves elliptic-lanceolate, acuminate, long petioled. Raceme 6-17-flowered, 15-35 cm long.

Flowers brownish. Petals slender, 1-veined. Lip white with brown patch on margin of side lobes; mid-lobe oblong truncate; disc with 5, unequal lamellae. Capsule ellipsoid.

**Fl. & Fr.:** April – May

**Distribution:** India (NE India), E Himalaya, China, Myanmar, Tibet

**Specimen examined:** Common on tree trunks in forest. Chozuba. NLNU 0663.

*Cymbidium* Sw., Nova Acta Regiae Soc. Sci. Upsal. 6: 70. 1799

Plants epiphytic, lithophytic or terrestrial, usually autotrophic, rarely mycotrophic. Pseudobulbs short to elongate, covered by bladeless sheaths. Leaves long, oblong or rarely lanceolate, coriaceous. Inflorescence erect or curved, suberect or pendent, racemose, 1 to many flowered; peduncle loosely sheathed. Flowers often large and showy. Sepals and petals free, spreading or erect. Lip 3-lobed, sessile, borne on a short column foot; lateral lobes erect; midlobe recurved. Column long; pollinia 2 or 4, subglobose or pyramidal, attached by a short caudicle to a broad viscidium.

- |  |                      |
|--|----------------------|
| 1a. Pseudobulbs few-leaved; leaves petioled, oblong-lanceolate | <i>C. tigrinum</i>   |
| 1b. Pseudobulbs many-leaved; leaves sessile, linear            |                      |
| 2a. Raceme dense, sepals and petals connivent                  | <i>C. elegans</i>    |
| 2b. Raceme lax, sepals and petals spreading                    |                      |
| 3a. Pedicelled ovary 4-5 cm long, yellowish green              | <i>C. iridioides</i> |
| 3b. Pedicelled ovary 2.0-2.9 cm long, greenish purple          | <i>C. erythraeum</i> |

*Cymbidium elegans* Lindl., Gen. Sp. Orchid. Pl. 163. 1833; King & Pantl. in Ann. Roy. Bot. Gard. Calcutta 8: 194. t. 259. 1898; Katak, Orch. Megh., 154. 1986; Hynniewta *et al.*, Orch. Nagaland, 129. 2000; *Cyperorchis elegans* (Lindl.) Blume, Rumphia 4: 47. 1849; Hook.f., Fl. Brit. Ind. 6 : 14. 1890.

Leaves distichous, apex acuminate or obtuse and usually slightly 2-lobed. Inflorescence arising from lower part of pseudobulb; rachis pendulous or nodding, densely 18-35-flowered. Flowers narrowly bell-shaped; pedicel and ovary; sepals and petals cream-yellow to pale yellowish green; lip cream yellow to pale yellowish green. Sepals narrowly obovate-lanceolate, apex acute. Petals broadly linear-oblong, apex obtuse; lip oblong-triangular, 3-lobed. Column puberulent toward base, narrowly winged.

**Fl. & Fr.:** October-December

**Distribution:** India (NE India), E Himalaya, China, Myanmar, Nepal, Tibet

**Specimen examined:** Trees in forests. Tsupfume. NLNU 0265.

*Cymbidium erythraeum* Lindl., J. Proc. Linn. Soc., Bot. 3: 30. 1858; *C. longifolium* D. Don, Prodr. Fl. Nepal. 36. 1825; Hook.f., Fl. Brit. Ind. 6 : 13. 1890; Hynniewta *et al.*, Orch. Nagaland, 131. 2000.

Plant epiphytic or lithophytic. Leaves distichous, linear-oblong, tapering to fine point. Inflorescence erect to horizontal, arching, 5- to 14 -flowered; sheaths scarious; floral bracts triangular. Flowers fragrant; sepals and petals greenish, spotted and striped red-brown, lip yellowish to white, spotted red-brown. Sepals similar, narrowly obovate, acute. Petals narrow, oblong, acute, falcate, spreading. Lip 3-lobed, adnate to base of the column. Column winged, sparsely pubescent. Fruit fusiform -ellipsoid.

**Fl. & Fr.:** October-May

**Distribution:** India (NE India), E & W Himalaya, China, Myanmar, Nepal, Tibet, Vietnam

**Specimen examined:** Trees and rocks at forest margins and in forests. Thetsumi. NLNU 0450.

***Cymbidium iridioides*** D. Don, Prodr. Fl. Nepal. 36. 1825; Kataki, Orch. Megh., 152. 1986; Chowdhery, Orch. Fl. Arun. Pradesh 293. 1998; Hynniewta *et al.*, Orch. Nagaland, 129. 2000.

Pseudobulbs narrowly ovoid. Leaves linear-elliptic, acute; leaf base sheathing. Inflorescence 7-20-flowered; peduncle sheathed. Flowers fragrant; sepals and petals yellowish-green, lip yellowish, red-spotted, lateral lobes red-veined, callus yellowish spotted with maroon. Sepals subsimilar, narrowly obovate, acute. Petals oblong, curved, spreading. Lip 3-lobed, adnate to the column base. Column clavate, winged. Fruit fusiform-ellipsoid.

**Fl. & Fr.:** October – November

**Distribution:** India (NE India), E & W Himalaya, China, Myanmar, Nepal, Tibet, Vietnam

**Specimen examined:** On trees, in forests. Mesulumi. NLNU 0384.

***Cymbidium tigrinum*** C.S.P. Parish ex Hook., Bot. Mag. 90: ad t. 5457. 1864; Hook.f., Fl. Brit. Ind. 6 : 9. 1890; Hynniewta *et al.*, Orch. Nagaland, 134. 2000.

Pseudobulbs subglobose, 2.7-5 x 3-3.5 cm. Leaves 2-4, 10-15 x 3 cm, narrowly elliptic, apex long acuminate. Inflorescence arising from base of pseudobulb, arching; rachis 2-5-flowered. Flowers slightly fragrant; sepals and petals yellowish green, tinged reddish brown with purplish brown spots near base; lip with tinged reddish brown spots. Sepals narrowly elliptic-lanceolate, apex acuminate. Petals narrowly elliptic, apex acute; lip subobovate, 3-lobed; lateral lobes erect; mid-lobe recurved, margin undulate. Column 2.5-3 cm; pollinia 2.

**Fl. & Fr.:** March-July

**Distribution:** India (NE India), China, Myanmar, Thailand, Tibet

**Specimen examined:** Bare rocks, rocky crevices in open situations. Phukhungri. NLNU 0890.

***Dendrobium*** Sw., Nova Acta Regiae Soc. Sci. Upsal. 6: 82. 1799

Epiphytic, lithophytic, or terrestrial. Stems pseudobulbous or elongate, stout or slender, erect or drooping, simple or branched. Leaves 1 to many, apical or arranged distichously along stems, linear lanceolate. Inflorescence lateral, 1- to many- flowered, racemose, erect, horizontal, or pendulous. Flowers often showy, resupinate or non-resupinate, ephemeral or long live. Sepals free, lateral sepals adnate to the foot of the column forming a sac or mentum. Petals similar to sepals, margin entire, fimbriate; lip entire to lobed, shortly clawed, sometimes forming a closed spur with the lateral sepals. Column short, stout, apex with a short curved spine; pollinia 4, waxy, oblong, naked.

- 1a. Stems with pseudobulb; inflorescence 1-flowered *D. rotundatum*
- 1b. Stems without pseudobulb; inflorescence 2- many flowered
  - 2a. Sepals and petals not spreading, narrow, with acuminate apices *D. denudans*
  - 2a. Sepals and petals moderately or widely spreading, broad,  
with obtuse to round or short apices
  - 3a. Stems and leaves with dark brown or blackish hairs;  
mentum 15 mm or more *D. williamsonii*
  - 3b. Stems and leaves glabrous; mentum less than 6 mm
    - 4a. Stems beaded with swollen nodes and contracted internodes
      - 5a. Lip broadly ovate, obscurely 3-lobed *D. falconeri*
      - 5b. Lip sub-orbicular, not lobed *D. wardianum*
    - 4b. Stems not beaded, with nodes and internodes equally or more or less thick
      - 6a. Stems 4-5 angled; inflorescence dense
        - 7a. Flowers orange-yellow; lip fimbriate, orange yellow *D. densiflorum*
        - 7b. Flowers pale mauve to white; lip margin erose, deeply yellow *D. farmeri*

6b. Stems terete; inflorescence lax

8a. Inflorescence few to many flowered raceme; lip fimbriate

9a. Leaf apex bifid; lip reddish nerved at base with

1 deep yellow blotch

*D. chrysotoxum*

9b. Leaf apex acute; lip uniformly yellow with

1 deep purple blotch

*D. fimbriatum* var. *oculatum*

8b. Inflorescence 1- flowered, 2-4-flowered cluster; lip not fimbriate

10a. Inflorescence on old leafless stem; flowers yellow

11a. Stem sheath inflated; lip with 1 large dark red blotch,

margin erose

*D. ochreatum*

11b. Stem sheath scarious; lip with 2 small purplish

brown blotches, margin ciliate

*D. chrysanthum*

10a. Inflorescence leaf opposed; flowers purplish to mauve or white

12a. Flowers mauve to creamy white; lip without blotch

*D. polyanthum*

12b. Flowers purplish white or yellow

13a. Lip with yellow blotch

*D. crepidatum*

13b. Lip with a deep purple spot surrounded by a white circle

*D. lituiflorum*

***Dendrobium chrysanthum*** Wall.ex Lindl. in Edward's Bot. Reg. 15: t. 1299.1830; Hook.f., Fl. Brit. Ind. 5:747. 1890; King & Pantl. in Ann. Roy. Bot. Card. Calcutta 8: 55, t. 77. 1898; Chowdhery, Orch. Fl. Aruna. Pradesh 290. 1998.

Epiphytic herbs, 40-80 cm long. Stems covered with scarious, white lined sheaths. Leaves lanceolate, acuminate, base sheathing. Flowers in leaf-opposed fascicles on leafy or leafless stem, up to 4 cm across, golden-yellow, with two confluent brownish-purple

blotches at lip. Lip simple, clawed at base, broadly orbicular, margin shortly fimbriate-dentate. Capsule subovoid, grooved.

**Fl. & Fr.:** August - October

**Distribution:** India (NE India), China, Myanmar, Nepal, Thailand, Tibet, Vietnam

**Specimen examined:** Scattered on tree trunks in primary forests. Phek. NLNU 0880.

*Dendrobium chrysotoxum* Lindl., Edwards's Bot. Reg. 33: t. 19. 1847; Hook.f., Fl. Brit.

Ind. 5:750. 1890; Chowdhery, Orch. Fl. Aruna. Pradesh, 293. 1998; Hynniewta *et al.*, Orch. Nagaland, 140. 2000.

Stem pseudobulbous, erect, fusiform, with 2-5 internodes, golden yellow when dry. Leaves 2-5, subterminal, oblong, leathery. Inflorescence subterminal, ascending or slightly pendulous, laxly many flowered. Flowers slightly fragrant, thickly textured, golden yellow, lip deeper golden yellow with red stripes on each side at base, anther cap pale yellow. Dorsal sepal oblong, slightly obtuse; lateral sepals nearly equal to dorsal sepal. Petals oblanceolate, margin minutely dentate; lip adaxially densely pubescent, margin undulate, apex bilobed.

**Fl. & Fr.:** April – June

**Distribution:** India (NE India), Bangladesh, China, Myanmar, Thailand, Vietnam

**Specimen examined:** Grows on tree trunks in forests, on rocks in open forests. Chozuba. NLNU 0352. **(Pl. 58)**

*Dendrobium crepidatum* Lindl. & Paxton, Paxton's Fl. Gard. 1: 63. 1850; Hook.f., Fl. Brit.

Ind. 5:740. 1890; Hynniewta *et al.*, Orch. Nagaland, 142. 2000.

Stems 20-30 cm, unbranched, with many nodes, internodes 3-4 cm, with green and white-striped sheaths. Leaves 8-15 x 1-1.5 cm, narrowly lanceolate. Inflorescence arising from old stems after leaves have fallen, very short, 1-4-flowered. Sepals and petals white,

pale purple above middle, lip pale purplish red above middle, golden yellow below middle, column white. Dorsal sepal subelliptic, obtuse; lateral sepals ovate-oblong, midvein on abaxial surface keeled. Petals broadly obovate, rounded; lip orbicular or broadly obovate, adaxially densely pubescent. Column white; pollinia linear-oblong.

**Fl. & Fr.:** April - May

**Distribution:** India (throughout), China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** On tree trunks in open forests, on rocks in mountain valleys. Zelome. NLNU 0420.

*Dendrobium densiflorum* Lindl. In Wall., Pl. Asiat. Rar. 1: 34, t. 40. 1830; Hook.f., Fl. Brit. Ind. 5: 748. 1890; King & Pantl. in Ann. Roy. Gard. Calcutta 8: 56, t. 79. 1898; Chowdhery, Orch. Fl. Aruna. Pradesh 295. 1998; Hynniewta *et al.*, Orch. Nagaland, 142. 2000..

Stem 25-30 cm, tufted, strongly clavate; sheathless. Leaves 3-4, 10-15 x 3.5-4.5 cm, broadly elliptic-ovate, entire, acute. Inflorescence drooping, axillary, densely many-flowered. Flowers 6 cm across, pale yellow, with orange-yellow lip; lip simple, clawed at base, orbicular, margin lacerate. Sepals obtuse; petals sub-orbicular. Lip sub-orbicular, apex retuse, margin ciliate. Column 6-7 mm, pale yellow; pollinia oblong.

**Fl. & Fr.:** April-June

**Distribution:** India (NE India), Bangladesh, China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Common on tree trunks in forests. Thetsumi. NLNU 0419.

*Dendrobium denudans* D. Don, Prodr. Fl. Nepal. 34. 1825; Hook.f., Fl. Brit. Ind. 5:715. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Culcutta 8: 45, t. 62. 1898; Hynniewta *et al.*, Orch. Nagaland, 144. 2000.



Epiphytic herbs. Stems cylindrical, yellowish, covered with tubular sheaths. Leaves lanceolate to oblong, acute, membranous. Racemes axillary, subapical, pendent, laxly many-flowered. Flowers greenish-white, with radiating red-purple line at lip, 2-2.5 cm across. Sepals and petals long acuminate. Lip strongly curved at base, 3-lobed; side-lobes long, narrow, serrate-lacerate.

**Fl. & Fr.:** October - November

**Distribution:** India (NE India), E & W Himalaya, Nepal, Thailand

**Specimen examined:** Rare on tree trunks in forest. Tsupfume. NLNU 0280. **(Pl. 58)**

*Dendrobium falconeri* Hook., Bot. Mag. 82: ad t. 4944. 1856; Hook. f., Fl. Brit. Ind. 5:742. 1890; Hynniewta *et al.*, Orch. Nagaland, 147. 2000.

Stems 45-70 cm, pendulous, cylindric, slender, fleshy, many branched, moniliform. Leaves narrowly lanceolate, leathery. Inflorescences lateral. Flowers spreading, large; sepals pale purple or red, petals white with purple apex, lip white with purple tip, yellow on both sides at base, disk with a deep purple blotch. Dorsal sepal ovate-lanceolate, lateral sepals ovate lanceolate, mentum subglobose. Petals ovate-rhombic; lip ovate-rhombic, adaxially densely barbellate, margin denticulate. Pollinia oblong.

**Fl. & Fr.:** April - May

**Distribution:** India (NE India), E Himalaya, Bangladesh, China, Nepal, Thailand, Vietnam

**Specimen examined:** On rocks or on tree trunks in forests. Sakraba. NLNU 0668.

*Dendrobium farmeri* Paxton, Paxton's Mag. Bot. 15: 241. 1849; Hook. f., Fl. Brit. Ind. 5: 750. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calcutta 8: 57, t. 80. 1898; Karthik. & al., Fl. Ind. Enum. Monocot. 127. 1989; Chowdhery, Orch. Fl. Aruna. Pradesh 298. 1998.

Stem up to 30 cm tall, clavate-fusiform, broadly 4-5-ridged, narrow towards base. Leaves 2-3, subterminal, elliptic-lanceolate, acute. Racemes axillary, decurved, laxly many-flowered. Flowers 4-5 cm across, white, tinged with yellow. Sepals ovate-oblong; petals suborbicular, shortly clawed at base. Lip dark yellow with white to pale margin, simple, clawed, pubescent. Column 2-3 mm long; pollinia elliptic oblong.

**Fl. & Fr.:** April-July

**Distribution:** India (NE India), E Himalaya, Bangladesh, Myanmar, Nepal, Thailand

**Specimen examined:** Scattered on tree trunks in dense primary forests. Tsupfume. NLNU 0267. (Pl. 58)

*Dendrobium fimbriatum* var. *oculatum* Hook., Bot. Mag. 71: t. 4160. 1845; Hook.f., Fl. Brit. Ind. 5: 745. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calcutta 8: 58, t. 82. 1898; Karthik. & al., Fl. Ind. Enum. Monocot. 127. 1989; Hynniewta *et al.*, Orch. Nagaland, 147. 2000.

Epiphytic, erect herbs, up to 100 cm long. Stems thickest in middle, light yellowish-green, striate; older stems leafless. Leaves all along the stem, broadly elliptic-lanceolate, acuminate. Racemes pendent, lateral, laxly. Flowers yellow to light orange-yellow, 4-5 cm across. Lip dark orange-yellow, with an orbicular, dark-purple blotch at centre, suborbicular, densely pubescent, margin-frimbriate. Column yellow; pollinia oblong, compressed.

**Fl. & Fr.:** April-July

**Distribution:** India (throughout), E Himalaya, China, Nepal, Philippines, Thailand, Sumatera, Vietnam

**Specimen examined:** Scattered on tree trunks in dense primary forests. Chozuba. NLNU 0353. (Pl. 59)

***Dendrobium lituiflorum*** Lindl., Gard. Chron. 1856:372.1856.

Stems pendulous, cylindric, unbranched, with many nodes. Leaves narrowly oblong, leathery. Inflorescence arising from old leafless stems, 1- to 2- flowered; peduncle perpendicular to stem. Pedicel and ovary about 2.5cm. Flowers spreading, large, membranous; inner surface of lip with a deep purple spot surrounded by a white circle. Dorsal sepal oblong-lanceolate; lateral sepals similar to dorsal sepal; mentum subglobose. Petals subelliptic, margin entire, apex acute; lip subobovate, shorter than petals, margin, denticulate. Column base dilated, apex truncate and concave.

**Fl. & Fr.:** March - April

**Distribution:** India (NE India), E Himalaya, China, Myanmar, Thailand, Vietnam

**Specimen examined:** On tree trunks in forests. Khuza. NLNU 0818.

***Dendrobium ochreatum*** Lindl. in Edw. Bot. Reg. 21: t. 1756. 1835; Hook.f., Fl. Brit. Ind. 5: 747. 1890; Hynniewta *et al.*, Orch. Nagaland, 153. 2000.

Stem stout 20-30 cm. Leaves 5-10 x 1.5-3 cm, lanceolate, obliquely acuminate at apex; peduncles leaf-opposed. Inflorescence 1- or 2-3-flowered, flowers 7 cm across, golden yellow, mildly scented; bracts ovate; sepals oblong-lanceolate; petals elliptic-lanceolate; lip orbicular, yellow with red blotch on disk, and red lines at base, erose at margins, pubescent inside; mentum obtuse.

**Fl. & Fr.:** April – May

**Distribution:** India (NE India), Bangladesh, Myanmar, Nepal, Thailand

**Specimen examined:** Epiphytic in primary forests. Chozuba. NLNU 0361.

***Dendrobium polyanthum*** Wall. ex Lindl., Gen. Sp. Orchid. Pl. 81. 1830; *D. primulinum* Wall. ex Lindl., Gard. Chron. 1858: 400. 1858; Katak, Orch. Megh., 55. 1986; Hook.f., Fl. Brit. Ind. 5: 735. 1890.

Stems pendulous, cylindric, stout, unbranched, with many nodes. Leaves alternate along entire stem, lanceolate or ovate-lanceolate. Inflorescence arising from old stems after leaves have fallen. Flowers pendulous; white or pale pink. Dorsal sepal narrowly lanceolate, subacute; lateral sepals similar in size and shaped; mentum narrowly conic, obtuse. Petals narrowly oblong, margin entire, apex obtuse; lip broadly obovate, both surfaces densely pubescent, margin ciliate. Column oblong.

**Fl. & Fr.:** April

**Distribution:** India (NE India), China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Epiphytic on tree trunks in open forest. Zelome. NLNU 0268. **(Pl. 59)**

***Dendrobium rotundatum*** (Lindl.) Hook.f., Fl. Brit. Ind. 5: 712. 1890; *Epigeneium rotundatum* (Lindl.) Summerh., Kew Bull. 12: 264. 1957; Lucksom, Orch. Sikk. & NE Himal., 591. 2000.

Rhizome many branched, covered with papery tubular sheaths. Pseudobulbs 3-11 cm apart on rhizome, often curved, ovoid, 2-leaved, with scalelike basal sheaths. Leaf blade oblong or elliptic, leathery, apex retuse; petiole 5-10 mm. Inflorescence 1-flowered; enclosed in large membranous sheaths. Flowers yellowish brown. Dorsal sepal ovate-lanceolate, acute; lateral sepals lanceolate. Petals oblong-lanceolate, acuminate; lip obovate-oblong in outline, 3-lobed; disk with 3 lamellae, median much shorter.

**Fl. & Fr.:** March-May

**Distribution:** India (NE India), China, Myanmar, Nepal, Tibet

**Specimen examined:** On rocks or on tree trunks in open forests or at forest margins. Tsupfume. NLNU 0898.

***Dendrobium wardianum*** Warner, Select Orchid. Pl.: t. 19. 1862; Hook.f., Fl. Brit. Ind. 5: 742. 1890; Hynniewta *et al.*, Orch. Nagaland, 156. 2000.

Stems 45-100 cm, pendulous, fleshy, with many swollen nodes. Leaves 8-12 x 1.2-1.8 cm, oblong, leathery. Inflorescence on old leafless stems, 1- or 2- flowered. Pedicel and ovary pale purple. Flowers 8 cm across; sepals and petals white with pale purple tips, lip with purplish red stripes. Dorsal sepal ovate-lanceolate; lateral sepals suborbicular; mentum subglobose, small. Petals obliquely ovate, base contracted into a short claw; lip broadly obovate, adaxially densely barbellate, margin ciliate. Column 6mm long. Capsule ovoid.

**Fl. & Fr.:** April – May

**Distribution:** India (NE India), Bangladesh, China, Myanmar, Thailand, Vietnam

**Specimen examined:** Epiphytic on tree trunks in open forests. Tsupfume. NLNU 0891. (**Pl. 59**)

***Dendrobium williamsonii*** Day & Rchb.f., Gard. Chron. 78. 1859; Hook.f., Fl. Brit. Ind. 5: 721. 1890; Hynniewta *et al.*, Orch. Nagaland, 156. 2000.

Stem fusiform, 15-20 cm, fusiform, erect, covered with hirsute leaves. Leaves few towards apex, oblong to oblanceolate. Inflorescence 1-3-flowered in terminal short peduncles. Flowers 2.2-2.3 cm, pale yellow with red lines on lateral lobes of lip; dorsal sepal ovate or lanceolate; lateral sepals jointed to form a straight long mentum; petals oblanceolate; lateral lobes crisped; midlobe orbicular, undulate, crisped at margins; disk with 3 ridges. Column 1cm long, white; pollinia linear-oblong.

**Fl. & Fr.:** April – May

**Distribution:** India (NE India), China, Myanmar, Thailand, Vietnam

**Specimen examined:** Epiphytic in forests. Tsupfume. NLNU 0867.

***Epipogium*** Borkh., Tent. Disp. Pl. German.: 139. 1792

Plants mycotrophic, leafless, lacking chlorophyll; roots coralloid or tuberous. Inflorescence few-flowered, racemose. Flowers more or less pendent. Sepals and petals similar, free, connivent or spreading. Lip sessile, fleshy, basally produced into a distinct spur; disc papillose to pilose. Column short; pollinia 2.

***Epipogium. roseum*** (D. Don) Lindl., J. Proc. Linn. Soc., Bot. 1: 177. 1857; Chowdhery, Orch. Fl. Aruna. Pradesh 343. 1998; *Limodorum roseum* D. Don, Prodr. Fl. Nep. 30. 1825; *Epipogum nutans* Reichb.f. Bonpland. 5: 36. 1836; Hook.f., Fl. Brit. Ind. 6: 124. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calcutta, 8: 253. t. 335. 1898; *Podanthera pallida* Wt. Icon. 5(1): 22. t. 1759. 1857.

Plant up to 50cm tall; rhizome tuberous, of many internodes. Stem erect, glabrous, sheathed. Inflorescence laxly several flowered. Flowers resupinate, variable, pendent. Sepals lanceolate, acute, undulate. Petals spreading, narrowly ovate-lanceolate, acute, slightly undulate. Lip spurred, margins erose-denticulate.

**Fl. & Fr.:** May- June

**Distribution:** India (throughout), Asia, Africa, Australia

**Specimen examined:** In decaying vegetation. Zelome. NLNU 0271.

***Eria*** Lindl., Bot. Reg. 11: t. 904. 1825

Plants epiphytic. Stem pseudobulbous, 2 to many leaves. Leaves flat or terete, thin-textured or coriaceous. Inflorescence terminal or axillary. Flowers small to medium in size, often inconspicuous. Sepals free, glabrous or hirsute; lateral sepals adnate to the elongate

column foot to form a short to long, spur-like or gibbous mentum. Lip sessile on column foot and incumbent. Column short, broad, often 2-winged, foot prominent; pollinia 8, waxy.

1a. Inflorescence and ovary glabrous; lamellae 7 *E. coronaria*

1b. Inflorescence and ovary pubescent; lamellae 3 *E. alba*

***Eria alba*** Lindl., Gen. Sp. Orchid. Pl. 67. 1830; Hook.f., Fl. Brit. Ind. 5: 795. 1890; Hynniewta *et al.*, Orch. Nagaland, 170. 2000.

Pseudobulb ovoid, clustered. Leaves 2-6, linear-lanceolate, narrowed and petiolate at base; petiole grooved. Inflorescence terminal, erect, racemose, laxly 5-8-flowered; peduncle short, pubescent; rachis pubescent. Sepals and petals white, lip yellow with purple edges. Sepals subsimilar, spreading, elliptic-lanceolate, pubescent externally; lateral sepals weakly falcate. Petals oblong, subacute. Lip 3-lobed, fleshy, clawed at base. Column lacking a foot.

**Fl. & Fr.:** June – July

**Distribution:** India (NE India), E & W Himalaya, Nepal

**Specimen examined:** On tree trunks. Chizami. NLNU 0839.

***Eria coronaria*** (Lindl.) Rchb. f., Walpers, Ann. Bot. Syst. 6: 271. 1864; King & Pantl. in Ann. Roy. Bot. Gard. Calcutta, 8: 125. t. 172. 1898; Kataki, Orch. Megh., 88. 1986; Hynniewta *et al.*, Orch. Nagaland, 174. 2000; *Trichosma sauvis* Lindl. in Bot. Reg. Misc. 83. 1841; Hook.f., Fl. Brit. Ind. 5: 735. 1890.

Pseudobulb cylindric, slender, tufted, with a single node, sheathed at base; sheaths tubular, fibrous. Leaves 2, arising from pseudobulb apex, elliptic to ovate-lanceolate. Inflorescence arising from pseudobulb apex, erect to arching, 4- to 6-flowered; peduncle short, sheathed at base. Flowers white to pale purple; pedicel and ovary glabrous. Sepals

spreading, glabrous. Petals elliptic oblong, glabrous. Lip 3-lobed, oblong; lateral lobes large, rounded; mid-lobe small, oblong; disc with 2 broad, undulate ridges.

**Fl. & Fr.:** October - November

**Distribution:** India (NE India), E & W Himalaya, China, Thailand, Nepal, Vietnam

**Specimen examined:** On tree trunks. Meluri. NLNU 0952.

*Gastrochilus* D. Don, Prodr. Fl. Nepal.: 32. 1825

Plants epiphytic, with short to long monopodial stems. Leaves coriaceous, distichous. Inflorescence axillary, short, few-flowered; peduncle short; rachis short. Flowers fleshy, conspicuous. Sepals and petals similar, spreading. Lip adnate to column base; hypochile globose, saccate, sides adnate to the column wings; epichile broad, rounded, flat, sometimes pubescent to fimbriate. Column very short, stout, lacking a foot; pollinia 2, grooved; stipe long.

*Gastrochilus calceolaris* (Buch.-Ham. ex Sm.) D. Don, Prodr. Fl. Nepal.: 32. 1825; Hook. f., Fl. Brit. Ind. 6: 60. 1890; Chowdhery, Orch. Fl. Aruna. Pradesh 413. 1998; Hynniewta *et al.*, Orch. Nagaland, 188. 2000.

Plant pendent. Leaves distichous, linear lanceolate to oblong-lanceolate, apex unequally emarginate. Inflorescence short, corymbose to subracemose, much shorter than the leaves, densely flowered. Flowers fragrant; sepals and petals yellow to greenish, speckled, blotched with red-brown, lip white or yellow, speckled with red. Sepals similar, narrowly elliptic, subacute to rounded. Petals subspathulate, obtuse. Lip sessile; hypochile saccate-globose; epichile reniform, margin denticulate; disc heavily echinate. Column fleshy. Fruit ovoid.

**Fl. & Fr.:** March - May



**Distribution:** India (NE India), E & W Himalaya, China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** On tree trunks in humid forest. Chozuba. NLNU 0354. (Pl. 59)

*Habenaria* Willd., Sp. Pl., ed. 4, 4: 44. 1805

Plants terrestrial. Stem erect, few- to many-leaved, bearing bladeless sheaths below. Leaves thin-textured, narrowly elliptic to orbicular, sheathing at base, uppermost bract-like. Inflorescence terminal, racemose, laxly to densely many-flowered. Dorsal sepal forming a hood over column with the petals; lateral sepals spreading or reflexed. Petals entire. Lip spurred, entire or 3-lobed. Column short or long; anther erect or reclinate; pollinia 2; stigmas 2; rostellum 3-lobed.

1a. Leaves few; side lobes of lip smaller than the midlobe *H. acuiifera*

1b. Leaves many; side lobes of lip larger than the midlobe *H. dentata*

*Habenaria acuiifera* Wall.ex Lindl., Gen. Sp. Orchid. Pl.: 325. 1835; Hook.f., Fl. Brit. Ind. 6: 146. 1890; Katak, Orch. Megh., 216. 1986; Hynniewta *et al.*, Orch. Nagaland, 197. 2000.

Stems 15-35 cm high slender, erect. Leaves few, sessile, linear-lanceolate, acuminate, 8-15 x 0.8-1.5 cm. Inflorescence 5-10 cm. Flowers 1.6-1.8 cm across; yellow; bracts lanceolate, acuminate; dorsal sepals oblong, obtuse concave; lateral sepals oblong-ovate, concave; petals linear-oblong; lip erect; lateral lobes subulate; midlobe linear; spur clavate, as long as pedicel ovary.

**Fl. & Fr.:** August-September

**Distribution:** India (NE India), E Himalaya, China, Myanmar, Thailand, Vietnam

**Specimen examined:** Open grassy slopes. Thetsumi. NLNU 0429.

***Habenaria dentata*** (Sw.) Schltr. in Repert. Spec. Nov. Regni Veg. Beih . 4: 125. 1919; Kataki, Orch. Megh., 217. 1986; Hynniewta *et al.*, Orch. Nagaland, 199. 2000; *H. geniculata* D. Don, Prodr. Fl. Nep. 25.1825; Hook.f., Fl., Brit. Ind. 6: 138. 1890; King & Pantl. in Ann. Roy. Bot. Card. Calcutta, 8. 309. t. 405. 1898.

Plant erect, 40-70 cm tall. Stem terete. Leaves oblong-elliptic, acute, sessile, sheathing at base. Inflorescence few- to many-flowered. Flowers 1.5 cm across; sepals and petals white with green veins, lip white. Dorsal sepal ovate to broadly ovate, acute, erect; lateral sepals ovate lanceolate, acute, suberect. Petals oblong, subacute, reflexed. Lip 3-lobed, spurred, shortly clawed at base, margins fimbriate to crenulate; spur 4 cm long. Column broad.

**Fl. & Fr.:** September - October

**Distribution:** India (NE India), E & W Himalaya, China, Japan, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** In grasslands and open forest. Thetsumi. NLNU 0421.

***Herminium lanceum*** (Thunb. ex Sw.) Vuijk, Blumea 11: 228. 1961

Terrestrials. Roots tuberous; tubers two, unequal. Stems short, stout or slender. Leaves 1- few, sessile or sub-sessile. Inflorescence a raceme, erect, usually longer than the leaves, many-flowered. Flowers small; sepals subequal, free or connivent in a hood, 1-nerved; petals as long as sepals, narrower; lip continuous with the base of the column, shorter or longer than the perianth, erect or pendulous, entire or 2-3-lobed; column very short; pollinia 2; caudicles short.

***Herminium lanceum*** (Thunb. ex Sw.) Vuijk, Blumea 11: 228. 1961; Kataki, Orch. Megh., 213. 1986; Hynniewta *et al.*, Orch. Nagaland, 210. 2000; *H. angustifolium* (Lindl.) Benth. ex

Hook.f., Fl. Brit. Ind 6:332 1890, King & Pantl. in Ann. Roy. Bot. Card. Calcutta, 8: 332. t. 434.1898.

Stems erect slender 15-30 cm high. Leaves 10-20 cm long, sessile, linear, acuminate. Inflorescence 10-35 cm long, raceme, dense flowered, erect, slender; peduncle terete or slightly compressed; sheaths lanceolate. Flowers pale-green, decurved, about 5 mm across; bracts green, ovate or ovate-lanceolate; pedicelled ovary about 7 mm long, ribbed; sepals broadly oblong; petals as long as the sepals. Lip longer than the perianth, projecting downwards, linear about 4 mm long, 3-lobed.

**Fl. & Fr.:** July

**Distribution:** India (NE India), E Himalaya, China, Japan, Korea, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Open grassland mountain slope. Kapamodzu. NLNU 0269.

***Holcoglossum*** Schltr., Repert. Spec. Nov. Regni Veg. Beih. 4: 285. 1919

Epiphytic, monopodial, small to moderate-sized. Stems enclosed by persistent leaf sheaths, rooting mostly from base or lower part. Leaves many, distichous, terete, subterete, or broadly subterete, fleshy. Inflorescences axillary, racemose, few to many flowered. Sepals subsimilar; lateral sepals often slightly larger, oblique. Petals similar to dorsal sepal; lip saccate or spurred, 3-lobed. Column short, thick, winged, with a very short but distinct foot; rostellum distinct, sometimes reduced, bilobed; pollinia 2, waxy, globose.

***Holcoglossum amesianum*** (Rchb.f.) Christenson, Notes Roy. Bot. Gard. Edinburgh 44: 255. 1987; Seidenfaden in Opera Botanica, 95:308, fig.201.T, 36. 1988; *Vanda amesiana* Reichenbach f., Gard. Chron., ser. 3, 1: 764. 1887.

Monopodial epiphytic, stem 3-7 cm. Leaves 4-7, nearly basal; blade broadly subterete, fleshy. Inflorescence ascending, 25-35 cm long, several flowered. Sepals and petals white with pinkish midvein, lip with 3 deep purple-red ridges above. Dorsal sepal elliptic, lateral sepals obliquely ovate-elliptic, obtuse. Petals oblanceolate; lip spurred, 3-lobed; spur narrowly conic, obtuse and slightly curved backward at tip. Column thick; anther cap narrowed and truncate at apex.

**Fl. & Fr.:** March - April

**Distribution:** India (NE India), China, Laos, Myanmar, Thailand, Vietnam

**Specimen examined:** Epiphytic on tree trunks in broad-leaved evergreen forests. Tsupfume.

NLNU 0217 (**Pl. 59**)

*Hygrochilus* Pfitzer in Engler & Prantl, Nat. Pflanzenfam. Nachtr. 1: 112. 1897.

Epiphytic, monopodial. Stems short, 3–5-leaved. Leaves distichous, flat, base sheathing, jointed. Inflorescences lateral, arching or nearly spreading horizontally, unbranched, laxly few to many flowered. Flowers large, showy. Sepals and petals free. Petals slightly shorter and wider; lip thickly textured; lateral lobes erect, small; mid-lobe larger; disk saccate between 2 lateral lobes, with a keel extending from base to apex. Column arcuate; rostellum long and narrow; pollinia 4 in 2 pairs, waxy, subglobose.

*Hygrochilus parishii* (Rchb.f.) Pfitzer, Engler & Prantl, Nat. Pflanzenfam., Nachtr. 1: 112.

1897; Pearce & Cribb, Fl. Bhut. 3.3: 581. 2002.

Stems stout, enclosed in persistent leaf sheaths. Leaf blade oblong or obovate-oblong, unequally bilobed. Inflorescences 1-6, laxly 5-8-flowered; peduncle 5-17 cm, with 3 or 4 sheaths; floral bracts broadly ovate. Flowers 4-5 cm across; sepals and petals yellow with deep purple spots, lip white, tinged with lilac on mid-lobe. Sepals broadly ovate. Petals

broadly ovate, obtuse; lip fleshy, 3-lobed; lateral lobes suborbicular; mid-lobe cuneate-flabellate, obtuse. Column winged; rostellum with ligulate lobules; anther cap beaked.

**Fl. & Fr.:** June – July

**Distribution:** India (NE India), China, Laos, Myanmar, Thailand, Vietnam

**Specimen examined:** Epiphytic on tree trunks in open forests. Thetsumi. NLNU 0415.

*Liparis* Rich., De Orchid. Eur.: 30. 1817

Terrestrial, lithophytic or epiphytic, arising from pseudobulbs or corms. Leaves 1 to many, linear to ovate or elliptic, plicate, sheathing at base. Inflorescences terminal, erect to pendulous, racemose, laxly few to many flowered. Flowers small, usually resupinate. Sepals free, spreading. Petals recurved, filiform; lip recurved, entire to 3-lobed, often with a callus, lacking spur; column slender, slightly curved, winged at apex. Pollinia 4, waxy, ovoid.

1a. Leaf cordate, more than 6 cm wide; column knob-like *L. cordifolia*

1b. Leaf not cordate, less than 3 cm wide; column hooked *L. bootanensis*

*Liparis bootanensis* Griff., Itin. Notes, 98. 1837; Hook.f., Fl. Brit. Ind. 5: 700. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calcutta, 8: 30 t 40 1898; *L. lancifolia* Hook.f. Icon. Pl. t. 1855. 1889; Hynniewta *et al.*, Orch. Nagaland, 206. 2000; Lucksom, Orch. Sikk. & NE Himal., 283. 2007.

Pseudobulbs oblong, 2.5-4.5 cm long, 1-leaved. Leaves sub-sessile, lanceolate, acuminate, 14-19 x 2 cm. Inflorescence a raceme, arising with the new shoots at the base of old pseudobulbs; racemes erect or arched, many flowered. Flowers lax, ochreous, about 1 cm across. Sepals oblong-lanceolate, subequal, 1 cm long; petals linear, curved; lip sessile at the base of column, recurved, entire; apex truncate, erose; column slender, hooked at apex.

**Fl. & Fr.:** June – July

**Distribution:** India (NE India), China, Laos, Myanmar, Thailand, Vietnam

**Specimen examined:** Epiphytic on tree trunks in open forests. Sakraba. NLNU 0668.

*Liparis cordifolia* Hook.f., in Hook. Icon. Pl. 19: t. 1811. 1889; Pearce & Cribb, Fl. Bhut. 3.3: 198. 2002; Lucksom, Orch. Sikk. & NE Himal., 277. 2007.

Terrestrial. Pseudobulbs crowded, compressed, ovoid. Stem wide, with small, triangular bracts at intervals. Leaf 1, ovate to cordate, acuminate, sheathing at base. Inflorescence subdensely 6 - to 20-flowered; rachis 2.5-5 cm long; floral bracts triangular, acute. Flowers up to 1.5 cm long, green. Sepals similar, linear-lanceolate, acute. Petals linear, spreading. Lip obovate-deltoid, triangular, flat with concavity at base; apex truncate; margin crenulate. Column knob-like, curved, expanded at base, apex with 2 short, rounded wings.

**Fl. & Fr.:** October-December

**Distribution:** India (NE India), E & W Himalaya, China, Nepal, Thailand, Vietnam

**Specimen examined:** Forest floor. Wazeho. NLNU 0822.

***Oberonia* Lindl., Gen. Sp. Orchid. Pl.: 15. 1830**

Epiphytic or occasionally terrestrial, small to medium in size, erect to pendent. Stems usually clustered, leafy. Leaves fleshy, distichous, forming a fan or distributed along the stem, bilaterally compressed to a compressed leaf base. Inflorescence terminal, racemose or spicate, densely many-flowered, cylindric. Flowers non-resupinate, flat, minute to small, spiral to verticillate. Sepals and petals spreading, free, subsimilar; petals smaller and narrower. Lip sessile. Column very short; pollinia 4, pyriform, waxy.

1a. Inflorescence upto 15 cm long; lip not narrowed at middle *O. falconeri*

1b. Inflorescence 40-50 cm long; lip narrowed at middle *O. acaulis*

***Oberonia acaulis*** Griff., Not. Pl. Asiat. 3: 275. 1851; Seidenf. In Dansk. Bot. Ark. 33: 20. f. 11. 1978. *O. myriantha* Lindl. Fol. Orch. Oberon. 4. 1859; Hook.f., Fl. Brit. Ind. 5. 679. 1890; Hynniewta *et al.*, Orch. Nagaland, 221. 2000.

Stem short, stout, leaves few. Leaves 10-20 x 1-2 cm, radical, ensiform, straight or falcate. Inflorescences from amongst leaves, lax, 40-50 cm long; peduncles 2-3 cm; racemes slender, decurved. Flowers brownish, in whorls; bracts lanceolate, erose, acute; sepals and petals entire, acute; lip 3-lobed; lateral lobes ovate, obtuse or acute; midlobe obcordate; lobes ovate acute; pollinia broadly oblong.

**Fl. & Fr.:** July - August

**Distribution:** India (NE India), E & W Himalaya, China, Nepal, Thailand, Vietnam

**Specimen examined:** Grows on tree trunk. Chozuba. NLNU 0355.

***Oberonia falconeri*** Hook.f., Icon. Pl. 18:t. 1780. 1888; Hook.f., Fl. Brit. Ind. 5: 678. 1890; Pearce & Cribb, Fl. Bhut. 3.3: 224. 2002; Lucksom, Orch. Sikk. & NE Himal., 243. 2007.

Plant 7-12 cm tall. Leaves 4 or 5, 2-6.5 x 0.6-1.2 cm, overlapping at base, ensiform, weakly falcate, acute. Inflorescence subdensely many-flowered; peduncle covered with scarious bracts; rachis winged; floral bracts scarious, lanceolate, acute to acuminate. Flowers yellow-green to pale brown. Sepals similar, oblong-elliptic, obtuse. Petals ovate, obtuse. Lip 3-lobed, broadly oblong. Column short, simple.

**Fl. & Fr.:** August-October

**Distribution:** India (throughout), E & W Himalaya, China, Nepal, Thailand, Vietnam

**Specimen examined:** Epiphytic on tree trunks in forests or thickets. Thetsumi. NLNU 0422.

***Otochilus*** Lindl., Gen. Sp. Orchid. Pl.: 35. 1830

Plants epiphytic. Pseudobulbs arising from previous pseudobulb, cylindric, fleshy. Leaves 2, linear, elliptic or lanceolate. Inflorescence laxly few- to many-flowered. Flowers small. Sepals and petals subequal, free, narrow, spreading. Lip sessile at base of column, saccate at base, 3-lobed; lateral lobes erect, auriculate; mid-lobe oblong, elongate. Column elongate, erect, semi-terete, clavate; pollinia 4, paired.

***Otochilus fusca*** Lindl. Gen. Sp. Orch. 35. 1830; Hook.f., Fl. Brit. Ind. 5: 844. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calcutta 8: 143. t. 199. 1898; Kataki, Orch. Megh., 130. 1986; Hynniewta *et al.*, Orch. Nagaland, 229. 2000; Pearce & Cribb, Fl. Bhut. 3.3: 342. 2002.

Pseudobulbs cylindric, 4-6 cm long. Leaves 10-15 x 1.0-1.2 cm, linear-lanceolate, acuminate. Inflorescences 10-15 cm long, slender, racemes, many-flowered. Flowers 1.5 cm across, white; bracts obovate, margin incurved. Lip white, brownish pink at base, obscurely 3-lobed; midlobe large, lanceolate, acuminate. Column 0.7-0.8 cm, cylindric, brownish.

**Fl. & Fr.:** November-December

**Distribution:** India (NE India), E Himalaya, Bangladesh, China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Epiphytic on tree trunks in forests. Chozuba. NLNU 0362.

***Paphiopedilum*** Pfitzer, Morph. Stud. Orchideenbl. 11. 1886

Plants terrestrial, occasionally epiphytic or lithophytic. Stem short. Leaves distichous, ovate-elliptic, acute, coriaceous, green or mottled with darker green. Inflorescence 1- to several-flowered, terminal. Flowers showy, rather waxy. Dorsal sepal large; lateral sepals united to form a synsepal. Petals spreading, suborbicular to spatulate.



Lip deeply inflated, globose, ellipsoid. Column short, with a fleshy, often shield-shaped staminode at apex; anthers 2; pollinia 2, glutinous.

***Paphiopedilum hirsutissimum*** (Lindl. ex Hook.) Stein, Orchid.-Buch.: 470. 1892; Seidenf. in Bot. Tidsskr. 70: 64. T. 1. 1975; Katakai, Orch. Megh., 228. 1986; Hynniewta *et al.*, Orch. Nagaland, 232. 2000; *Cypripedium hirsutissimum* Lindl. ex Hook., Bot. Mag. t. 4990. 1857; Hook.f., Fl. Brit. Ind. 6: 171. 1890.

Plants lithophytic or terrestrial. Leaves 5 or 6, distichous. Scape 12-20 cm long; suberect or arching; peduncle brown-purple, densely long hairy. Flower 7-8 cm across; greenish-purplish; bracts 2-2.5 cm long, greenish brown, ovate, acute hairy. Sepals unequal; dorsal large, greenish purple, purple spotted at base; laterals ovate, hairy. Petals 6-7 x 2-2.5 cm, greenish purple, purple spotted at base, spatulate. Lip sessile, oblong, 4-5 cm long, greenish-purple, purple spotted; sidelobes small, truncate; midlobe oblong; apex conical.

**Fl. & Fr.:** April-May

**Distribution:** India (NE India), China, Myanmar, Thailand, Vietnam

**Specimen examined:** On cliffs or rocky places in forests. Chepoketa. NLNU 0913. **(Pl. 59)**

***Papilionanthe*** Schltr., Orchis 9: 78. 1915

Plants epiphytic, scrambling, monopodial, erect or pendent, branched or unbranched. Leaves distichous, terete, fleshy to coriaceous, jointed or sheathed at base. Inflorescence axillary, 1- to several-flowered. Flowers large. Sepals and petals spreading, subsimilar, free. Lip 3-lobed, continuous with the column foot. Column short, fleshy, with a short foot; rostellum elongate; pollinia 2, grooved; stipe broadly triangular to subquadrate; viscidium large.

***Papilionanthe vandarum*** (Rchb.f.) Garay in Bot. Mus. Leaflet. 23: 372. 1974; Katak, Orch. Megh., 177. 1986; *Aerides vandarum* Reichb.f. in Gard. Chron. 997. 1867; Hook.f., Fl. Brit. Ind. 6 : 44. 1890.

Stem pendent, branched, terete, flexuous, covered by leaf sheaths; sheaths ridged, overlapping, tubular. Leaves terete, 15-20 cm long. Inflorescence leaf-opposed; peduncle short, sheathed. Flowers white with a purple-flushed base to the lip and spur, pedicel pink. Dorsal sepal obovate-oblong, obtuse, margins undulate; lateral sepals similar. Petals subrhombic, obtuse, margins undulate, base twisted. Lip 3-lobed; sidelobes lanceolate; mid-lobe clawed, dilated and 2-fid; spur slender. Column fleshy

**Fl. & Fr.:** March - April

**Distribution:** India (NE India), China, Myanmar, Nepal

**Specimen examined:** Grows on tree trunk. Tsupfume. NLNU 0270. **(Pl. 60)**

***Pecteilis*** Raf., Fl. Tellur. 2: 37. 1837

Plants terrestrial, medium to large; tuber large. Stem erect, stout, leafy. Leaves several, inserted along stem, or in a basal rosette. Inflorescence terminal, laxly to densely few- to several-flowered. Flowers medium to large, showy; pedicel and ovary short. Sepals connivent to form a hood over the column. Petals linear. Lip decurved, 3-lobed, spurred; lateral lobes spreading, fringed to lacerate; mid-lobe smaller, entire; spur pendent, curved, cylindric, elongate. Column erect; pollinia 2.

***Pecteilis susannae*** (L.) Raf., Fl. Tellur. 2: 37. 1837; Katak, Orch. Megh., 222. 1986; Hynniewta *et al.*, Orch. Nagaland, 234. 2000; *Orchis susannae* L., Sp. Pl. 939. 1753; *Habenaria susannae* (L.) R. Br., Hook.f., Fl. Brit. Ind. 6: 137. 1890; *Platanthera susannae* Lindl. Gen. & Sp. Orch. 295. 1835.

Plant 40-90 cm tall. Stem leafy, thick, sheaths at base. Leaves ovate, oblong, acute; sheathed. Inflorescence laxly 3- to 5-flowered. Flowers fragrant, uniformly white; pedicel and ovary narrowly fusiform, winged, margins of wings minutely dentate. Dorsal sepal broadly ovate to rhombic, obtuse; lateral sepals broadly ovate, oblique, subacute, spreading. Petals short, linear to oblong, acute. Lip 3-lobed, spurred; lateral lobes broadly triangular, truncate, laciniate-pectinate; mid-lobe linear to oblong or linear-spathulate, obtuse; spur long-cylindric. Column erect.

**Fl. & Fr.:** July-September

**Distribution:** India (throughout), China, Japan, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Forests, grassy slopes, damp places in valleys. Zuketsa. NLNU 0691.

**(Pl. 60)**

*Peristylus* Blume, Bijdr. Fl. Ned. Ind.: 404. 1825

Plants terrestrial or epiphytic, small to medium; tubers small, cylindric to ellipsoid. Stem erect, few- to several-leaved. Leaves thin, linear to broadly elliptic. Inflorescence terminal, laxly to densely few-to many-flowered. Flowers small, resupinate. Dorsal sepal and petals forming a hood over column. Petals broad. Lip simple to 3-lobed, connate at base with the margins of the column; spur short, pouch-shaped to cylindric. Column short; pollinia 2, shortly clavate; rostellum small, 3-lobed.

*Peristylus goodyeroides* (D. Don)Lindl., Gen. Sp. Orchid. Pl. 299. 1835; Kataki, Orch. Megh., 219. 1986; Hynniewta *et al.*, Orch. Nagaland, 238. 2000; *Habenaria goodyeroides* D. Don, Hook.f., Fl. Brit. Ind. 6: 161. 1890; King Pantl., in Ann. Roy. Bot. Gard. Calcutta, 8: 326. t. 430. 1898.

Tubers ellipsoid to cylindric, pubescent. Stem erect, 15-30 cm long. Leaves 5-12 x 2-5 cm, sessile, elliptic, acute. Inflorescence many-flowered, dense, 15-30 cm long, erect or

slightly curved. Flowers sweetly fragrant, white or cream. Dorsal sepal broadly ovate, lanceolate, apiculate, concave, forming hood with petals; lateral sepals oblong, apiculate, 1-veined. Petals rhombic, obtuse. Lip 3-lobed, spurred. Column long, white.

**Fl. & Fr.:** June-July

**Distribution:** India (throughout), China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Open forest, grassy slopes. Thetsumi. NLNU 0425.

*Phalaenopsis* Blume, Bijdr. Fl. Ned. Ind.: 294. 1825

Plants monopodial, epiphytic, medium-sized to large. Stem attenuate. Leaves few, oblong to elliptic. Inflorescence 1- to many-flowered, racemose or panicle; peduncle long; rachis sometimes flattened. Flowers large to small, long-lasting, waxy. Sepals and petals similar, spreading, free; petals narrowed at base. Lip 3-lobed; lateral lobes erect; mid-lobe porrect; basal callus bifid or complex, sometimes extended into 2 recurved filiform tails. Column erect, expanded at apex; column foot short; rostellar projections and stipes long and slender; viscidium elliptic; pollinia 2.

1a. Racemes 4-6-flowered; petals obovate-spathulate *P. taenialis*

1b. Racemes 8-18- flowered; petals oblong *P. yingjiangensis*

*Phalaenopsis taenialis* (Lindl.) Christenson & Pradhan, Indian Orchid J. 1: 154. 1985; Pearce & Cribb, Fl. Bhut. 3.3: 541. 2002; *Aerides taenialis* Lindl., Gen. Sp. Orchid. Pl.: 239. 1833; *Doritis taenialis* (Lindl.) Hook.f., Fl. Brit. Ind. 6: 31. 1890; *Kingidium taeniale* (Lindl.) P.F. Hunt. Kew Bull. 24: 98. 1970; Hynniewta *et al.*, Orch. Nagaland, 202. 2000.

Roots tufted, numerous, long, flattened. Leaves usually 1- 3, 3-10 x 1-3.5 cm, semi-deciduous, elliptic-obovate. Inflorescence basal, pendent, racemose, 4-6-flowered. Flowers 1-1.5 cm across; pale purple, lip epichile and anther purple; pedicel and ovary slender,

curved. Sepals subequal, obtuse; dorsal sepal oblong-ob lanceolate; lateral sepals broadly elliptic. Petals obovate, obtuse. Lip adnate to the column foot; hypochile spurred below, narrowly oblong, falcate. Column narrowly winged; spur cylindric-conical.

**Fl. & Fr.:** April-May

**Distribution:** India (NE India), Bangladesh, China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** On tree trunks in montane forest. Tsupfume. NLNU 0921.

*Phalaenopsis yingjiangensis* (Z.H. Tsi) Kocyan & Schuuit., Phytotaxa 161: 67. 2014;

*Ornithochilus yingjiangensis* Z.H. Tsi in Acta Phytotax. Sin. 22: 479. 1984.

Plant 15-20 cm. Leaves 2-4, elliptic-oblong, 8-19 x 2.4-4.6 cm, apex acute, glabrous. Inflorescence 10-23 cm long, 1-2 axillary racemes with 8-18 flowers loosely arranged. Flowers resupinate, 1.2-1.5 cm across. Sepals and petals obtuse, spreading. Dorsal sepal ovate, apex obtuse and incurved; lateral sepals obliquely ovate, apex obtuse. Petals oblong, apex obtuse. Lip 3-lobed, side lobes auriculate, suberect, margin crenate-undulate, spur subcylindric.

**Fl. & Fr.:** April-May

**Distribution:** India (NE India) China

**Specimen examined:** On tree trunks in montane forest. Phek. NLNU 0810.

***Pholidota* Lindl., Exot. Fl. 2: t. 138. 1825**

Plants pendent or erect, epiphytic or lithophytic. Pseudobulbs close or distant on rhizome, slender or swollen. Leaves narrowly elliptic, ovate or oblong, petiolate, coriaceous. Inflorescence terminal from pseudobulb apex, distichous, pendent, laxly to densely many flowered; floral bracts, large, concave. Flowers small, resupinate or non-resupinate. Dorsal sepal concave or convex, broadly ovate to elliptic; lateral sepals concave or convex, often

keeled. Petals ovate to linear. Lip sessile, base saccate; epichile subentire, or 3- or 4-lobed, deflexed. Column short, apex broadly hooded.

1a. Psuedobulb 1-leaved; leave apex bilobed

*P. imbricata*

1b. Psuedobulb 2-leaved; leaf apex acute

2a. Stem not articulate; inflorescence from rhizome

or lateral to psuedobulb

*P. convallariae*

2b. Stem articulate; inflorescence terminal to psuedobulb

*P. articulata*

***Pholidota articulata*** Lindl., Gen. Sp. Orchid. Pl. 38. 1830; Hook.f., Fl. Brit. Ind. 5: 844. 1890; Karthik. & al., Fl. Ind. Enum. Monocot. 163. 1989; Chowdhery, Orch. Fl. Aruna. Pradesh 589. 1998; Hynniewta *et al.*, Orch. Nagaland, 245. 2000.

Epiphytic herbs, stem creeping, branched, pendulous, articulate. Pseudobulbs cylindric, 6-10 cm high, terete, sheathed. Leaves 2, ovate to linear-lanceolate, acute. Racemes 6-14 cm, pendent, synanthous, often flexuous. Flowers resupinate, pale white with brownish-pink tinge; bracts light brown. Sepals subequal, dorsal ovate, obtuse; laterals ovate acute, keeled; petals linear-oblong, obtuse. Lip white, 3-lobed; constricted in the middle; hypochile cymbiform; epichile recurved, 2-lobed.

**Fl. & Fr.:** May - June

**Distribution:** India (NE India), China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** On trees in forests. Khezhakhen. NLNU 0416.

***Pholidota convallariae*** (Reichb.f.) Hook.f., Icon. Pl. 19: t. 1880. 1889; Chowdhery, Orch. Fl. Aruna. Pradesh 589. 1998; Hynniewta *et al.*, Orch. Nagaland, 247. 2000.

Pseudobulbs 2.5-4 cm high, apex 2-leaved. Leaf blade narrowly elliptic, obtuse. Inflorescence arising with young pseudobulb; rachis 10 or more flowered. Flowers fragrant,

white or creamy white. Dorsal sepal suboblong or elliptic, obtuse; lateral sepals obliquely ovate. Petals ovate-elliptic, obtuse; lip shallowly saccate, apex emarginate. Column stout, apex with a broad wing; rostellum nearly transversely oblong.

**Fl. & Fr.:** May - June

**Distribution:** India (NE India), China, Myanmar, Thailand, Tibet, Vietnam

**Specimen examined:** Epiphytic on trees in forests. Khezhakhen. NLNU 0423.

*Pholidota imbricata* Lindl. in Hook., Exot. Fl. 2: t. 138. 1825; Hook.f., Fl. Brit. Ind. 5: 845. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calcutta, 8: 144. t. 201. 1898; Chowdhery, Orch. Fl. Aruna. Pradesh 589. 1998. *Cymbidium imbricatum* Roxb., Fl. Ind. 3: 460. 1832; *Pholidota pallida* Lindl. in Bot. Reg. t. 1777. 1836.

Epiphytic herbs. Pseudobulbs 3-6 cm high, ovoid-conical, sheathed, 1-leaved. Leaves 15-20 x 3-5 cm, apical, elliptic-lanceolate, acute, thickly coriaceous, petiole up to 2 cm long. Racemes 12-15 cm long, distichous, drooping, dense. Flowers non-resupinate, pale yellowish-white, distichous; bracts brown, suborbicular, persistent. Sepals suborbicular, obtuse; petals linear oblong. Lip with concave base, broadly 3-lobed; midlobe oblong, reflexed. Column winged; pollinia clavate.

**Fl. & Fr.:** June-July

**Distribution:** India (throughout), E & W Himalaya, Bangladesh, China, Myanmar, Nepal, Thailand, Tibet, Vietnam

**Specimen examined:** Scattered on trees in primary forests. Sakraba. NLNU 0681.

*Pleione* D. Don, Prodr. Fl. Nepal.: 36. 1825

Terrestrial, epiphytic or lithophytic. Pseudobulbs annual, clustered on rhizome, ovoid, conical, pyriform. Leaves 1 or 2, arising from apex of pseudobulb, deciduous.

Inflorescence basal, erect, 1- or 2-flowered, appearing before or after leaves. Flowers showy, sometimes fragrant. Sepals and petals free, spreading. Lip obscurely 3-lobed to entire, apical margins erose to lacerate. Column slender, slightly curved, winged above, entire, erose or denticulate at apex.

***Pleione humilis*** (Sm.) D.Don, Prodr. Fl. Nepal.: 37. 1825; Kataki, Orch. Megh., 126. 1986; *Epidendrum humile* Sm., Exot. Bot. 2. t. 98. 1804. p.p. *Coelogyne humilis* Lindl. Coll. Bot.: t. 37. 1825; Hook.f., Fl. Brit. Ind. 5:840. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calcutta, 8: 139. t. 194. 1898.

Epiphytic or lithophytic. Pseudobulbs 3-5 cm, ovoid, pale green. Leaf 1, oblanceolate to elliptic, acute, produced after the flowers. Inflorescence 1- or 2-flowered; peduncle enclosed by scarious sheaths. Flowers spreading to pendent; sepals and petals white, lip white with purple spots. Dorsal sepal linear-oblanceolate; lateral sepals obliquely oblanceolate. Petals obliquely oblanceolate. Lip oblong-elliptic, emarginate, saccate at base, obscurely 3-lobed in front, margin lacerate. Column broadly winged, irregularly dentate at apex.

**Fl. & Fr.:** January - March

**Distribution:** India (NE India), E & W Himalaya, Myanmar, Nepal, Tibet

**Specimen examined:** Epiphytic on tree trunks. Kapamodzu. NLNU 0272.

***Renanthera*** Lour., Fl. Cochinch. 521. 1790.

Epiphytic or lithophytic, monopodial. Stem long, sometimes branched. Leaves many, distichous, flat, thickly leathery, unequally bilobed, with a sheathing base. Inflorescence lateral, long paniculate, laxly many flowered. Flowers resupinate, usually red or orange. Sepals and petals free; dorsal sepal and petals similar, spreading; lateral sepals usually



broadier than dorsal sepal and petals. Lip attached to column base, saccate or spurred, 3-lobed. Column short and stout, without a foot; pollinia 4, in 2 pairs, waxy.

***Renanthera imschootiana*** Rolfe, Bull. Misc. Inform. Kew 1891: 200. 1891; Backer *et al.*, Fl. Java, 3: 343. 1968; Hynniewta *et al.*, Orch. Nagaland, 258. 2000.

Stems stout, erect. Leaves 8-12 x 2-3 cm, oblong-lanceolate, leathery, apex unequally obtusely bilobed. Inflorescence 50-70 cm long, axillary, usually branched, many flowered. Flowers 4.5 cm across, reddish; bracts purplish green, ovate, acute; lip red, column deep red. Dorsal sepal subspathulate-oblongate; lateral sepals obliquely elliptic ovate, margin undulate, apex obtuse. Petals narrowly spathulate, obtuse and thickened; lip 3-lobed; lateral lobes erect, deltoid, base with 2 membranous lamellae, apex acute; mid-lobe ovate, acute, strongly recurved; spur obtuse. Column cylindric.

**Fl. & Fr.:** May - June

**Distribution:** India (NE India), E Himalaya, China, Vietnam

**Specimen examined:** Epiphytic on tree trunks in forests along valleys. Khezhakhen. NLNU 0441. (**Pl. 60**)

***Rhynchostylis*** Blume, Bijdr. Fl. Ned. Ind.: 285. 1825

Plants epiphytic. Stems short, thick. Leaves fleshy, long and narrow, channelled, apex unequally 2-lobed. Inflorescence lateral, pendent, racemose, densely many-flowered. Flowers resupinate. Sepals and petals similar, spreading. Lip not hinged, adnate to the column foot, 3-lobed or simple, spurred; spur backward-pointing, laterally flattened. Column short; foot short; cleft; stipe long, slender, widened at apex; viscidium ovate; rostellum long-pointed.

***Rhynchostylis retusa*** (L.) Blume, Bijdr. Fl. Ned. Ind. 285. 1825; Hook.f., Fl. Brit. Ind. 6:32. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Culcatta 8:213, t. 284. 1898; Karthik. & al., Fl. Ind. Enum. Monocot. 168. 1989; Chowdhery, Orch. Fl. Aruna. Pradesh 626. 1998.  
*Epidendrum retusum* L., Sp. Pl. 2: 953. 1753.

Stem 10-15 cm, pendent, epiphytic herbs. Stems clothed with sheaths of dried leaves. Leaves 15-30 x 3-4 cm, fleshy, deeply channeled, keeled, obliquely 2-lobed at apex. Inflorescence axillary, drooping, cylindric, densely many flowered. Flowers white to pink, with few white purple dots. Lip strongly saccate-spurred and compressed at base, oblong-spathulate above, rounded to retuse at apex. Capsule ellipsoid.

**Fl. & Fr.:** April - May

**Distribution:** India (throughout), E Himalaya, Bangladesh, China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** On tree trunks of forests. Khezhakheno. NLNU 0205.

***Satyrium*** Sw., Kongl. Vetensk. Acad. Nya Handl. 21: 214. 1800

Plants terrestrial; tubers large. Leaves basal, on flowering stem and on separate, sterile shoots. Inflorescence terminal, spicate, few- to many-flowered. Flowers non resupinate; ovary not twisted, 6 -ribbed. Sepals entire, more or less united to petals and lip at base; dorsal sepal linear to oblong; lateral sepals obliquely oblong. Petals spathulate to lanceolate. Lip erect, spurred, more or less hooded, with a broad or narrow mouth and recurved apex; spurs 2, basal, short or long. Column erect, incurved; rostellum 3-lobed; viscidia 2, attached by caudicles to pollinia.

***Satyrium nepalense*** D.Don, Prodr. Fl. Nepal: 26. 1825; Hook.f., Fl. Brit. Ind. 6:168.1890; King & Pantl. in Ann. Roy. Bot. Gard. Calcutta, 8. 338. t. 444.1898; Kataki, Orch. Megh., 225. 1986; Hynniewta *et al.*, Orch. Nagaland, 259. 2000.

Stem stout, erect, 20-40 cm long, sheathed. Leaves 2-3, sessile, elliptic-lanceolate. Inflorescence densely many flowered; covered with large, leaf-like bracts; rachis 7-14 cm long; floral bracts oblong-lanceolate, exceeding ovary. Flowers fragrant, pink. Dorsal sepal oblanceolate-spathulate, obtuse; lateral sepals oblong, glandular. Petals similar to sepals, twisted at mouth of the lip. Lip conspicuous, orbicular, hooded and keeled on the back; spurs 2, long, parallel, extending beyond ovary. Column short, curved.

**Fl. & Fr.:** August-October

**Distribution:** India (throughout), E & W Himalaya, China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** In grassland and dry hill slopes, in forest clearings. Tsupfume. NLNU 0991. (Pl. 60)

***Spathoglottis*** Blume, Bijdr. Fl. Ned. Ind.: 400. 1825

Plants terrestrial. Pseudobulbs ovoid, subterranean. Leaves plicate, sheathing at base. Inflorescence lateral, racemose. Flowers showy. Sepals and petals subequal, similar, spreading. Lip strongly 3-lobed, sessile or shortly clawed; lateral lobes erect, oblong; mid-lobe spathulate; disc at base of mid-lobe tuberculate or crested. Column elongate, curved, clavate, winged, lacking a foot; pollinia 8, in 2 groups of 4.

***Spathoglottis pubescens*** Lindl., Gen. Sp. Orch. 120. 1831; Hook.f., Fl. Brit. Ind. 5: 814. 1890; King & Pantl. in Ann. Roy. Bot. Gard. Calcutta, 8: 100. 1898; Kataki, Orch. Megh., 98. 1986; Hynniewta *et al.*, Orch. Nagaland, 262. 2000.

Pseudobulbs ovoid, 1-2.5 cm across. Leaves 10-20 cm long, linear-lanceolate, acuminate; peduncles terminal, slender; racemes 4-6 cm. Inflorescence erect, terete, 20-35 cm long; peduncle 2 sheathed; racemes few flowered. Flowers yellow; bracts lanceolate, acute. Sepals elliptic sub-acute. Petals obovate, obtuse; lip 3-lobed; lateral lobes oblong, obtuse; midlobe obcorbate with 2 short thick ridges on disk.

**Fl. & Fr.:** August – September

**Distribution:** India (NE India), E Himalaya, China, Myanmar, Thailand, Vietnam

**Specimen examined:** Grasslands and open hillslopes. Thetsumi. NLNU 0442.

*Sunipia* Lindl., Orchid. Scelet. 14, 21, 25. 1826

Plants epiphytic; rhizome stout, creeping. Pseudobulbs distant along rhizome, obovoid. Leaf single, coriaceous, erect to suberect, obtuse. Inflorescence basal, erect, racemose, laxly to densely 1- to many-flowered; floral bracts prominent. Flowers distichous. Sepals subsimilar; dorsal sepal free; lateral sepals free or variously connate. Petals much smaller than sepals, margins entire to lacerate. Lip simple, entire, fleshy at apex. Column fleshy; foot variable; pollinia 4, in 2 pairs; viscidium 1; rostellum short.

*Sunipia bicolor* Lindl., Gen. Sp. Orchid. Pl. 179. 1833; Katak, Orch. Megh., 81. 1986; Hynniewta *et al.*, Orch. Nagaland, 264. 2000; *Bulbophyllum bicolor* (Lindl.) Hook.f., Fl. Brit. Ind. 5: 770. 1890; *Ione bicolor* Lindl. Fol. Orch. 3. 1853; King & Pantl. in Ann. Roy. Bot. Gard. Calcutta, 8: 159. t. 216. 1898.

Pseudobulbs 2–3 cm apart on rhizome, 1-leaved. Leaf sub-sessile, linear obtuse, 8-10 cm long. Scapes suberect; slender; raceme laxly few flowered. Flowers pinkish, 1cm across; bracts lanceolate, acuminate, as long as the pedicelled ovary; sepals linear lanceolate; laterals connate at the base; petals ovate, 3 mm long; margin entire or obscurely serrate; lip

sessile at the base of the column, dark purple, 3 mm long, margins lacerate at sides. Column stout.

**Fl. & Fr.:** July - November

**Distribution:** India (NE India), E Himalaya, Bangladesh, China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Tree trunks in forests, rocks along valleys. Zhavame. NLNU 0201.

*Tainia* Blume, Bijdr. Fl. Ned. Ind.: 354. 1825

Plants terrestrial. Pseudobulb uninodal, cylindric to ovoid, bearing 1 leaf. Leaf elliptic to ovate, petiolate. Inflorescence terminal or lateral; peduncle sheaths tubular, acute; floral bracts triangular. Flowers resupinate, opening simultaneously. Sepals and petals acute; lateral sepals slightly decurrent along column foot. Lip 3-lobed, spurless. Column slender, slightly winged at apex; anther with 2 crests; pollinia 8, in 4 pairs.

*Tainia viridi-fusca* (Hook.) Benth. & Hook.f., Gen. Pl. 3: 515. 1883; Hook.f., Fl. Brit. Ind. 5: 820. 1890; Katak, Orch. Megh., 106. 1986; Hynniewta *et al.*, Orch. Nagaland, 269. 2000.

Pseudobulbs ovoid, crowded. Leaves lanceolate; penduncles sheathed. Inflorescence a racemes, about 15-25 cm long, lax-flowered. Flowers 3.5-4 cm across, greenish-brown; bracts lanceolate; sepals and petals spreading, oblong-lanceolate, 5-nerved. Lip 3-lobed; lateral lobes rounded; midlobe ovate, recurved; spur short, 3mm long, obtuse.

**Fl. & Fr.:** April

**Distribution:** India (NE India), E Himalaya, China, Myanmar, Thailand, Vietnam

**Specimen examined:** In shaded humus covered soil. Chizami. NLNU 0819. (Pl. 60)

*Thelasis* Blume, Bijdr. Fl. Ned. Ind.: 385. 1825

Epiphytic. Pseudobulbs small, 1- or 2-leaved, with sheaths, membranous. Leaves

sessile or subsessile, oblong or oblanceolate. Inflorescence from the base of pseudobulb, erect, racemose, many-flowered. Flowers small, resupinate. Sepals and petals similar, spreading at apex only. Lip sessile at the base of column, erect. Column short, lacking a foot; rostellum erect prominent; pollinia 8.

***Thelasis longifolia*** Hook.f., Fl. Brit. Ind. 6:87.1890; King & Pantl. in Ann. Roy. Bot. Gard. Calcutta, 8: 250. t. 332. 1898; Kataki, Orch. Megh., 193. 1986; Hynniewta *et al.*, Orch. Nagaland, 269. 2000.

Pseudobulbs sub-globose, depressed, covered with sheaths, 3 cm across, 1-leaved. Leaf sessile, oblong-lanceolate, acute, 10-15 x 2 cm, erect or arched. Inflorescence stout, erect, shorter than the leaf; peduncle imbricately sheathed at base and 1-2 upwards, distant; racemes slightly thicker than the peduncle, many-flowered. Flowers yellowish, dense, 5 mm long; sepals and petals subequal, ovate-oblong, acute; sepals 5 mm long; petals 3 mm long; lip sessile, elliptic-ovate, shallow at base, acute, as long as the sepals.

**Fl. & Fr.:** July

**Distribution:** India (NE India), E Himalaya, Nepal

**Specimen examined:** Scattered on tree trunks in primary forests. Wazeho. NLNU 0628.

***Thunia*** Rchb. f., Bot. Zeitung (Berlin) 10: 764. 1852

Epiphytic or terrestrial, medium to large, lacking pseudobulbs. Stems fasciculate, erect, biennial, sheathed below and leafy above, leaves distichous, sessile below. Inflorescence terminal, on young leafy shoots, racemose; floral bracts large, spathe-like, persistent. Flowers short-lived, large, showy. Sepals and petals subsimilar, free. Lip entire, spurred, fringed on front margin; disc with 5-7 lamellae or fringes; spur short, obtuse. Column slender, semi-terete at apex.

***Thunia alba*** (Lindl.) Reicbh.f. in Bot. Zeit. 10: 764. 1852. *Phaius albus* Lindl. Gen. Sp. Orch. 128. 1830; Hook.f., Fl. Brit. Ind. 5: 818. 1890; Katak, Orch. Megh., 104. 1986; Hynniewta *et al.*, Orch. Nagaland, 270. 2000.

Stem 30-50 cm, erect. Leaves distichous, sessile, linear-lanceolate, glaucous beneath. Inflorescence a raceme, terminal, drooping, few-flowered; bracts white, cymbiform. Flowers about 5 cm across, white; sepals and petals lanceolate, white with purple patches in middle; lip white with a purple patch in the middle, convolute; erose-margin; disc 5-ridged; spur short, retuse; rostellum beaked.

**Fl. & Fr.:** July-August

**Distribution:** India (throughout), E Himalaya, China, Myanmar, Nepal, Thailand, Tibet, Vietnam

**Specimen examined:** Epiphytic or terrestrial, in shaded humid places in primary forest. Phukhungri. NLNU 00959.

***Vanda*** R. Br., Bot. Reg. 6: t. 506. 1820

Epiphytic or lithophytic, monopodial. Stems short or long erect. Leaves distichous, terete or flat, coriaceous, apex obliquely 2-lobed. Inflorescence axillary, laxly racemose. Flowers fleshy, resupinate, brightly coloured. Sepals and petals free, elliptic obovate, twisted or undulate, often tessellated, margins reflexed, narrowed at base. Lip 3-lobed, shortly spurred. Column short, stout, lacking a foot; rostellum broad shelf-like; stipes and viscidium short, broad; pollinia 2, grooved.

1a. Sepals and petals not incurved, widely spreading *V. coerulea*

1b. Sepals and petals incurved, not spreading

2a. Inflorescence laxly 7-11 flowered *V. testacea*

2b. Inflorescence laxly 2-3 flowered *V. pumila*

***Vanda coerulea*** Griff. ex Lindl., Edw. Bot. Reg. 33: t. 30. 1847; Hook.f., Fl. Brit. Ind. 6: 51. 1890; Kataki, Orch. Megh., 174. 1986; Hynniewta *et al.*, Orch. Nagaland, 275. 2000.

Stems erect 10-30 cm long, leafy throughout or towards apex. Leaves oblong 10-20 cm, obliquely truncate at apex. Inflorescences 1-3, erect or suberect, longer than the leaves. Flowers large, 8-10 cm across, pale to dark blue; bracts small, ovate; sepals and petals subequal, obovate, rounded at apex, obscurely tessellate, margin undulate. Lip 3-lobed, dark blue; side lobes small; midlobe oblong, emarginated at apex; disk with 2 thick ridges; spur conical about 5mm long.

**Fl. & Fr.:** September-December

**Distribution:** India (NE India), E Himalaya, China, Myanmar, Thailand

**Specimen examined:** Epiphytic on trees. Zhavame. NLNU 00281.

***Vanda pumila*** Hook.f., Fl. Brit. India 6: 53. 1890; King & Pantl. in Ann. Roy. Gard. Calcutta, 8: 216. t. 288. 1898; Kataki, Orch. Megh., 175. 1986; Chowdhery, Orch. Fl. Aruna. Pradesh, 688. 1998.

Stems 5–23 cm tall. Leaves 9-22 x 1.4-2 cm, leaf blade, slightly fleshy or thickly leathery, apex unequally 2- or 3- dentate. Inflorescences erect, laxly 2-3-flowered; rachis flexuous; floral bracts broadly ovate, apex obtuse. Flowers 4-5.4 cm across, thickly textured, widely opening, fragrant; sepals and petals white to cream yellow. Dorsal sepal oblanceolate, obtuse to subacute; lateral sepals slightly oblique. Petals 2-2.2 x 0.7-0.9 cm, oblong-lanceolate. Lip 1.5-1.9 x 0.6-0.8 cm, pale cream-colored, streaked with purple to red; spurred, 3-lobed. Column cream-yellow to white.

**Fl. & Fr.:** March-May



**Distribution:** India (NE India), E & W Himalaya, China, Laos, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** On tree trunks in forest. Chepoketa. NLNU 0906. (Pl. 60)

*Vanda testacea* (Lindl.) Rchb.f., Gard. Chron., 8: 166. 1877; Hook.f., Fl. Brit. India 6: 50. 1890; King & Pantl. in Ann. Roy. Gard. Calcutta, 8: 215. t. 288. 1898; Chowdhery, Orch. Fl. Aruna. Pradesh, 688. 1998; Hynniewta *et al.*, Orch. Nagaland, 276. 2000.

Stem about 20-35 cm tall, erect, covered by leaf sheaths. Leaves oblong, coriaceous, apex unequally 2-lobed, 8-12 x 1.3-1.7 cm. Inflorescence laxly 7-11 flowered. Flowers 1.8-2 cm across; sepals and petals creamish yellow; lip white, reddish pink. Dorsal sepal obovate spathulate, rounded and incurved at apex; lateral sepals obovate spathulate, twisted. Petals 0.7-0.8 cm, spathulate twisted. Lip spurred, sessile, 3-lobed, margins crenulate. Column 3mm long, truncate.

**Fl. & Fr.:** March - April

**Distribution:** India (throughout), E Himalaya, Bangladesh, Myanmar, Nepal, Sri Lanka, Thailand

**Specimen examined:** Epiphytic on trees. Chozuba. NLNU 0388.

*Vandopsis* Pfitzer, Nat. Pflanzenfam. 2(6): 210. 1889

Epiphytic or terrestrial, monopodial. Stem rigid, elongate. Leaves distichous, coriaceous, flat, jointed. Inflorescence axillary, racemose. Flowers fleshy, resupinate, flat, medium to large. Sepals and petals spreading. Lip firmly adnate to the column, geniculately bent, channelled or gibbous at base. Column short, lacking a foot; pollinia 2, deeply grooved, in unequal pairs, sessile; stipes broadly oblong; viscidium transverse, prominent.

***Vandopsis undulata*** (Lindl.) J.J.Sm., in Nat. Tijds. Ned. Ind. 72: 77. 1912; King & Pantl. in Ann. Roy. Bot. Gard. Calcutta, 8: 205. t. 275. 1898; Kataki, Orch. Megh., 160. 1986; Chowdhery, Orch. Fl. Aruna. Pradesh, 692. 1998; Hynniewta *et al.*, Orch. Nagaland, 276. 2000.

Plants 30-60 cm. Stem covered by leaf sheaths. Leaves 5-12 x 1-1.7 cm, oblong, apex unequally 2-lobed, lobules rounded. Inflorescence leaf-opposed, laxly few-flowered. Flowers 3-3.5 cm across; sepals and petals white, lip yellow to white at apex, greenish-yellow with purple-red striations at base, anther cap yellow. Dorsal sepal oblong spathulate; lateral sepals spreading, similar. Petals spreading, narrowly oblong-spathulate. Lip fleshy, 3-lobed, adnate to the column; lateral lobes erect, rounded; mid-lobe spathulate, laterally compressed. Column stout.

**Fl. & Fr.:** March - April

**Distribution:** India (NE India), E & W Himalaya, China, Myanmar, Nepal, Vietnam

**Specimen examined:** Epiphytic on tree trunks in forests. Tsupfume. NLNU 0999.

## ZINGIBERACEAE

Lindl., Key Struct. Phys. Syst. Bot. 69. 1835

Herbs, terrestrial or rarely epiphytic, perennial or annual, aromatic, with fleshy rhizomes. Leaves distichous, sessile or petiolate, sheathing, ligulate. Flowers terminal on a stem, or on a separate short sheath covered shoot arising from rhizome, bisexual, zygomorphic. Bracts enclosing a solitary or several flowers cincinni. Calyx tubular or truncate, usually 3-toothed. Corolla tubular or funnel-shaped, 3-lobed, the dorsal lobe usually somewhat larger and hooded over the resting buds. Stamen 1; filament short or long, or rarely absent; connective sometimes spurred at base or produced above forming an anther-

crest or produced on sides forming wings. Lateral staminodes 2, petaloid, subulate or absent.

Fruit a dehiscent capsule or rarely indehiscent. Seeds arillate.

- |   |                   |
|---|-------------------|
| 1a. Inflorescence with a terminal plume of sterile bracts       | <i>Curcuma</i>    |
| 1b. Inflorescence without terminal plume of sterile bracts      |                   |
| 2a. Inflorescence terminal on a leafy stem                      |                   |
| 3a. Ovary pubescent   | <i>Alpinia</i>    |
| 3b. Ovary glabrous  |                   |
| 4a. Filament fused to labellum                                  | <i>Globba</i>     |
| 4b. Filament not fused to labellum                              |                   |
| 5a. Anthers spurred at base                                     | <i>Cautleya</i>   |
| 5b. Anthers not spurred at base                                 | <i>Hedychium</i>  |
| 2a. Inflorescence basal, arising from rhizome                   |                   |
| 6a. Inflorescence in between radical leaves                     | <i>Kaempferia</i> |
| 6b. Inflorescence on a leafless peduncle                        |                   |
| 7a. Fruits enclosed within persistent bracts and bracteoles     | <i>Zingiber</i>   |
| 7b. Fruits not enclosed within persistent bracts and bracteoles | <i>Amomum</i>     |

*Alpinia* Roxb., Asiat. Res. 11: 350. 1810

Rhizome creeping. Leafy shoots many-leaved. Leaves petiolate, large, oblong-lanceolate. Inflorescence a terminal, usually lax raceme or panicle. Bracts often absent or when present open to the base, each subtending a single flower or a cincinnus of 2-many flowers. Bracteoles present or absent. Calyx usually tubular, unilaterally split. Corolla tube cylindric, more or less than equal to or shorter than the calyx. Labellum large, showy or inconspicuous, apex variously lobed or entire. Lateral staminodes small or absent, toothlike

or subulate. Anthers sessile or with a filament, connective crest or not. Ovary 3-locular, placentation axile. Capsule globular.

1a. Lip large and showy, yellow orange with red stripes; fruit red *A. malaccensis*

1b. Lip small, pink; fruit blue-black *A. nigra*

*Alpinia malaccensis* (Burm.f.) Roscoe, Trans. Linn. Soc. London 8: 345. 1807; Baker in Hook.f., Fl. Brit. Ind. 6:255. 1892; Rao & Verma in Bull. Bot. Surv. Ind. 14:140. 1972; M. Sabu, Zingib. & Cost. of South Ind. 58. 2006.

Stem upto 3m high, robust. Leaves lanceolate, acuminate, lamina 50-60 x 5-7cm, pubescent beneath, margin wavy, fringed with hairs. Inflorescence in terminal erect racemes, 17-28 cm long, rachis stout, villous. Bracts absent; bracteoles brownish white, split open to the base. Calyx white, 1.5-2 cm long, shortly 3-lobed, slit open at one side, apex hairy. Corolla tube about 1 cm long, shorter than the calyx; lobes oblong, margin ciliate. Lateral staminodes, subulate. Labellum yellow orange with red stripes, ovate, sides incurved, apex emarginated. Ovary pubescent. Capsule globose, becoming red at maturity.

**Fl. & Fr.:** March-May

**Distribution:** India (throughout), Bangladesh, Bhutan, Java, Malaysia, Myanmar, Thailand

**Specimen examined:** Grows in open secondary forest. Mesulumi. NLNU 00397. **(Pl. 61)**

*Alpinia nigra* (Gaertn.) Burt, Notes Roy. Bot. Gard. Edinburgh 35:213. 1977; *Zingiber nigrum* Gaertn., Fruct. Sem. Pl. 1: 35, t. 12. 1788; *Alpinia allughas* (Retz.) Roscoe, Trans. Linn. Soc. London 8: 346. 1807; Baker in Hook.f., Fl. Brit. Ind. 6: 346. 1807.

Stems 1-2 m high. Leaves subsessile, oblong-lanceolate, 20-50 x 4-15 cm; acuminate at apex, ligules 0.5-0.6 cm. Inflorescences terminal panicles, 12-55 cm, pubescent. Calyx pinkish, pubescent. Corolla pink; tube 7-13 mm; lobes oblong, 0.7-1.5 x 0.4-0.7 cm; lip

obovate, 1.2-1.8 x 0.8-1.4 cm, bilobed, white with a paired of pink lines at centre and margins; capsules globose, 1-0.6 cm, blue-black.

**Fl. & Fr.:** May-December

**Distribution:** India (throughout), Bhutan, Sri Lankan, Thailand

**Specimen examined:** Common in swampy localities along river bank. Chepoketa. NLNU 0919. (Pl. 61)

*Amomum* Roxb., Pl. Coromandel 3: 75. 1820

Perennial herbs with creeping rhizome. Leaves sessile or petiolate. Inflorescence radical, pedunculate, dense flowered spike. Bracts persistent or deciduous; each subtending a single flower; bracteoles present, rarely absent. Calyx tubular, 3-toothed. Corolla tube as long as or little taller than the calyx. Segments linear, the dorsal segment often broader and more concave. Labellum obovate, sub entire or bilobed. Lateral staminodes subulate or absent. Stamen shorter than the lip. Fruit a capsule or a berry, smooth, sometimes ridged or winged.

*Amomum dealbatum* Roxb., Fl. Ind. 1: 42. 1820; Baker in Hook.f., Fl. Brit. Ind. 6:239. 1892; Rao & Verma in Bull. Bot. Surv. Ind. 14:135. 1972.

Stem leafy, upto 2m high. Leaves oblong-lanceolate, acuminate, lamina 40-110 x 7-14 cm, pubescent beneath. Inflorescence radical, sub-globose, up to 4-5 cm broad, peduncle up to 7 cm long. Bracts oblong, red, soon disintegrating; each bracts subtends one flower. Flowers white with a yellow median band and radiating red veins. Calyx shorter than the bract. Corolla tube shorter than the bract. Labellum oblong, emarginated. Stamen shorter than the labellum. Capsule sub-globose, reddish, 9-winged.

**Fl. & Fr.:** April - June.

**Distribution:** India (NE India), E Himalaya, China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in moist shady places. Tsupfume. NLNU 0972.

*Cautleya* (Royle ex Benth.) Hook.f., Bot. Mag. 114: t. 6991. 1888

Rhizome small or absent; roots fleshy. Leaves sessile. Inflorescence in terminal spikes. Each bracts subtends a single yellow flower. Bracteoles absent. Calyx tubular, slit open on one side. Corolla tube as long as or longer than the calyx. Lateral segments spreading, fused each other centrally and to lip in lower half, free at margin. Lateral staminodes petaloid. Labellum deeply bilobed. Ovary trilocular with axile placentation. Fruit a capsule, 3-valves, dehiscing to base.

*Cautleya gracilis* (Sm.) Dandy, J. Bot. 70: 328. 1932; Balakr., Fl. Jowai. 2: 524. 1983; *Roscoe gracilis* Sm., Trans. Linn. Soc. 13: 460. 1882; *R. lutea* Royle, Ill. Bot. Himal. 361. t. 89. f. 2. 1839; *C. lutea* (Royle) Hook. f. in Bot. Mag. t. 6991. 1888; Baker in Hook.f., Fl. Brit. Ind. 6:208. 1890.

Epiphytic. Stem 25-45 cm high. Leaves oblong-lanceolate, lamina 15-30 x 2-5 cm, caudate acuminate, glabrous beneath, sessile or sub-sessile. Inflorescence in terminal upright spike, spike 5-8 cm long, dense 8-15 flowered. Bracts ovate-lanceolate, green, 1-1.5 cm long shorter than the calyx; each bract subtends one flower. Flowers yellow. Calyx red, longer than the bracts. Corolla tube slightly longer than the calyx, lobes about 1.8 cm long. Labellum obovate, deeply bilobed up to the middle. Stamens equal to labellum. Capsule globose, red.

**Fl. & Fr.:** June - December.

**Distribution:** India (NE India), E & W Himalaya, China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows on forest tree trunks. Kapamodzu. NLNU 0282.

*Curcuma* L., Sp. Pl. 1: 2. 1753

Herbs with profusely branched rhizome. Leaves petiolate in basal branches, oblong lanceolate. Inflorescence in a terminal spike, sometimes lateral or central. Spike pedunculate, compact. Bracts ovate-oblong, fused to each other in the lower part forming pouches; lower fertile bracts subtends a cincinnus of 2-7 flowers; upper sterile bracts larger, differently coloured. Calyx cylindric. Corolla tube funnel shaped. Lateral staminodes petaloid. Labellum obovate with a thickened central portion and thinner side lobes. Filament short and broad; anther versatile, spurred. Capsule ellipsoid.

*Curcuma angustifolia* Roxb., As. Res. 11: 338. t. 3. 1810; Baker in Hook.f., Fl. Brit. Ind. 6:210. 1890; Rao & Verma in Bull. Bot. Surv, Ind. 14:121. 1972; Balakr., Fl. Jowai. 2:520. 1983.

Rhizome pale yellow, slightly aromatic. Stem leafy, 25 - 50 cm, leaves elliptic to oblong-lanceolate, lamina caudate acuminate, narrowed at base, 30-40 x 8-10 cm, glabrous. Inflorescence in lateral spike, 10-15 cm long. Lower fertile bracts green ovate-lanceolate, upper sterile bracts purplish, 3-4 cm long. Corolla tube about 2 cm long, lobes 2-2.3 cm long. Labellum yellow, emarginated. Filament 1.5 cm long.

**Fl. & Fr.:** June - September.

**Distribution:** India (throughout), W Himalaya, Bangladesh, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in open places among grasses and in forest. Chozuba. NLNU 0363.

*Globba* L., Mant. Pl. 2: 143, 170. 1771

Perennial herbs with creeping rhizomes. Leaves sessile or shortly petiolate. Inflorescence

terminal. Flowers often reproduced by bulbils. Calyx funnel-shaped, shortly 3-lobed. Corolla tube much longer than the calyx lobes. Lateral staminodes petaloid, attached to the corolla tube at the same level as corolla segments. Labellum connate to the filament in a slender tube about 1 cm above staminodes, apex usually bilobed or emarginated. Filament long, slender, with inflexed edges, strongly curved in upper part. Fruit small, globose or sub-globose capsule.

***Globba racemosa*** Sm., Exot. Bot. 2: 115. 1808; Baker in Hook.f., Fl. Brit. Ind. 6:201. 1892; Rao & Verma in Bull. Bot. Surv. Ind. 14:118. 1972; Balakr., Fl. Jowai. 2:523. 1983; *Globba orixensis* Roxb., Baker in Hook.f., Fl. Brit. Ind. 6:201. 1892.

Plant up to 1.5 cm long. Leaves elliptic-lanceolate, acuminate, lamina 15-25 x 2-4 cm, glabrous above, finely hairy on the mid-rib beneath. Inflorescence 20-35 cm long. Bracts linear-lanceolate, 2-3 cm. Flowers 2-5 at tips of branches, yellow or orange yellow with deeper yellow blotch at the mouth, often mostly reproduced by bulbils. Calyx up to 1 cm long. Corolla tube up to 2.5 cm long, lobes 0.7-0.8 x 0.3-0.4 cm. Labellum obovate, apex bilobed, base auricled. Capsule globose to oblong, faintly 3-lobed, wrinkled.

**Fl. & Fr.:** August – October

**Distribution:** India (NE India), E & W Himalaya, Myanmar, Nepal, Thailand

**Specimen examined:** Grows in moist shady places. Thetsumi. NLNU 0427.

### ***Hedychium*** Koenig, Retzius, Observ. Bot. 3: 61. 1783

Terrestrial or epiphytic perennial, rhizomatous herbs. Leaves distichous, sessile or shortly petiolate. Inflorescence a terminal spike, with closely imbricating or lax bracts, each subtending one-several flowers. Bracteoles small. Calyx tubular, 3-toothed, split on one side. Corolla tube as long as or exceeding the bract. Segments 3, narrowly linear, reflexed in the



flower. Labellum suborbicular, clawed or not, more or less deeply bilobed. Lateral staminodes petaloid, larger than corolla lobes. Stamen often long exserted. Capsule globose, 3-valved. Seeds sub-globose with lacerate aril.

- 1a. Epiphytic or terrestrial *H. villosum*
- 1b. Terrestrial
  - 2a. Calyx shorter than the bracts
    - 3a. Each bract subtends 4-5 flowers *H. flavescens*
    - 3b. Each bract subtends 2-3 flowers
      - 4a. Inflorescence lax flowered *H. coccineum*
      - 4b. Inflorescence dense flowered *H. greenii*
  - 2b. Calyx as long as or longer than the bracts
    - 5a. Each bract subtends 1-2 flower *H. gardnerianum*
    - 5b. Each bract subtends 1 flower
      - 6a. Corolla tube as long as calyx *H. longipedunculatum*
      - 6b. Corolla tube much longer than calyx
- 7a. Inflorescence lax flowered *H. spicatum*
- 7b. Inflorescence dense flowered *H. ellipticum*

***Hedychium coccineum*** Sm., Rees, Cycl. 17: 5. 1811; Baker in Hook.f., Fl. Brit. Ind. 6:231. 1892; Balakr., Fl. Jowai. 2: 528. 1983.

Stems 1-2 m. Leaves linear-lanceolate, acuminate, lamina 30-44 x 3.5-5 cm, dark green and glabrous above, pale green and villous along the mid-rib beneath. Inflorescence terminal, erect, 18-32 cm, lax-flowered. Bracts oblong, convolute; each bract subtends 2-3 flowers. Flowers orange-red. Calyx equal to or slightly shorter than the bract. Corolla tube equal to or slightly longer than the bract. Lateral staminodes spatulate, 2.8-3 x 0.4 cm.

Labellum suborbicular, clawed, deeply bilobed; filament dull purplish brick red.

**Fl. & Fr.:** June – November

**Distribution:** India (NE India), Myanmar, Nepal, Sri Lanka, Thailand

**Specimen examined:** Grows in open secondary forest. Zelome. NLNU 0962. **(Pl. 61)**

*Hedychium ellipticum* Sm., Rees, Cyclop.16: 2. 1811; Baker in Hook.f., Fl. Brit. Ind. 6: 228. 1892; Balakr., Fl. Jowai. 2: 529. 1983.

Stems 0.8-1.4 m. Leaves oblong, 25-30 x 8-12 cm, Inflorescences terminal, a dense flowered spike. Bracts oblong, imbricate. Inflorescence terminal. Flowers white, becoming yellow, fragrant. Calyx as long as the bracts; corolla tube twice as long as the bract. Stamines spathulate. Labellum oblong distinctly clawed, shorter than the stamines, emarginated at apex. Anther linear, orange-yellow.

**Fl. Fr.:** May - December

**Distribution:** India (NE India), E & W Himalaya, Nepal, Myanmar, Thailand, Vietnam

**Specimen examined:** Grows in open moist slopes among grasses. Kapamodzu. NLNU 0284. **(Pl. 61)**

*Hedychium flavescens* Carey ex Roscoe, Monandr. Pl. Scitam. t. 50. 1824; M. Sabu, Zingib. & Cost. of South Ind. 199. 2006; *H. coronarium* var. *flavescens* (Carey) Baker in Hook.f., Fl. Brit. Ind. 6: 226. 1892; *H. coronarium* var. *subditum* (Turrill) Rao & Verma, in Bull. Bot. Surv. Ind. 14:129. 1972.

Stem 2-3 m high. Leaves elliptic-lanceolate, acuminate, lamina 30-45 x 5-6 cm, glabrous above, pubescent beneath. Inflorescence terminal, dense flowered, 10-16 cm. Bracts broadly ovate; each bract subtends 4-5 flowers. Flowers yellow, fragrant. Calyx shorter than the bract. Corolla tube slender, lobes linear. Stamines spathulate. Labellum

suborbicular, clawed, bilobed. Stamens exceeding the labellum; filament yellow.

**Fl. & Fr.:** July - November.

**Distribution:** India (NE India), E Himalaya, China, Nepal, Myanmar, Vietnam

**Specimen examined:** Grows in moist and shady places. Phek. NLNU 0532.

*Hedychium gardnerianum* Roscoe, Monand. Pl. t. 62. 1828; Baker in Hook.f., Fl. Brit. Ind. 6: 230. 1892; Rao & Verma in Bull. Bot. Surv. Ind. 14: 133. 1972; Balakr., Fl. Jowai. 2: 530. 1983.

Stem 1-2 m high. Leaves sessile, oblanceolate-lanceolate, acuminate, lamina 30-45 x 9-13cm, glabrous above, powdery beneath. Inflorescence terminal, 23-27 cm, lax flowered. Bracts oblong; each bract subtends 1-2 flowers. Flowers bright yellow. Calyx longer than bracts. Corolla tube longer than bracts by about 1.5-2 cm. Lateral staminodes oblanceolate, 3x0.6 cm. Labellum obovate, emarginated, 2.5-3.2 cm. Stamen exceeding the labellum; filaments bright red.

**Fl. & Fr.:** September-November

**Distribution:** India (NE India), E Himalaya, China, Nepal, Myanmar, Vietnam

**Specimen examined:** Grows in shaded moist places in forest. Pfitsero. NLNU 0288. (Pl. 61)

*Hedychium greenii* W. W. Sm., Rec. Bot. Surv. Ind. 4: 272. 1911; Rao & Verma in Bull. Bot. Surv. Ind. 14:130. 1972.

Stem about 1 m high. Leaves elliptic, oblong, acuminate, lamina 19-27 x 5-8 cm, glabrous above, purplish red and villous along the mid-rib beneath. Inflorescence terminal, cernuous, 7-12 cm, dense flowered. Bracts ovate-lanceolate, flatly imbricating; each bract subtends 2-3 flowers. Flowers red. Calyx shorter than the bract. Corolla tube equal to or

slightly longer than the bract. Lateral staminodes narrowly oblanceolate, 3.5-4.2 x 0.5 cm. Labellum fan-shaped, cuneate, notched, with crumpled margin, 3.5-4 x 3.5-4 cm. Stamen equal to or slightly longer than the labellum; filament red.

**Fl. & Fr.:** August - October.

**Distribution:** India (NE India), E Himalaya, China, Nepal, Myanmar, Vietnam

**Specimen examined:** Grows in open moist forest. Zapami. NLNU 0247. **(Pl. 61)**

*Hedychium longipedunculatum* Sastry & D.M. Verma, J. Bombay Nat. Hist. Soc. 65: 293. 1968; Rao & Verma, Bull. Bot. Surv. Ind. 14: 130. 1972.

Epiphytic herbs, 25-50 cm high. Leaves oblong or oblong-lanceolate, abruptly acuminate, glabrous, green above, purplish beneath. Ligules upto 2 cm long, membranous, apex bilobed. Peduncle upto 14 cm long slightly curved; spikes 4-6 cm long, spike dense-flowered, cone-like. Flowers creamy-yellow, fragrant. Calyx tubular. Corolla tube as long as calyx, villous within. Lateral staminodes 2, petaloid, spathulate, cream coloured. Labellum deeply bilobed. Ovary subglobose. Capsule subglobose.

**Fl. & Fr.:** May - September

**Distribution:** India (NE India), E Himalaya

**Specimen examined:** Grows in moist slopes, along forest margin. Zipu. NLNU 0902. **(Pl. 62)**

*Hedychium spicatum* Sm., Rees, Cycl. 17: no. 8. 1811; Baker in Hook.f., Fl. Brit. Ind. 6: 227. 1892; Naik & Panig., Bull. Bot. Surv. Ind. 3: 72. 1961.

Stem leafy, about 1 m high. Leaves elliptic to oblong-lanceolate, acuminate, lamina 25-30 x 5-8 cm, glabrous above, pubescent beneath. Inflorescence terminal, 15-28 cm, lax flowered. Bracts ovate-oblong, convolute; each bract subtends one flower. Flowers white

with red blotch at the mouth. Calyx longer than the bract. Corolla tube exceeding the bracts by about 2.5-3.5 cm. lateral staminodes linear, 2.5 x 0.2 cm. Labellum oblong, cuneate, deeply bilobed, divided to about half way down, with acute lobes, 3-4 cm. Stamen shorter than the labellum; filament red, curved.

**Fl. & Fr.:** August – October

**Distribution:** India (throughout), E & W Himalaya, China, Myanmar, Nepal, Thailand, Tibet

**Specimen examined:** Grows in grassland, open mountain slope. Kapamodzu. NLNU 0286.

*Hedychium villosum* Wall., Roxb., Fl. Ind. 1: 12. 1820; Baker in Hook.f., Fl. Brit. Ind. 6:228. 1892; Rao & Verma in Bull. Bot. Surv. Ind. 14:131. 1972.

Terrestrial or epiphytic. Stem leafy, 1-2 m. Leaves elliptic to oblong-lanceolate, acuminate, lamina 25-40 x 5.5-8 cm, glabrous above, villous. Bracts oblong, convolute, villous pubescent; each bract subtends 2-3 flowers. Flowers white. Calyx villous pubescent, longer than the bract. Corolla tube much longer than the bract. Lateral staminodes linear, 2.5-3 x 0.2 cm. Labellum obovate, narrowly clawed, bilobed, 2.5-2.8 x 1.5 cm. Stamen much longer than the labellum, exceeding by about 3 cm; filament brownish red.

**Fl. & Fr.:** February - May

**Distribution:** India (NE India), E Himalaya, Cambodia, China, Myanmar, Nepal, Thailand

**Specimen examined:** Grows on trees in primary forest. Tsupfume. NLNU 0978.

*Kaempferia* L., Sp. Pl. 1: 2. 1753

Rhizome creeping, branched or not, ending in fleshy tubers. Leafy stem short or absent. Leaves distichous, few. Inflorescence terminal on the leaf shoot or on separate peduncle, enclosed within leaves and sheaths, appearing before leaves. Flowers few to many, spirally

arranged. Bracts closely imbricating, each subtends a single flower. Bracteoles split to the base. Calyx tubular, unilaterally split, shorter than or as long as the corolla tube. Corolla lobes subequal, reflexed or spreading. Labellum deeply bilobed. Lateral staminodes petaloid. Anthers sessile or with short filament, connective prolong into distinct, reflexed crest. Ovary trilocular, axile placentation. Fruit a capsule.

***Kaempferia rotunda*** L., Sp. Pl. 1: 3. 1753; Baker in Hook.f., Fl. Brit. Ind. 6: 222. 1892; Rao & Verma in Bull. Bot. Surv. Ind. 14:124. 1972.

Perennial herb. Root ending in tubers. Leafless when flower. Leaves erect, oblong, lamina 10-40 x 3-10 cm, villous pubescent beneath, shortly petaloid. Inflorescence in radical spike direct from tuberous. Root-stock 3-5 flowered. Bracts oblong acute, purplish white, 2-3.5 cm long. Corolla tube white, 5-7 cm long, lobes as long as the tube, linear, spreading. Lateral staminodes white, oblong, acute up to 5 cm long. Labellum lilac, obovate, deeply bilobed. Filament about 0.5 cm long; anther-crest cut into two lanceolate lobes. Capsule oblong.

**Fl. & Fr.:** April – July

**Distribution:** India (throughout), E & W Himalaya, China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in clear open forest floor. Chepoketa. NLNU 0964. **(Pl. 62)**

***Zingiber*** Mill., Gard. Dict. Abr. ed. 4:s.p. 1754

Rhizomatous perennial herbs. Leaves sessile or sub-sessile, linear or oblong-lanceolate. Inflorescence usually radical, rarely terminal on a separate leafless shoot, compact. Bracts large, imbricate; each subtends one flower; bracteoles split to the base. Calyx tubular, shortly 3-lobed. Corolla tube as long as the bracts; lobes lanceolate, dorsal lobe broader than the

lateral lobes. Labellum obovate, cuneate, appear like 3- lobed with the lateral staminodes adnate to the labellum. Filament short. Capsule oblong.

***Zingiber chrysanthum*** Roscoe, Monandr. Pl. Scitam. t. 86. 1824; Baker in Hook.f., Fl. Brit. Ind. 6:243. 1892; Rao & Verma in Bull. Bot. Surv. Ind. 14:136. 1972; Balakr., Fl. Jowai. 2:520. 1983.

Stem leaf, up to 2 m high. Leaves oblong-lanceolate, lamina 25-30 x 5-7 cm, pubescent beneath. Inflorescence in dense globose or oblong spike direct from the tuberous root-stock; peduncle very short, about 4 cm long. Bracts green, 3-5 cm long, outer bracts ovate, inner lanceolate and hairy tip. Calyx pubescent. Corolla tube 4-5 cm long; lobes red, lanceolate. Labellum bright yellow, 2.5 cm long, deeply 3- lobed, mid-lobe orbicular, side lobes ovate. Capsule ellipsoid, bright red, oblong, splitting open when ripe.

**Fl. & Fr.:** August – October

**Distribution:** India (NE India), E & W Himalaya, Bangladesh, Myanmar, Nepal

**Specimen examined:** Grows in open forest under tree canopy. Mesulumi. NLNU 0404.

## **COSTACEAE**

Nakai, J. Jap. Bot. 17: 203. 1941

Herbs with fleshy rhizomes. Leaves arranged spirally; leaf sheath tubular. Inflorescence in terminal spikes. Bracts broad, imbricate; each bract subtends a large single flower. Calyx 3-lobed, tubular. Corolla proximally tubular. Staminodes 5, fertile stamens 1. Filament petaloid. Ovary inferior. Fruit a capsule. Seeds numerous.

***Cheilocostus*** C. D. Specht, Taxon 55: 159. 2006

Rhizome tuberous. Stem erect, branched or un-branched, covered with tubular sheaths towards the base. Leaves spirally arranged, shortly petiolate. Inflorescence dense

globose or ellipsoid spicate, terminally on leafy stem or on short leafless shoots. Each bract subtends 1 or 2 flowers. Calyx unequally 3-lobed. Corolla tube shorter or longer than the calyx. Labellum large, obovate, the edges often crisped. Stamens with a broad filament. Ovary 3-loculed. Capsule 3-angled, woody.

***Cheilocostus speciosus*** (J. Koenig) C.D. Specht, *Taxon* 55:160. 2006; *Costus speciosus* (Koenig) Smith, *Trans. Linn.Soc. London* 1: 249. 1791; Baker in Hook.f., *Fl. Brit. Ind.* 6: 249. 1892

Erect herbs with leafy shoot up to 3 m tall. Leaves oblanceolate to obovate, acuminate, glabrous above, silky pubescent beneath. Spikes terminal, compact, ovoid or ellipsoid, up to 12 cm long. Bracts ovate-oblong, greenish red. Bracteoles red. Calyx funnel shaped, 3-lobed. Flowers white. Labellum obovate –orbicular. Capsule globose-oblong, trigonous, woody.

**Fl. & Fr.:** July-December.

**Distribution:** India (throughout), Bhutan, China, South-East Asia; Australia

**Specimen examined:** Grows in moist, shady places. Mesulumi. NLNU 0407.

## MARANTACEAE

R. Br., *Voy. Terra Austral.* 2: 575. 1814

Rhizomatous, caespitose herbs or shrubs. Leaves clustered at the base and on peduncle of the inflorescence, oblong-lanceolate, petioled, pinnately nerved; petiole usually with an elongated thickening towards the apex. Inflorescence paniculate or capituliform. Flowers bisexual, often bracteolate, often borne in pairs, subtended by a prophyll.

***Phrynium*** Willdenow, *Sp. Pl.* 1: 1, 17. 1797

Caespitose herbs without stem. Leaves large, radical, peduncular; petioles long. Inflorescence spirally condense spike. Flowers in 2-5 subtended by prophylls, Capsule 1-3



seeded.

***Phrynium pubinerve*** Blume, Enum. Pl. Jav. 1: 58. 1827; Rao & Verma in Bull. Bot. Surv. Ind. 14: 14. 1972; Balakar., Fl. Jowai 2: 531. 1983; *P. capitatum* Willd., Baker in Hook.f., Fl. Brit. Ind. 6: 258. 1892.

Leaves oblong to ovate-oblong, cuspidate, base round or acute, 20-40 x 8-23 cm; petiole upto 60 cm long. Inflorescence a sessile capitulate on the upper half of the petioles. Flowers reddish-orange. Bracts green, tip yellowish-orange, hairy, 2-2.5 cm long. Capsule-ellipsoid.

**Fl. & Fr.:** June-September

**Distribution:** India (throughout), China, Malaysia, Sri Lanka, Vietnam

**Specimen examined:** Grows along stream and in shaded places in forest. Lozaphuhu. NLNU 0534.

## MUSACEAE

A. L. de Jussieu, Gen. Pl. 61. 1789

Herbs, pseudo-stems represented by many imbricate petiole bases. Leaves spirally arranged, with a thick midrib and broad lamina. Flowers mostly unisexual, subtended by large green spathaceous bracts, zygomorphic; perianths in two whorls, outer narrowly tubular, inner 2-lipped. Stamens 5, perfect, with a small sixth rudimentary stamen added; ovary inferior, 3-locular, ovules numerous. Fruits fleshy, indehiscent.

***Musa*** L., Sp. Pl. 2: 1043. 1753

Stem sub-arborescent, of convolute leaf sheaths, somewhat swollen at the base. Leaves very large, oblong. Calyx with 5 short teeth. Corolla as long as the calyx or shorter. Perfect stamens 5, sixth rudimentary or absent; filament stout, filiform; anther linear, erect, 2-celled. Ovary 3-celled; ovules many; styles filiform. Fruit fleshy, indehiscent.

- |  |                       |
|--|-----------------------|
| 1a. Fruits pinkish-red                           | <i>M. velutina</i>    |
| 1b. Fruits green                                 |                       |
| 2a. Psuedostem brownish red to blackish          | <i>M. cheesmanii</i>  |
| 2b. Psuedostem green, tinged with brownish spots | <i>M. sikkimensis</i> |

***Musa cheesmanii*** N.W. Simmonds, Kew Bull. 11: 479. 1957.

Plant robust, clump forming. Pseudostem 9-10 m tall, base bulbous, brownish red to blackish, shiny. Petiole up to 90 cm. Leaves intermediate; lamina oblong, about 2 m long. Inflorescence pendent; peduncle up to 60 cm long; sterile bracts 2. Male rachis to 2 m long. Fruit bunch pendent; fruits 18 cm long, not curved; pedicel to 7.5 cm, glabrous; fruit apex long pointed; pulp white. Seeds many, angular, compressed.

**Fl. & Fr.:** February - October

**Distribution:** India (NE India), E Himalaya

**Specimen examined:** Grows in primary and secondary forest. Khuza. NLNU 0873.

***Musa velutina*** H. Wendl. & Drude, Gaertenflora 24: 65, t. 823. 1875; Baker in Hook.f., Fl. Brit. Ind. 6: 263. 1892; Balakr., Fl. Jowai. 2: 531. 1983; Karthik. *et al.*, Fl. Ind. Enum. Monocot. 104. 1989.

Pseudostems 1-1.5 m, pale red at base, purple-blotched upwards; leaves oblong, rounded at base, truncate-rounded at base, 60-100 x 20-35 cm; midrib red beneath; petioles 40-50 cm; peduncles 1.5-2 cm thick, red, white hairy; bracts red-purple, pubescent, ovate-lanceolate, 15-20 cm. Flowers 3-5 in a single row, orange-yellow. Fruits sessile, 6-7 x 3-4 cm, pinkish-red, hairy; pulp white; seeds angular, black.

**Fl. & Fr.:** July –November

**Distribution:** India (NE India), E Himalaya

**Specimen examined:** Grows along streamsides. Chepoketa. NLNU 0919. (Pl. 62)

*Musa sikkimensis* Kurz, J. Agric. Hort. Soc. Ind., Part 1, 5. 3: 164. 1877; Simmonds, Kew Bull. 11. 3: 478. 1956.

Plants robust; pseudostems green, tinged with brownish colour. Leave habit intermediate; leaf sheath bases not enclosing pseudostems, often blotched with black-brown spots; petioles up to 60 cm long; lamina oblong-lanceolate, yellowish green. Inflorescence axis bent at an angle, pubescent, light green; bracts ovate, obtuse, not revolute. Staminate buds globose, persistent, apex obtuse. Bunch oblique. Fruits globose, slightly straight, ridged; pedicel covered with sparse hairs, apex bluntly tipped. Seeds numerous, angular, smooth, pale brownish.

**Fl. & Fr.:** February-October

**Distribution:** India (NE India), E Himalaya, Bangladesh, Myanmar

**Specimen examined:** Grows in moist places in mountain slopes. Pfutsero. NLNU 0274.

## CANNACEAE

Juss., Gen. Pl. 62. 1789

Perennial herbs. Stem simple, smooth, slender; nodes swollen. Leaves sessile alternate, elliptic-lanceolate, acuminate, pinnately nerved; petioles with sheathing bases. Inflorescence a terminal raceme or panicle. Flowers bisexual. Sepals and petals 3. Corolla tube cylindric, 3-lobed, equal. Fertile stamen 1. Staminodes 4-6; staminal tube cylindric, segments petaloid, equal. Style flattened, petaloid. Capsule sub-globose, echinate.

*Canna* L., Sp. Pl. 1: 1. 1753

Description as of family.

*Canna indica* L., Sp. Pl. 1: 1. 1753; Baker in Hook.f., Fl. Brit. Ind. 6: 260. 1892; C.

*coccinea* Mill., Gard. Dict. ed. 8: 3. 1768; Balakr. Fl. Jowai 2:532.1983.

Erect herbs up to 1 m high. Leaves oblong to elliptic-lanceolate. Inflorescence raceme of spike. Bracts pale green; each bract subtends 2-sessile flowers. Sepals pale green. Petals yellow or pinkish red. Staminodes 2-3, red, spatulate; lip bright red with pale yellow in lower half. Fruit a capsule, ovoid.

**Fl. & Fr.:** January-December

**Distribution:** India (throughout); cultivated throughout the tropics.

**Specimen examined:** Cultivated in gardens. Pfutsero. NLNU 0292.

## HYPOXIDACEAE

R. Br. Voy. Terra Austral. 2: 576. 1814

Perennial herbs, rhizomatous. Leaves radical, elliptic-lanceolate, lamina often plicate, sometimes petiolate. Inflorescence on a leafless scape, in simple or condensed capitate raceme, bracteate. Perianth segment 6, outer 3 hairy on outside, free or fused into tube below. Stamens 6 fused to base of segments; filaments free. Fruit a capsule or berry.

*Curculigo* Gaertn., Fruct. Sem. Pl. 1: 63. 1788

Rootstock tuberous. Leaves lanceolate, blade plicate, linear. Inflorescence terminal spicate or racemed or subcapitate, scape short or long. Perianth lobe united at base forming a tube. Filaments short, filiform. Fruit a berry crowned with persistent perianth.

1a. Leaves long petioled, leaves upto 90 cm *C. capitulata*

1b. Leaves shortly petioled, leaves upto 30 cm *C. orchioides*

*Curculigo capitulata* (Lour.) Kuntze, Revis. Gen. Pl. 2: 703. 1891; *Molineria capitulata* (Lour.) Herb., Amaryll. 84. 1837; Balakr., Fl. Jowai 2: 533. 1983; Noltie, Fl. Bhut. 3.1: 67. 1994; *Curculigo recurvata* W.T.Aiton., Hort. Kew. 2: 253. 1811; Hook.f., Fl. Brit. Ind. 6:

278. 1892.

Leaves lanceolate, long petioled, 20-90 x 4-19 cm, apex acuminate, torn at apex, glabrous above, villous along the nerves beneath; base sheathing. Flowers yellow, in a condensed, deflexed, capitate raceme. Bracts lanceolate, longer than flowers. Perianth lobes oblong-lanceolate; outer 3 lobes hairy outside. Filaments very short. Style slender, stigma capitate. Berry globose, obscurely 3 angled.

**Fl. & Fr.:** April - October

**Distribution:** Tropical and Subtropical Asia

**Specimen examined:** Grows in moist shady places. Chepoketa. NLNU 0916 (**Pl. 62**)

*Curculigo orchioides* Gaertn., Fruct. 1: 63.t. 13. 1788; Hook.f., Fl. Brit. Ind. 6: 279. 1892; Balakr., Fl. Jowai 2: 532. 1983; Noltie, Fl. Bhut. 3.1: 69. 1994.

Rootstock tuberous or elongate. Leaves linear-lanceolate, acuminate, 5-30 x 0.5-3 cm, petiolate, glabrous; base sheathing. Flowers yellow, spicate; scape hidden in leaf bases, white, hairy; bracts lanceolate. Perianth lobes lanceolate, outer 3 lobes wider and hairy on outside. Capsule oblong or ovoid.

**Fl. & Fr.:** May - October

**Distribution:** India, Tropic and Subtropical Asia to West Pacific

**Specimen examined:** Grows in open areas, grasslands. Khezhakheno. NLNU 0242. (**Pl. 62**)

## AMARYLLIDACEAE

J. St. Hill, Expos. Fam. Nat. 1: 134. 1805

Perennial, usually bulbous herbs. Leaves commonly linear with sheathing base. Inflorescence umbel-like, 1-many-flowered. Flowers bilaterally symmetric. Stamen 6, inserted on tube; anthers usually dorsifixed. Ovary inferior, 3-loculed; style simple; stigma

simple. Fruit a capsule or berry.

*Crinum* L., Sp. Pl. 1: 291. 1753

Bulbous perennials. Leaves linear to ensiform. Scape solid. Spathe with 2 free valves. Inflorescence a few to many-flowered umbel; bracts filiform. Perianth with a long tube, usually spreading, lobes. Stamens 6, inserted at throat of tube; anther dorsifixed, versatile. Ovules numerous, axile. Style filiform; stigma entire, minute. Capsule subglobose breaking open irregularly. Seeds rounded greenish.

*Crinum amoenum* Roxb., Fl. Ind. 2: 127. 1832; Hook. f. Fl. Brit. Ind. 6: 282. 1892; Balakr. Fl. Jowai. 2: 533. 1983; Noltie, Fl. Bhut. 3. 1: 83. 1994.

Bulb subglobose. Leaves spreading, ensiform, acute. Scape sometimes purplish. Umbel 3-10 flowered, flower sessile. Perianth fragrant; tube reddish; lobes white, spreading, linear-lanceolate. Filaments purplish-red above, whitish below curve; anthers linear. Style exceeding stamens curved purplish.

**Fl. & Fr.:** June - September

**Distribution:** India (NE India), E Himalaya, Bhutan, Bangladesh, Myanmar, Nepal

**Specimen examined:** Grows in open places in slopes, along roadsides, also cultivated. Tsupfume. NLNU 0983.

## AGAVACEAE

Juss. Gen. Pl. 40. 1789

Herbs or shrubs; rootstock rhizomatous. Leaves crowded on or at the base of the stem. Flowers bisexual. Stamens 6. Ovary 3-celled. Fruits capsule or berry.

*Dracaena* Vand. ex L., Mant. Pl. 1: 9. 1767

Herbs, shrubs or dwarf trees. Leaves linear to narrowly ovate, sometimes succulent.

Inflorescences axillary, pedunculate, racemose or paniculate. Flowers borne on jointed pedicels, bisexual, actinomorphic. Fruit a 1-seeded berry.

***Dracaena angustifolia*** Roxb. Fl. Ind. 2: 327. 1892; Hook.f., Fl. Brit. Ind. 6: 327. 1892; Majumdar, in Rec. Bot. Surv. Ind. 20 (2): 225. 1973; Bora & Kumar, Flo. Div. Assam 347. 2003. *Pleomele angustifolia* (Roxb.) N. E. Brown, in Kew Bull. 1914: 277. 1914; Deb, Fl. Tripura 2: 424. 1983.

Shrubs, stem to 5 m tall, erect, woody. Leaves crowded at stem apex, blade 30-50 x 2-4 cm, linear, finely acuminate, sheaths overlapping. Inflorescence spicate. Bracts leafy. Flowers to 1 cm long. Perianth 6, basally connate, white with purplish tip. Stamens 6, adnate to the perianth. Styles filiform. Berries to 8 mm across, globose.

**Fl. & Fr.:** July-October

**Distribution:** India (NE India), Bangladesh, China, SE Asian countries; N Australia

**Specimen examined:** Grows in shaded moist places in forests. Chepoketa. NLNU 0917.

## **DIOSCOREACEAE**

R. Br. Prodr. 294. 1810

Herbaceous twining or climbing perennials, arising from tuber. Stems glabrous or pubescent, sometimes prickly, often with bulbils. Leaves alternate or opposite, petiolate, simple or palmate, petioles with a pulvinus at each ends. Inflorescence axillary, spikes or racemes, solitary or several together. Flowers small, unisexual, rarely bisexual. Male flowers: perianth 6, in 2 whorls; stamens 6 (3 perfect, 3 staminodes), attached to base of perianth. Female flowers: perianth similar to male; staminodes 3, 6 or 0; ovary inferior, 3-loculed, ovules 2 per locule; styles 3. Fruit a capsule, or berry.

***Dioscorea*** Plum. ex L., Sp. Pl. 2: 1032. 1753

Stems twining to left or right, with or without recurved prickles, often with axillary bulbils. Plant dioecious. Male flowers sessile borne singly or clustered on spikes in axillary or terminal axes; flowers globose or cupshaped. Female flowers sessile on axillary spikes. Capsule 3 winged, dehiscing from apex.

- |  |                       |
|--|-----------------------|
| 1a. Stems twining to right; leaves simple            | <i>D. alata</i>       |
| 1b. Stems twining to left; leaves simple or compound |                       |
| 2a. Leaves simple; prickles absent                   | <i>D. bulbifera</i>   |
| 2b. Leaves compound; prickles present                | <i>D. pentaphylla</i> |

***Dioscorea alata*** L., Sp. Pl. 1033. 1753; Hook.f., Fl. Brit. Ind. 6: 296. 1892; Rao & Verma, Bull. Bot. Surv. Ind. 15: 201. 1973; Noltie, Fl. Bhut. 3.1: 14. 1994.

Stems twining to right, usually 4-angled, prickles absent, bulbils present; tubers globose or cylindric. Leaves opposite, simple, ovate-triangular, 10-17 x 5-14 cm, apex acuminate, base subcordate or hastate, base 5-7 nerved; petioles 6-11 cm long. Male flowers in slender fascicled spikes; stamens 6. Female spikes solitary or in pairs in the axils on lateral branches. Capsule oblate, obcordate, winged.

**Fl. & Fr.:** September-January

**Distribution:** India, SE Asia

**Specimen examined:** Grows in shaded places. Khuza. NLNU 0884.

***Dioscorea bulbifera*** L., Sp. Pl. 1033. 1753; *D. sativa* Thunb. Fl. Jap. 151. 1784; Hook.f., Fl. Brit. Ind. 6: 295. 1892; Rao & Verma, Bull. Bot. Surv. Ind. 15: 201. 1973; Balakr., Fl. Jowai 2: 536. 1983; Noltie, Fl. Bhut. 3.1: 9. 1994.



Stem twining to left, angled, prickles absent. Bulbils many, ovoid, globose, warty. Leaves alternate, broadly ovate-cordate, 9-24 x 6-15 cm, apex caudate acuminate, base cordate, glabrous, margin entire or undulate; petioles 5-10 cm long. Male inflorescences 1-4 together on large pendulous panicles. Flowers borne singly, sessile. Female inflorescence axillary, solitary or paired. Capsules reflexed, winged, rounded at both ends.

**Fl. & Fr.:** June-December

**Distribution:** India, Bhutan, Japan, Korea, Myanmar, Thailand, Vietnam, Africa

**Specimen examined:** Grows in shaded places. Wazeho. NLNU 0625. (Pl. 62)

*Dioscorea japonica* var. *nagarum* Prain & Burkill, Ann. Roy. Bot. Gard. 14. 1: 259. 1936; Rao & Verma, Bull. Bot. Surv. Ind. 15: 201. 1973

Stems twining to right, slender, smooth. Leaves alternate basally on stem, opposite distally on stem, simple, ovate lanceolate, base hastate to cordate, apex long acuminate; petiole 4-6 cm long. Male spikes axillary, 1-4 together, erect; buds globose. Female spikes solitary or 2 or 3 together. Capsule oblate, winged.

**Fl. & Fr.:** May-November

**Distribution:** India, China, Japan, Korea

**Specimen examined:** Grows climbing on trees in shaded places. Pfutsero. NLNU 0276.

*Dioscorea pentaphylla* L., Sp. Pl. 1032. 1753; Hook.f., Fl. Brit. Ind. 6: 289. 1892; Rao & Verma, Bull. Bot. Surv. Ind. 15: 193. 1973; Balakr., Fl. Jowai 2: 537. 1983

Stem twining to left, angled, sparsely pubescent, prickles abundant. Bulbils present, globose or ellipsoid. Leaves alternate, 3-5 foliate, petioles 6-9 cm long; leaflets elliptic lanceolate, base cuneate, apex acuminate, margin entire, petiolules 0.3-0.5 cm, pubescent.

Male inflorescence spikes, solitary or in pairs in axillary or terminal leafless branches; flowers sessile or subsessile, stamens 3. Female inflorescence spikes 1-3 together. Capsules oblong, winged.

**Fl. & Fr.:** July-December

**Distribution:** India, Bhutan, China, Japan, Malaysia, Myanmar, Nepal, Philippines, Vietnam, Africa, Australia, Pacific Islands

**Specimen examined:** Grows climbing on trees in shady places. Lozaphuhu. NLNU 0544.

**(Pl. 63)**

## LILIACEAE

A. L. de Jussieu, Gen. Pl. 49. 1789

Root-stock bulbous. Leaves basal, usually spirally arranged, entire. Inflorescence in terminal racemes, umbels or solitary. Perianth segments 6 in two whorls, free or fused at the base. Stamens 6. Style simple. Fruit a capsule or rarely berry.

1a. Plants with corms or bulbs

2a. Plants with corms

*Iphegenia*

2b. Plants with bulbs

*Cardiocrinum*

1b. Plants without corm or bulbs

3a. Leaves scale like, with tufts of cladodes

*Asparagus*

3b. Leaves not scale like

4a. Leaves all radical

5a. Flowers in lax racemes

*Chlorophytum*

5b. Flowers in dense-flowered spikes

*Campylandra*

4b. Leaves cauline or radical and cauline

6a. Leaves scabrous along midvein and at margin

*Dianella*

6b. Leaves never scabrous along midvein, rarely margin

7a. Tepals saccate, spurred at base

*Disporum*

7b. Tepals not spurred

8a. Leaves alternate, sessile or petiolate; perianth

Segments 4 or 6

*Maianthemum*

8b. Leaves alternate, opposite or whorled;

perianth 6

*Polygonatum*

***Asparagus* L., Sp. Pl. 1: 313. 1753**

Perennial herbs or subshrubs, usually with short rhizomes. Dioecious or hermaphrodite. Stem erect or climbing, usually branched, with cladodes (leaflike stems) in axils of main stems and branches. Cladodes borne in clusters, rarely solitary, green. Leaves scalelike, base spurred. Inflorescence axillary, flowers in cluster, rarely solitary, sometimes a raceme or umbel. Perianth campanulate or subglobose; segments free or occasionally connate at base. Stamens 6. Ovary 3-loculed; ovules few per locule. Fruit a berry.

***Asparagus filicinus*** D. Don, Prodr. Fl. Nepal. 49. 1825; Hook.f., Fl. Brit. Ind. 6: 314. 1892.

Herbs, dioecious. Stems erect, unarmed. Rootstock a rhizome; with a cluster of fusiform roots; roots swollen at base. Stems much branched, 50-70 cm. Cladodes in fascicles of 5-8, linear, falcate, 3-15 x 0.8-2 mm, flat, midvein distinct. Leaf spur short, not spinescent. Inflorescences developing with cladodes or very soon afterward. Berry deep green.

**Fl. & Fr.:** May - August.

**Distribution:** India (N.E. India), China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in shaded moist places, forest margin. Lozaphuhu. NLNU 0546.

***Campylandra*** Baker, J. Linn. Soc. Bot. 14: 582. 1875

Perennial herbs, rhizomatous, monopodial. Rhizome ascending or creeping, stout; stem short. Leaves basal or on short stem, often distichous, leaf blade ligulate to ovate-elliptic. Inflorescence a terminal spike, many flowered. Perianth segments 6, connate into a tube, fleshy, lobes spreading. Stamens 6, basally adnate to perianth tube. Ovary 3 loculed, ovules 2-4 per locule, stigma small, 3-lobed. Fruit a berry.

***Campylandra wattii*** C. B. Clarke, J. Linn. Soc. Bot. 25:78. 1890; *Tupistra wattii* Hook.f., Fl. Brit. Ind. 6: 325. 1892.

Stem stout, fleshy, elongating from a long fleshy prostrate rhizome. Leaves 4-12, petiole 3-9 cm, basally widened and clasping the stem, leaf blade ovate-elliptic to elliptic-lanceolate, 6-20 x 3-7 cm. Peduncle stout and short, spike densely flowered; bracts lanceolate. Perianth yellow, lobes ovate, fleshy. Filaments adnate to perianth tube. Ovary globose, stigma 3-lobed. Berry globose, red when matured.

**Fl. & Fr.:** February-May, fruiting the following year; throughout the year

**Distribution:** India, Bhutan, China

**Specimen examined:** Grows in dense forest in moist and shaded places. Tsupfume. NL 0995.

***Cardiocrinum*** (Endl.) Lindl., Veg. Kingd. 205. 1846.

Perennial herbs, bulbiferous. Stem very tall, stout, glabrous. Leaves basal and cauline, petiolate, ovate-cordate. Inflorescence a terminal raceme, several to many flowered; bracts persistent or caducous. Flowers bisexual, tubular-funnelform, large. Tepals 6, free.

Stamens 6, inserted at base of tepals; filaments flat; anthers dorsifixed, versatile, narrowly ellipsoid. Ovary cylindric, 3-loculed; ovules many per locule. Style elongate; stigma slightly 3-lobed. Fruit a loculicidal capsule. Seeds reddish brown, flat, narrowly winged.

***Cardiocrinum giganteum*** (Wall.) Makino, Bot. Mag. (Tokyo) 27: 125. 1913; Noltie, Fl. Bhut. 3.1: 104. 1994.

Stem erect, green or dark green, hollow. Leaves on proximal stem larger, those on distal much smaller, sometimes bractlike; petiole 15–20 cm; leaf blade ovate-cordate. Raceme 10-16-flowered; bracts caducous. Tepals white or tinged with green, streaked with purple or purple-red adaxially, linear-oblongate, apex obtuse. Capsule subglobose; apex beaked. Seeds ovate-deltoid.

**Fl. & Fr.:** May - August.

**Distribution:** India (N.E. India), E & W Himalaya, Bhutan, China, Myanmar, Nepal, Tibet

**Specimen examined:** Grows in shaded moist places, forest. Tsupfume. NL 0988. **(Pl. 63)**

***Chlorophytum*** Ker Gawler, Bot. Mag. 27: t. 1071. 1807.

Leaves linear or oblanceolate, all basal. Flowers in a spike-like terminal cluster, subtended by a bract; pedicels jointed, upper part tepaloid. Perianth segments 6, free. Stamens 6, inserted opposite tepals; anthers basifixed. Style filiform, apex entire. Capsule 3-angled.

***Chlorophytum arundinaceum*** Baker, Hook.f., Fl. Brit. Ind. 6: 333. 1892; Noltie, Fl. Bhut. 3.1: 74. 1994.

Roots fibrous, cylindric. Leaves basal, 6-8, outer ones shorter than the inner ones, oblanceolate, apex acute, base narrowed into petiole. Inflorescence a simple raceme, up to 9 cm long, borne on a long leafless scape. Scape up to 18 cm long. Bracts lanceolate,

persistent, 0.6 cm long. Pedicels up to 0.6 cm long. Perianth purplish-white; lobes lanceolate, 0.3-0.5 cm long. Fruit a capsule.

**Fl. & Fr.:** July-September.

**Distribution:** India (N.E. India), E Himalaya, Bhutan, China, Myanmar, Nepal

**Specimen examined:** Grows in shaded moist places, forest. Tsupfume. NLNU 0975.

*Dianella* Lamarck, Encycl. 2: 276. 1786.

Perennial herbs. Rhizome generally branched. Stem simple or branched. Leaves sub basal, distichous, grass like. Scape usually tall, with few linear lanceolate cauline leaves and a terminal panicle. Panicle laxly branched, with several to many racemes or smaller panicles; bracts small. Flowers small. Tepals 6, free. Stamens 6, inserted at base of tepals. Ovary 3-loculed. Style slender; stigma small. Fruit a berry.

*Dianella ensifolia* (L.) Redoute, Liliac. 1: t. 1. 1802; Hook.f., Fl. Brit. Ind. 6: 337. 1892; Noltie, Fl. Bhut. 3.1: 70. 1994.

Perennial herbs. Rhizome creeping. Leaves linear-lanceolate, gradually narrowed at both ends, apex acute, margin minutely serrate. Scape 25cm, with several bractlike stem leaves. Inflorescence in panicle laxly branched, usually with flowers borne distally. Tepals spreading, linear lanceolate to narrowly oblong. Berries deep blue, subglobose.

**Fl. & Fr.:** March-August.

**Distribution:** India (N.E. India), E Himalaya, Bhutan, China, Myanmar, Nepal

**Specimen examined:** Forests, grassy slopes. Lozaphuhu. 0538. **(Pl. 63)**

*Disporum* Salisbury ex D. Don, Prodr. Fl. Nepal. 50. 1825.

Perennial herbs. Stem erect, simple or branched in distal part, with 1 to several sheaths proximally. Leaves sessile or subsessile, linear to suborbicular. Inflorescences

terminal or pseudolateral, umbellate or with flowers paired or solitary; bract absent. Flowers bisexual, often nodding, funnel-shaped, in terminal or axillary umbels. Tepals 6, free, often saccate or spurred at base. Stamens 6, inserted at base of tepals; filaments usually slightly flat; anthers basifixed to innate, extrorse. Ovary 3-loculed. Style filiform, 3-celled. Fruit a berry, dark blue to black. Seeds globose or ovoid.

***Disporum cantoniense*** (Lour.) Merr., Philipp. J. Sci.15: 229. 1919; Balakr. Fl. Jowai 2: 542. 1983; *D. pullum* Salisb., Trans. Hort. Soc. Lond. 1:331. 1812; Hook.f., Fl. Brit. Ind. 6: 360. 1892.

Erect herbs, upto 1.5 m, branched towards apex. Leaves lanceolate to narrowly oblong-lanceolate, 5-12 x 1-5 cm. Inflorescences terminal and pseudolateral, in umbels; peduncle usually distinct. Flowers slightly opening. Tepals purplish, oblanceolate, base gibbous-spurred, apex subacute. Stamens 6. Berries pendulous, blue-black.

**Fl. & Fr.:** May - October

**Distribution:** India (N.E. India), E Himalaya, Bhutan, China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in shaded moist forest areas, thickets. Pfutsero. NLNU 1105.

**(Pl. 63)**

***Iphigenia*** Kunth, Enum. Pl. 4: 212. 1843

Perennial herbs. Stem erect, leafy. Leaves few, scattered, sessile, linear. Flowers small, solitary or several in a terminal corymb. Tepals 6, free, spreading, narrow, clawed, deciduous. Stamens 6, inserted at base of tepals; filaments short, slightly flat; anthers versatile, extrorse. Ovary 3-loculed, ovoid to oblong; ovules many per locule. Style short,

united at base, adaxially stigmatic. Fruit a loculicidal capsule. Seeds many, subglobose; testa brown, thin.

***Iphigenia indica*** Kunth, Enum. Pl. 4: 213. 1843; Hook.f., Fl. Brit. Ind. 6: 360. 1892; Balakr. Fl. Jowai 2: 541. 1983.

Herbs, stem erect, corm globose. Leaves linear-lanceolate. Flowers solitary or paired. Tepals dark purple, linear to narrowly oblanceolate. Filaments green at base. Stigma lobes recurved. Capsule obovoid to oblong.

**Fl. & Fr.:** June - July

**Distribution:** India (throughout), China, Myanmar, Nepal, Thailand, Vietnam; Australia

**Specimen examined:** Grows in shaded places in pine forest. Wazeho. NLNU 0617.

***Maianthemum*** F.H. Wiggers, Prim. Fl. Holsat. 14. 1780.

Perennial, rhizomatous herbs. Stems erect, simple. Leaves alternate, sessile or petiolate, elliptic to ovate. Inflorescence a terminal raceme or panicle. Flowers bisexual or unisexual. Perianth segments 4 or 6, in 2 whorls, free or connate. Stamens 4 or 6, inserted at base of perianth segments or adnate to perianth tube; filaments filiform; anthers dorsifixed. Ovary 2- or 3-loculed. Fruit a berry, globose or subglobose. Seeds 1–3, globose to ovoid.

***Maianthemum fuscum*** (Wall.) La Frankie, Taxon 35: 588. 1986; Noltie, Fl. Bhut. 3.1: 47. 1994.

Rhizome creeping, tuberous, stout. Stem glabrous or distally pilose. Leaves glabrous or pilose; leaf blade oblong to ovate-lanceolate, 8-17 x 3-6.5 cm, base rounded or subcordate, margin sometimes ciliate, apex cuspidate-caudate. Inflorescence a panicle; rachis zigzagged or straight, occasionally with spreading, stiff hairs. Flowers maroon



outside, whitish green inside. Perianth segments nearly free, subelliptic. Ovary as long as style, style short. Berries red at maturity.

**Fl. & Fr.:** May-September.

**Distribution:** India (N.E. India), E Himalaya, China, Myanmar, Nepal, Tibet

**Specimen examined:** Grows in shaded moist places in forest. Sakraba. NLNU 0703.

*Polygonatum* Mill., Gard. Dict. Abr., ed. 4: 1109. 1754.

Perennial herbs, rhizomatous, terrestrial, rarely epiphytic. Stem erect, arching, or scandent, simple. Leaves alternate, opposite, or whorled, sometimes cirrhose at apex. Inflorescences axillary, umbel, corymb, or a solitary flower. Flowers bisexual, usually pendulous, rarely erect. Perianth segments 6, valvate, connate proximally and forming a tube usually for at least half their length. Stamens 6. Fruit a berry, globose.

*Polygonatum cirrhifolium* (Wall.) Royle, Ill. Bot. Himal. Mts. 1: 380. 1839; Hook.f., Fl. Brit. Ind. 6: 322. 1892.

Stem erect or scandent, glabrous. Leaves sessile, 3–6 whorls, rarely also a few alternate in proximal part of stem, narrowly linear to linear-lanceolate, apex usually cirrhose. Flowers pendulous; pedicel 3–8 mm. Flowers pale yellow, clustered in pairs of 2-4 in the axils of whorled leaves. Stamens shorter than the perianth. Fruit a berry.

**Fl. & Fr.:** May - September

**Distribution:** India (N.E. India), E Himalaya, Bhutan, China, Myanmar, Nepal

**Specimen examined:** Forests, grassy slopes. Khezhakhen. NLNU 0844. (Pl. 63)

## TRILLIACEAE

Chevall, Fl. Gen. Env. Paris 2: 297. 1827

Herbs, rootstock creeping rhizome. Leaves paired and opposite, more in a whorl at the top of the stem. Flowers bisexual, actinomorphic; perianth deciduous or persistent; segments free; subequal or different in two series, the inner petaloid or linear or filiform. Stamens as many as the perianth segments, filaments slightly flattened. Ovary 1-3 loculed, superior. Fruits berry or fleshy capsule, loculicidally dehiscent.

***Paris* L., Sp. Pl. 367. 1753**

Perennial herbs. Root-stock rhizomatous, creeping, annulate. Stem erect, with basal scale leaves and whorl of 4-12 petiolate or sessile leaves in upper part. Flowers single, terminal, sessile or pedicelled. Perianth segments 3-8 in 2 whorls. Stamens usually twice as many as tepals; filaments narrow, flat. Ovary superior; style thick, divided into stigmatic lobes at apex. Fruit a capsule, loculicidal, fleshy.

***Paris polyphylla* Sm.** in A. Rees, Cycl. 26: no. 2. 1813; Hook.f., Fl. Brit. Ind. 6: 362. 1892; S. Dasgupta in Singh & Sanjappa, Fasc. Fl. Ind. 23. 106. 2006.

Herbs, 1 m tall. Root stocks annulate. Leaves 5-12, oblong to lanceolate, 6-14 x 1-5 cm, acuminate at apex, base rounded or cuneate, petioled. Flowers axillary, solitary, sessile or pedicelled. Outer tepals 4-6, narrowly ovate-lanceolate to lanceolate; inner ones linear. Stamens as many as outer tepals or more. Capsule globose, fleshy, smooth. Seeds ovoid, scarlet.

**Fl. & Fr.:** March - November.

**Distribution:** India (NE India), Himalayas, Bhutan, China, Myanmar, Nepal, Pakistan

**Specimen examined:** Scattered in moist places inside forests. Tsupfume.NLNU 0976.

## **SMILACACEAE**

Ventenat, Tabl. Regn. Veg. 2: 146. 1799

Climbing shrubs. Roots tuberous. Stems often with stout recurved prickles. Leaves alternate, simple, often coriaceous, with prominent parallel veins linked by weaker reticulate veins. Petioles often modified tendrils. Inflorescence of pedunculate umbels, borne singly or in racemes in axils of wings. Pedicels arising from swollen receptacle at end of peduncle which may bear bracteoles. Flowers unisexual, of 2 slightly differentiated whorls each of 3 free tepals, or tubular with 3 apical lobes. Male flowers usually with 6 stamens, filaments free or fused. Ovary superior, trilocular. Fruit a berry.

**Smilax** L., Sp. Pl. 2: 1028. 1753

Leaves alternate, with 1-2 pairs of parallel veins from the base and little above the base. Petioles winged with tendrils arising from apex of wings. Flowers dioecious in umbels. Perianth segments 6. Male flowers; stamens 6. Female flowers; staminodes 3 or 6. Fruit a globous berry.

1a. Plants armed

*S. perfoliata*

1b. Plants unarmed

*S. menispermoides*

*Smilax perfoliata* Lour. Fl. Cochinch. 622. 1790; Balakr., Fl. Jowai 2:544. 1983; *Smilax prolifera* Roxb., Hook.f., Fl. Brit. Ind. 6:312. 1892; Noltie, Fl. Bhut. 3.1: 28. 1994.

Large climbing or straggling shrubs; branches stout, terete, prickly. Leaves ovate or orbicular-ovate, acuminate or cuspidate at apex, rounded at base, middle 3 fused at base. Petiole 2-4 cm, winged at lower half, wings oblong to half-ovate, papery, reticulate veined, deciduous in older stem. Inflorescences peduncled umbellate raceme or whorled; bracts coriaceous; female flowers 14-18, tepals, male umbels more flowered; tepals yellowish, reflexed at maturity, oblong. Berries red.

**Fl. & Fr.:** March-September.

**Distribution:** India (throughout), Bangladesh, Bhutan, Laos, Myanmar, Thailand, Vietnam

**Specimen examined:** Common in moist shady places of forests climbing or rambling. Khezhakheno. NLNU 0894.

*Smilax menispermoidea* A. DC., Monogr. Phan. 1: 108. 1878; Hook.f., Fl. Brit. Ind. 6:305. 1892; Karthik. *et al.*, Fl. Ind. Enum. Monocot. 286. 1989.

Climbing, unarmed shrubs; stem terete, on woody. Leaves ovate or elliptic-ovate, cordate at base, entire, acute at apex; tendrils usually present. Inflorescence a solitary umbel; peduncle 2-4 cm; 5-15 flowered. Male flowers: tepals purplish, red; filaments basally connate, forming a short column. Female flowers: tepals subequalling male ones; staminodes 6, sometimes antheriferous. Berries purplish black.

**Fl. & Fr.:** May - October

**Distribution:** India (NE India), E & W Himalaya, Laos, Myanmar, Vietnam

**Specimen examined:** Scattered in open forest thickets, stream sides. Tsupfume. NLNU 0991.

## PONTEDERIACEAE

Kunth, Nov. Gen. Sp. 1.3: 265. 1816

Annual or perennial herbs, aquatic or marshy herbs. Stems short, thick, rhizomatous. Leaves in basal rosettes or distributed along stems, sheathing at base. Inflorescence on scape, spike-like, or umbellate, subtended by tubular leaf sheath, bracts minute or absent. Flowers bisexual, regular or irregular. Perianth segments 6, in 2 series, petaloid, free or connate at base into tube. Stamens 6, sometimes 1 or 3. Ovary superior, 1-3-celled; stigma capitate or 3-fid. Fruit a capsule, 3-valved.

*Pontederia* L., Sp. Pl. 288. 1753

Aquatic or marshy herbs. Stem erect or creeping. Leaves basal with petiole and blade. Inflorescence racemose or subumbellate, subtended by sheathing spathes. Bracts large. Flowers regular, subsessile or shortly pedicelled. Perianth segments 6, free. Stamens 6, inserted at base of perianth. Ovary 3-celled; style filiform; stigma subentire or 3-lobed. Fruit a loculicidal, 3-valved capsule.

***Pontederia vaginalis*** Burm.f., Fl. Ind. 80. 1768; *Monochoria vaginalis* (Burm.f.) C. Presl, Reliq. Haenk. 1: 128. 1827; Hook.f., Fl. Brit. Ind. 6: 363. 1892; Noltie, Fl. Bhut. 3.1: 174. 1994.

Aquatic herbs. Leaves in basal rosette or on decumbent stem, blades lanceolate, or ovate-lanceolate, apex acute to acuminate; long petioled. Flowers short pedicelled, subspicate. Perianth segments blue, ovate-lanceolate to oblong. Capsule ovoid or ellipsoid.

**Fl. & Fr.:** August - October

**Distribution:** India (throughout), Tropical & Subtropical Asia to N Australia

**Specimen examined:** Grows in rice fields, ponds, swamps. Mesulumi. NLNU 0402. (**Pl. 63**)

## COMMELINACEAE

R. Br., Prodr. 268. 1810

Annuals and perennials herbs. Stem fleshy, climbing or under-shrubs. Leaves alternate, entire, basal sheaths encircling the stem. Inflorescence various, often subtended by spathe-like bracts. Flowers bisexual, more or less irregular. Sepals 3, alternating with 3 petals. Stamens 6, all fertile or 3 sterile. Fruit a capsule.

1a. Climbing herbs

*Streptolirion*

1b. Erect or prostrate herbs

2a. Inflorescences enclosed by spathaceous bracts

- |  |                  |
|--|------------------|
| 3a. Fertile stamens 3, staminodes 3                    | <i>Commelina</i> |
| 3b. Fertile stamens 6, staminodes 0                    | <i>Cyanotis</i>  |
| 2b. Inflorescences not enclosed by spatheaceous bracts |                  |
| 4a. Sepals hairy; fertile stamens 6                    | <i>Floscopa</i>  |
| 4b. Sepals usually glabrous; fertile stamens 2         | <i>Murdannia</i> |

***Commelina* L., Sp. Pl. 40. 1753**

Stem creeping at the base, rooting from lower nodes. Leaves alternate, usually lanceolate; sheaths hairy. Inflorescence in one or two cymosely branches subtended by funnel shaped bracts. Petals 3; 2 large, clawed; third usually smaller or absent. Fertile stamens 3. Ovary 2 or 3 loculed. Capsule oblong or globose.

- |   |                       |
|---|-----------------------|
| 1a. Leaf sheath with long, brown hairs at margin; spathe funnel-shaped  | <i>C. paludosa</i>    |
| 1b. Leaf sheath with white or brown hairs at margin; spathe boat shaped | <i>C. sikkimensis</i> |

***Commelina paludosa*** Blume, Enum. Pl. Java 1: 2. 1827; Balakr., Fl. Jowai. 2:548. 1983; Noltie, Fl. Bhu. 3.1: 235. 1994; *Commelina obliqua* Buch-Ham. ex D. Don, Hook.f., Fl. Brit. Ind. 6: 372. 1892.

Stem erect, straggling, much branched, up to 1 m long. Leaves elliptic-lanceolate, caudate acuminate, 12-20 x 2-5 cm, glabrous; base tapered into short petiole-like; sheaths with hairs around the mouth, striated. Inflorescence in compact raceme subtended by a funnel-shaped sub-sessile solitary spathe. Flowers whitish pale blue. Capsule trigonous obovoid.

**Fl. & Fr.:** April-September.

**Ditribution:** India (throughout), Himalaya, Bangladesh, China, Malaya, Myanmar, Nepal, Pakistan, Taiwan, Thailand, Vietnam

**Specimen examined:** Grows in marshy places along the roadside. Chozuba. NLNU 0366.

*Commelina sikkimensis* Clarke, Comm. Cyrt. Beng. 13. t. 6. 1874; Hook.f., Fl. Brit. Ind. 6: 369. 1892; Balakr., Fl. Jowai. 2:549. 1983.

Stem creeping, much branched herbs. Leaves lanceolate, 3-7 x 1-2.5 cm, acuminate at apex, base tapered into petiole-like. Sheath glabrous or hirsute, mouth ciliate. Inflorescence in cymes in unequal pairs subtended by a long peduncled ovate-lanceolate spathe. Flowers blue. Capsules oblong, pale greenish brown.

**Fl. & Fr.:** April-September

**Ditribution:** India (NE India), Himalaya, Bangladesh, Malaya

**Specimen examined:** Common on shady moist and stream sides and rice fields. Chozuba. NLNU 0358.

*Cyanotis* D. Don, Prodr. Fl. Nepal. 45. 1825

Herbs, usually prostrate or creeping. Leaves small. Flowers in terminal and lateral scorpioid cymes, with closely imbricating, sickle-shaped bracteoles inserted in two rows and subtended by leaf-like spathe bract; sometimes flowers all in axillary clusters. Sepals subequal, free or connate below. Corolla tubular below, 3-lobed. Stamens 6, all similar; filaments bearing clump of jointed hairs near apex. Ovary 3-celled. Capsule loculicidal, 3-valved.

*Cyanotis vaga* (Lour.) Schult. & Schult. f. in Roemer & Schultes, Syst. Veg. 7: 1153. 1830.

Stem 7-30 cm long, decumbent, much branched, rooting at nodes purplish, hairy. Leaves sessile, linear-lanceolate, 3-8 x 1-1.3 cm, sparsely hairy on both the surfaces, margin

densely hairy; sheaths hairy. Cymes scorpioid subtended by leaf-like spathes; spathes up to 3.5 cm long. Flowers blue subtended by long straight or curved bracts. Filaments long exerted from corolla, hairs bluish. Capsule small, hairy at top.

**Fl. & Fr.:** September-December.

**Ditribution:** India (throughout), Himalaya, Bhutan, China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in grasslands, roadsides, in open spaces. Tsupfume. NLNU 0993.

*Floscopa* Lour., Fl. Cochinch. 1: 193. 1790

Erect or decumbent herbs. Leaf sheaths tubular. Flowers in terminal or axillary thyrsoid panicles. Bracts present. Petals free. Stamens 6, sometimes one imperfect; upper 2-3 filaments glabrous, fused below; lower 3 filaments free. Ovary 2-celled. Capsule loculicidal, 2-valves; 2-seeded.

*Floscopa scandens* Lour., Fl. Cochinch. 1: 193. 1790; Hook.f., Fl. Brit. Ind. 6: 390. 1892; Balakr., Fl. Jowai. 2: 551.1983.

Stem erect or subscandent with creeping base, hairy, strongly striated. Leaves elliptic-lanceolate, acuminate, scabrous hirsute on both the surfaces; base tapered into short petiole-like; sheaths cylindric, densely hirsute. Panicles on a short peduncle, with densely hispid many flowered branches. Flowers whitish-purplish. Capsule suborbicullar-ellipsoid.

**Fl. & Fr.:** June - November.

**Ditribution:** India (throughout), E Himalaya, Bhutan, China, Myanmar, Thailand, Vietnam; Oceania

**Specimen examined:** Grows in moist shady places. Lozaphuhu. NLNU 0548.



***Murdannia*** Royle, Ill. Bot. Himal. Mts. 1: 403. 1840

Herbs. Leaves in a basal rosette and or along stem, base not narrowed into a petiole. Inflorescence in a terminal thyrse of several flowered or fascicles of 1-flowered cymes in leaf axils, usually borne on a leafy stem. Petals free, all similar. Stamens 2-3; filaments hairy or glabrous; staminodes 3-4. Ovary 3-celled. Capsule 3-valved.

1a. Flower stem erect; fertile stamens 3 *M. divergens*

1b. Flower stem weak; fertile stamens 2 *M. nudiflora*

***Murdannia divergens*** (Clarke) Bruck. in Engler, Nat. Pflanzenfam. ed. 2, 15a: 173. 1930; Balakr., Fl. Jowai. 2: 552.1983; *Aneilema divergens* Clarke, Commelyn. & Cyrtandr. Bengal. 28. 1874; Hook.f., Fl. Brit. Ind. 6: 376. 1892.

Herbs with roots tuberous; stems up to 35 cm long, erect. Leaves sessile, linear-lanceolate, 9-15 x 1-1.5 cm, acute at apex, rounded at base, minutely red spotted above; leaf sheaths 1-2 cm long, white ciliate at margin and mouth. Inflorescences in terminal panicles, 3-8 cm long; bracts ovate, persistent. Flowers pinkish; sepals linear-oblong, glabrous; petals obovate, stamens 3, filaments bearded with purplish hair. Capsules ellipsoid, acute at both ends, 3-locular, styles persistent in fruit.

**Fl. & Fr.:** June-September.

**Ditribution:** India (NE India), Himalaya, Bhutan, China, Myanmar, Nepal, Vietnam

**Specimen examined:** Common among open bushes and on hilly moist slopes. Pfutsero. NLNU 0237.

***Murdannia nudiflora*** (L.) Brenan in Kew Bull. 7: 189. 1952; Balakr., Fl. Jowai. 2: 553.1983; *Commelina nudiflora* L., Sp. Pl. 41. 1753; *Aneilema nudiflorum* (L.) R. Br., Prodr. 271. 1810; Hook.f., Fl. Brit. Ind. 6: 376. 1892.

Diffused slender herbs, much branched from base, rooting at base. Leaves linear or lanceolate, glabrous or sparsely hispid, apex obtuse or acuminate. Inflorescences in terminal panicles and in upper leaf axils. Petals pink or purple, obovate-orbicular. Filaments bearded. Capsules subglobose; seeds brown.

**Fl. & Fr.:** June-September.

**Ditribution:** India (throughout), Himalaya, Bhutan, China, Malaysia, Myanmar, Sri Lanka

**Specimen examined:** Common among open bushes and on hilly moist slopes. Pfutsero. NLNU 0245.

***Streptolirion*** Edgew., Proc. Linn. Soc. London 1: 254. 1845

Twining and scrambling herbs. Leaves cordate at base; petioles long. Inflorescence in axillary and terminal long pedunculate scorpioid cymes, arising from short branch puncturing base of leaf sheath. Flowers bisexual, some only male. Sepals free. Petals free, all similar. Stamens 6; filaments hairy. Ovary 3-celled; style filiform; stigma capitate. Capsule loculicidal, 3-valves.

***Streptolirion volubile*** Edgew., Proc. Linn. Soc. London 1: 254. 1845; Hook.f., Fl. Brit. Ind. 6:389. 1892; Noltie, Fl. Bhut. 3. 1: 218. 1994.

Stem glabrous, ribbed, up to 2 m long. Leaves with purplish marking, alternate, ovate, apex caudate acuminate, glabrous, base deeply cordate, margin densely ciliate; petiole up to 4 cm long; sheaths cylindric, striated with long cilia hairs around the mouth. Inflorescence peduncle subtended by tubular, membranous bract; cymes subtended by leaf-like bract; cymes branches pilose, subtended by pinkish or whitish bracts. Flowers white. Sepals pinkish or greenish, oblong-lanceolate, acute, hooded, sparsely pilose. Petals linear. Filament with yellow hairs. Capsule ellipsoid.

**Fl. & Fr.:** July-November.

**Ditribution:** India (NE India), Himalaya, Bhutan, China, Myanmar, Thailand, Vietnam

**Specimen examined:** Grows climbing over bushes along the stream. Kapamodzu. NLNU 0244.

## **JUNCACEAE**

Juss. Gen Pl. 43. 1789

Rhizomatous herbs. Stem tufted. Leaves flat, terete, sometimes reduced to sheath. Inflorescence simple or compound in terminal or pseudo-lateral cymes. Flowers bisexual, bracteate. Perianth segments 6 in two whorls, greenish, brownish or whitish, membranous or coriaceous. Stamens 6, sometimes 3, free. Ovary superior, 3-celled; style filiform or short, stigmas 3. Fruit a capsule, loculicidally 3-valved; many seeded.

### ***Juncus* L., Sp. Pl. 1: 325. 1753**

Glabrous rhizomatous herbs. Flower stem with basal scale leaves and usually also laminar leaves with sheathing bases; leaf sheath apex auriculate. Flowers often aggregated into capitula or sometimes borne singly. Perianth segments 6, outer 3 segments keeled or midrib thickened. Stamens 6, rarely 3. Capsule many seeded.

***Juncus effusus* L., Sp. Pl. 326. 1753; Hook.f., Fl. Brit. Ind. 6: 392. 1892; Balakr., Fl. Jowai 2: 554. 1983.**

Erect perennial herbs forming dense tufts. Stem soft, pith continuous, ribbed when dried, leaf blade absent. Flower stem with numerous longitudinal shallow grooves, up to 90 cm; base covered with linear-lanceolate light brownish green sheaths. Inflorescence psuedolateral, lax irregular compound cymes, various. Flowers small, partly stalked or sessile, subtended by 2 ovate bracts. Stamens 3. Capsule obovoid-trigonus.

**Fl. & Fr.:** April - November

**Distribution:** Widespread in temperate and montane tropical regions

**Specimen examined:** Grows in marshy places, river banks, fields. Pfutsero. NLNU 0997.

**(Pl. 64)**

## ARECACEAE

Bercht. & J. Presl, Prir. Rostlin 266. 1820

Shrubs, trees or woody climbers. Stem solitary or clustered, erect or scandent, naked or prickly. Leaves alternate, palmate or pinnate, rarely simple. Inflorescence in axillary panicles or spikes subtended by one or more spathes. Flowers bisexual; sepals 3; petals 3; stamens 6. Fruit a berry, drupe, or nut.

1a. Scandent spiny shrub

*Calamus*

1b. Erect shrub, devoid of or with few spines

2a. Leaflets sinuately lobed and toothed

*Wallichia*

2b. Leaflets not lobed, entire

*Phoenix*

*Calamus* L., Sp. Pl. 325. 1753

Erect or scandent, armed palms. Leaves alternate, pinnatisect; leaflets inserted regularly or in groups; rachis developed into an armed flagellum; sheath armed, produced into a ligula or ochrea. Plant dioecious. Inflorescences in axillary and much branched spadices on peduncle covered by tubular or open sheaths. Male inflorescences more branched than female ones. Fruit globose or ellipsoid, covered by overlapping shining scales.

*Calamus floribundus* Griff. in Calcutta J. Nat. Hist. 5: 56. 1845; Mart., Becari & Hook.f. in Fl. Brit. Ind. 6:444. 1892; Balakr., Fl. Jowai. 2: 556. 1983.

Scandent shrub. Leaves upto 1 m long; sheaths with brown 2-3 cm long spines; flagella sometimes present; ochreae 1-1.5 cm, bristly; petioles rachis and lower spathe with short and long scattered spines; leaflets inequidistant, in remote fascicles. Spadix with spinescent flagellum. Fruit subglobose, pale brownish yellow.

**Fl. & Fr.:** March - October

**Distribution:** India (NE India), E Himalaya, Bangladesh, Myanmar

**Specimen examined:** Grows in open primary forest. Chepoketa. NLNU 0908.

*Wallichia* Roxburgh, Pl. Coromandel 3: 91. 1820

Stem clustered or solitary. Leaves spiral or distichous, pinnatisect; leaflets irregularly toothed. Monoecious; inflorescence of interfoliar spadices on peduncle covered with many tubular spathes. Male inflorescence densely flowered. Female inflorescence laxly flowered. Fruit ovoid-oblong, fleshy with thin mesocarp; 2-3 seeded.

*Wallichia densiflora* Mart., Becari & Hook.f. in Fl. Brit. Ind. 6:419. 1892; Balakr., Fl. Jowai. 2: 557. 1983; Noltie, Fl. Bhu. 3.1:426. 1994.

Erect shrub. Stem very short or absent; trunk sheaths villous, becoming fibrous. Leaves pinnatisect, 2-3 m long; leaflets alternate, irregular, unevenly oblong to rhombic, sinuately lobed, acutely toothed, white beneath, base cuneate. Inflorescence spadices on a peduncle borne in between two opposite leaves, branched. Spathes purple, tubular. Male flowers yellow, female flowers purplish. Fruit ovoid, about 1.2 cm long, dull purple.

**Fl. & Fr.:** January- December

**Distribution:** India (throughout), Bangladesh, Bhutan, Laos, Myanmar, Thailand, Vietnam

**Specimen examined:** Grows in open primary forest. Lozaphuhu. NLNU 0542.

*Phoenix* L., Sp. Pl. 2: 1188. 1753

Short or tall dioecious palms. Leaves pinnate; leaflets induplicate, regularly or irregularly arranged. Inflorescences borne among leaves; spadix erect or drooping in fruit; flowers small. Fruit oblong, 1-seeded.

***Phoenix loureiroi*** Kunth, Enum. Pl. 3: 257. 1841; *P. humilis* Royle, Ill. Bot. Himal. 10: 399. 1839; Becari & Hook.f. in Fl. Brit. Ind. 6: 426. 1892; Balakr., Fl. Jowai. 2: 557. 1983.

Stem short, tufted, seldom elongate. Leaves 1-2 m, subglaucous; leaflets linear, scattered and irregularly arranged. Fruiting spadix on long flattened peduncles; branches slender. Fruits ovoid, dark purple when ripened.

**Fl. & Fr.:** January- December

**Distribution:** India (throughout), Bangladesh, Bhutan, Laos, Myanmar, Nepal, Philippines Thailand, Vietnam

**Specimen examined:** Grows in open forest, on steep slopes, in disturbed and burned areas. Zelome. NLNU 0203.

## ARACEAE

Juss., Gen. Pl. 23. 1789

Herbs, perennial, rhizomatous or tuberous. Leaves alternate or apparently basal, usually petiolate with sheathing base; leaf blade linear, simple, sometimes peltate or variously compound. Inflorescences subtended by membranous prophylls or cataphylls, consisting of a spadix subtended by a spathe. Fruit a head of indehiscent separate berries.

1a. Plants climbing or creeping on trees or rocks

2a. Petioles winged; spadix stipitate

*Pothos*

2b. Petioles not winged; spadix sessile

*Rhaphidophora*

1b. Plants not climbing

- 3a. Leaves simple *Remusatia*
- 3b. Leaves pedately or pinnately compound
  - 4a. Spathe limb usually with a filiform tail at apex *Arisaema*
  - 4b. Spathe limb not as above *Sauromatum*

***Arisaema*** Martius, Flora 14: 459. 1831

Erect tuberous herb. Leaves trifoliolate, digitate, pedate or radiate. Spadix included or exserted with long and filiform tail-like appendage at the apex. Fruit berries, red in cylindric cluster.

- 1a. Leaflets 7 or more.
  - 2a. Leaflets 2 cm broad *A. concinnum*
  - 2b. Leaflets 2-5 cm broad *A. consanguineum*
- 1b. Leaflets 3.
  - 3a. Spathe limb shorter than the tube *A. wattii*
  - 3b. Spathe limb equal to or longer than the tube
    - 4a. Spathe white *A. album*
    - 4b. Spathe purple *A. lingyunense*

***Arisaema album*** N.E.Br. in Journ. Linn. Soc. 18. 247; Hook.f., Fl. Brit. Ind. 6: 498. 1892.

Leaf solitary, trifoliolate. Leaflets petiolulate, lateral ovate, median elliptic, base cuneate or unequal. Spathe white, tube about as long as the ovate-lanceolate acuminate limb, appendage filiform shorter than the spathe bearing towards the tip. Spadix with scattered neuters on the base of the appendage.

**Fl. & Fr.:** June - August

**Distribution:** India (NE India), East Himalaya, Myanmar

**Specimen examined:** Grows in open forest. Phukhungri. NLNU 0923. (Pl. 64)

*Arisaema concinnum* Schott, Hook.f., Fl. Brit. Ind. 6:505. 1894; Polunim & Stainton, Flow. Hima. 436. 2008 (Repr).

Leaf solitary, radiate with more or less equal 7-13 spreading leaflets; leaflets sessile, 2-5 cm broad, oblanceolate with caudate acuminate apex; petiole stout greenish up to 50 cm long. Peduncle shorter than the petiole. Spathe green or variegated brown or purple; tube up to 6 cm long; limb ovate-lanceolate narrowed into a long, green or dark purple decurved tail up to 6 cm long. Spadix slender, green; appendage little longer than the cylindric spathe-tube with a few neuters at the base.

**Fl. & Fr.:** April - June

**Distribution:** India (NE India), Himalayas, China, Myanmar

**Specimen examined:** Grows in open forest among grasses. Sakraba. NLNU 705.

*Arisaema consanguineum* Schott, Hook.f., Fl. Brit. Ind. 6:505. 1894; Balakr., Fl. Jowai 2: 563. 1983; Polunim & Stainton, Flow. Hima. 436.2008 (Repr).

Leaf solitary sometimes two, radiate with 11-20 spreading leaflets; leaflets sessile, up to 2 cm broad, linear-lanceolate with caudate acuminate apex, glaucous beneath; petiole stout, variegated with dark purple and white up to 120 cm long. Peduncle shorter than the petiole. Spathe green; tube 4-6 cm long; limb oblong-ovate green with green striped, curved, narrowed into a long, greenish dark purple, thread-like apical tail up to 12 cm long. Spadix stout, green, appendage cylindrical little longer than the spathe-tube with a few neuters at the base.

**Fl. & Fr.:** April - June



**Distribution:** India (NE India), E & W Himalaya, China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows in open forest. Kapamodzu. NLNU 0943. **(Pl. 64)**

*Arisaema linyunense* H. Li, Acta Phytotax. Sin. 15(2): 107. 1977; H. Li *et al.*, Fl. China 23: 51. 2010; Mao & Gogoi, Fl. Dzukou Valley 255. 2016.

Tuber subglobose. Leaf solitary, emerging after anthesis; leaflets with petiolules; central leaflet rhombic; lateral leaflets oblique, base cuneate at inner side, rounded at outer side. Peduncle shorter than petioles. Spathe purple with white lines; tube funnel form, without lamella inside; limb incurved, galeate, with whitish reticulate networks on both sides, base constricted, apex rounded. Spadix unisexual; female zone conic; ovary cylindric; style short; stigma disciform; male zone cylindric; appendix purple, flagellate, base attenuate, not truncate.

**Fl. & Fr.:** April-May.

**Distribution:** India (NE India), China

**Specimen examined:** Grows in shaded moist forest. Pfutsero. NLNU 0957. **(Pl. 64)**

*Arisaema watti* Hook.f., Fl. Brit. Ind. 6: 498. 1892.

Leaves 2, leaflets trifoliate, subsessile finely acuminate, lateral ovate, median elliptic oblong, tube of spathe longer than the orbicular-ovate, caudate-acuminate limb, appendage long-stipitate stout, cylindric naked top rounded.

**Fl. & Fr.:** April - September

**Distribution:** India (NE India), China, Myanmar

**Specimen examined:** Grows in shaded moist forest. Tsupfume. NLNU 0974.

***Pothos* L., Sp. Pl. 2: 968. 1753**

Epiphytic and lithophytic climbing shrubs. Branches rooting at nodes. Leaves distichous, petioles winged. Inflorescences in axillary or terminal or from lateral shoots on short spadix, subtended by a persistent spathe. Flowers bisexual. Berry 1-3 seeded.

***Pothos scandens* L., Sp. Pl. 968. 1753; Hook.f., Fl. Brit. Ind. 6: 551. 1893; Balakr., Fl. Jowai 2:559. 1983.**

Climbing shrubs. Stem creeping. Leaves elliptic-oblong, apex acuminate, base rounded, 1.5-10 x 0.5-2.5 cm; petiole oblanceolate, narrowed at base; peduncle sheathed. Spathe green, concave, cuspidate. Spadix subglobose, ellipsoid. Berries oblong, scarlet.

**Fl. & Fr.:** February - October

**Distribution:** India (throughout), China, Myanmar, Malaysia, Sri Lanka

**Specimen examined:** Grows creeping on trees or rocks in primary forests. Chizami. NLNU 0826. (Pl. 64)

***Rhaphidophora* Hassk., Flora 25(Beibl. 2): 11. 1842**

Large lianas. Stems thick, climbing up trees or rocks with adhesive roots. Leaves distichous, petiolate; leaf blade entire or divided, or perforated. Inflorescences terminal on leafy shoots. Spathe ovate, acuminate, deciduous. Spadix sessile, perianth 0; ovules many. Berries many seeded.

***Rhaphidophora peepla* Schott, Bonplandia 5:45, 1857; Hook.f., Fl. Brit. Ind. 6: 545.1893.**

Lianas, moderately robust, stem terete, internodes 2-5 cm. Leaves ovate-oblong or elliptic-oblong or oblong lanceolate, unequal side, base rounded or cuneate, entire, apex acute or acuminate; petiole long 10-20 cm, shallowly channelled. Inflorescence solitary and terminal; spathe oblong or oblong-ovate, caducous. Spadix sessile and cylindric.

**Fl. & Fr.:** August - October

**Distribution:** India (NE India), E Himalaya, Bangladesh, China, Myanmar, Nepal, Thailand, Vietnam

**Specimen examined:** Grows creeping on trees or rocks in primary forests. Sakraba. NLNU 0707.

*Remusatia* Schott in Schott & Endlicher, Melet. Bot. 18. 1832

Herbs with radical bulbiferous shoot; bulbils with filiform bristles. Leaf entire and peltate. Inflorescence with large sheathing bracts below. Spathe coriaceous with convolute tube; limb broad or narrow, erect or spreading and reflexed. Spadix short, included.

*Remusatia hookeriana* Schott, Hook.f., Fl. Brit. Ind. 6:522. 1894; Balakr., Fl. Jowai 2:566. 1983; Polunim and Stainton, Flow. Hima. 438.2008 (Repr).

Tuber globose, 1.5-2.5 cm broad. Bulbiferous shoot arise direct from the tuber, extensively branched, spreading or pendulous, shoots bearing bulbils with long curled hairs. Leaf solitary, appearing with or before the inflorescence; blade ovate-oblong, base cordate, 11-15 x 8.5-10 cm; petiole up to 25 cm long; peduncle up to 12 cm long. Spathe with a broad limb, margin overlapping at apex. Spadix shorter than the spathe.

**Fl. & Fr.:** May - October

**Distribution:** India (NE India), E & W Himalaya, China, Myanmar, Nepal, Thailand

**Specimen examined:** Grows on a tree epiphytic. Phukhungri. NLNU 0926.

*Sauromatum* Schott in Schott & Endlicher, Melet. Bot. 17. 1832

Perennial herbs, tuberous. Leaves petiolate, blades hastate. Inflorescence pedunculate. Flowers unisexual, lacking perianth. Spadix with 4-section. Stamen single or fused in pairs; anther sessile. Ovaries 1-loculed; stigma sessile. Berries seeded.

*Sauromatum horsfieldii* Miq., Fl. Ned. Ind.3: 196. 1856; *Typhonium pedatum* Schott, Oesterr. Bot. Wochenbl. 7: 262. 1857; Hook.f., Fl. Brit. Ind. 6: 511. 1894.

Herbs, tuber subglobose. Leaves pedatisect, segments lanceolate; petiole variable in colour, striped or spotted, ranging from green to purple. Spathe linear acuminate, convolute at base, limb slightly arching, apex acuminate. Spadix shorter than spathe. Berries pale green, obovoid to ellipsoid.

**Fl. & Fr.:** May - July

**Distribution:** India (NE India), Cambodia, China, Myanmar, Yhailand, Vietnam

**Specimen examined:** Grows in field sides, streamsides, grassy slopes. Tsupfume. NLNU 0986.

## TYPHACEAE

Juss., Gen. Pl. 25. 2789

Perennial aquatic or marshy herbs, with creeping rhizomes. Stems simple or branched, robust or slender. Leaves alternate, distichous, erect, emergent or floating, sheathed at base. Bracts leaflike. Inflorescence either of globose heads on upper part of stems and branches with several male and female heads in a panicle, raceme, or spike, male heads above female, or of a single cylindric spike with lower part female and upper part male. Flowers minute, numerous. Fruits minute, nutlike, indehiscent, falling off together with stalk if present.

*Typha* L., Sp. Pl. 971. 1753

Herbs, perennial, in marshes or aquatic, with creeping rhizomes. Leaves alternate, erect, distichous, linear, margin entire, sheathed at base. Flowers unisexual, minute,

numerous, densely crowded in a cylindric spike with lower part female and upper part male; bracts leaflike. Fruit minute, falling off together with stalk.

***Typha elephantina*** Roxb., Fl. Ind. ed. 1832, 3: 556. 1832; Hook.f., Fl. Brit. Ind. 6: 489. 1892.

Stems stout, 2–2.5 m tall. Leaves 1-1.5 m x 0.8-1.3 cm, trigonous. Male spikes axis densely brown hairy; female part of spikes distinctly separated from male part. Female flowers with bracteoles; bracteoles whitish, linear.

**Fl. & Fr.:** August - October

**Distribution:** India (throughout), Myanmar, Nepal, Pakistan, Africa

**Specimen examined:** Grows in swamps, riversides. Thetsumi. NLNU 0435. **(Pl. 64)**

## CYPERACEAE

Juss., Gen. Pl. 26. 1789

Perennial or annual herbs, usually tufted. Stem commonly 3-angled. Leaves narrow, sheathing at base, ligule absent. Inflorescence spike or panicle. Flowers unisexual or bisexual, small, solitary in the axils of the spikes subtended by glumes or arranged variously in spikelets. Perianth absent or reduced to bristles or scales. Stamens 1-3. Fruit a compressed or trigonous nut.

1a. Achenes enclosed within an utricle *Carex*

1b. Achenes not enclosed in utricle

2a. Flowers unisexual; nuts large, smooth or sculptured *Scleria*

2b. Flowers bisexual; nuts not as above

3a. Style jointed with ovary, often fimbriate *Fimbristylis*

3b. Style continuous with ovary

*Cyperus*

***Carex* L., Sp. Pl. 2: 972. 1753**

Perennials with creeping rhizome. Spikelets unisexual subtended by a glume. Inflorescence in spikes composed of only male spikelets or female spikelets or both, with the spike arranged in panicles or racemes or rarely single.

1a. Spikelets upto 1.5 cm long; utricles ellipsoid

*C. cruciata*

1b. Spikelets upto 6 cm long; utricles obovoid

*C. baccans*

***Carex baccans* Nees, R. Wight, Contr. Bot. Ind. 122. 1834; C.B. Clarke in Hook.f., Fl. Brit. Ind. 6: 722. 1894; Balakr. Fl. Jowai. 2: 573. 1983.**

Herbs tufted, 1-2 m tall. Stem erect or nodding. Leaves exceeding the stem. Panicles 30-70 cm; bracts foliaceous. Spikelets 3-5 cm, glumes oblong, ovate, reddish-brown. Nuts ellipsoid, dark brown.

**Fl. & Fr.:** September - March

**Distribution:** India (throughout), China, Java, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, Vietnam

**Specimen examined:** Grows along roadsides, forest margins, near swamps. Thetsumi. NLNU 0846.

***Carex cruciata* Wahlenb., Kongl. Vetensk. Acad. Nya Handl. 24: 149. 1803; C.B. Clarke in Hook.f., Fl. Brit. Ind. 6:715. 1894; Balakr. Fl. Jowai. 2: 572. 1983.**

Rhizome stout, stem erect. Leaves exceeding stems, acuminate, 0.4-1.2 cm broad; sheaths reddish brown. Inflorescence elongate on distant peduncled pyramidal compound panicles, 15-45 cm long. Spikes numerous, linear-oblong. Nut ellipsoid, trigonous.

**Fl. & Fr.:** April-August.

**Distribution:** India (throughout), China, Myanmar, Nepal, Sumatera, Thailand, Vietnam

**Specimen examined:** Grows on open ground in dry places. Thetsumi. NLNU 0887.

*Cyperus* L., Sp. Pl. 1: 44. 1753

Annual or perennial herbs. Rhizomes short. Stem erect, trigonous. Leaves sheathing at the base. Inflorescence umbellate or capitate on unequal peduncle subtended by an involucre of leaf-like bracts usually exceeding inflorescence. Spikelets arranged in spikes along a rachis, or in heads or umbels. Perianth absent. Stamens 3, sometimes 2, rarely 1. Nuts trigonous.

1a. Flowers in heads

*C. brevifolius*

1b. Flowers in umbels

2a. Nuts oblong-obovate, triquetrous

*C. iria*

2b. Nuts linear-oblong, apiculate

*C. cyperoides*

*Cyperus brevifolius* (Rottb.) Hassk., Balakr. Fl. Jowai. 2:585. 1983. *Kyllinga brevifolia* Rottb., C.B. Clarke in Hook.f., Fl. Brit. Ind. 6:588. 1894.

Perennial herbs. Rhizome creeping elongated. Stems more than 5 together, 1-3 cm apart. Leaves 1-5, very much shorter than or longer than the stem, up to 0.2 cm broad. Inflorescence in heads on a long peduncle. Bracts 3-4. Spikes usually single or often with 2-3 median additional ones. Spikelets 0.2-0.3 cm long, usually with single nut. Glumes keeled, 3-nerved.

**Fl. & Fr.:** April-September.

**Distribution:** India (throughout), China, Myanmar, Nepal, Sumatera, Thailand, Vietnam

**Specimen examined:** Grows on ground near and around marshy places. Mesulumi. NLNU 0410.

*Cyperus cyperoides* (L.) Kuntze, Revis. Gen. Pl. 3: 333. 1898; Balakr. Fl. Jowai. 2: 584. 1983; *Marsiscus sieberianus* C.B. Clarke in Hook.f., Fl. Brit. Ind. 6: 622. 1893.

Perennial herbs. Stems tufted. Leaves shorter than or longer than stem, up to 0.4 cm broad; sheaths red brown. Inflorescence in simple umbels. Bracts 5-7, longer than the umbels, up to 18 cm long and 0.4 cm broad. Spikes sessile or peduncled, slightly ovoid-cylindric; spikelets linear-lanceolate. Glumes greenish, many nerved. Nuts linear-oblong, apiculate.

**Fl. & Fr.:** April - October

**Distribution:** India (throughout), Bhutan, China, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam; Africa, Australia

**Specimen examined:** Grows in damp places in open grasslands. Pfutsero. NLNU 1081.

*Cyperus iria* L., C.B. Clarke in Hook.f., Fl. Brit. Ind. 6:606. 1894; Balakr. Fl. Jowai. 2:588. 1983; Yadav & Sardesai, Fl. Kolh. Dist. 540. 2002.

Annual herbs. Stem tufted, compressed. Leaves few, linear-lanceolate, about as long as or shorter than the stem, up to 0.5 cm broad. Inflorescence in simple or compound umbels. Bracts 3-7, up to 30 cm long. Spike loosely spicate, up to 4 cm long, spikelets 5-20, compressed. Nuts oblong-obovate, triquetrous.

**Fl. & Fr.:** May - October

**Distribution:** India (throughout), Afghanistan, Bangladesh, Bhutan, China, Myanmar, Nepal, Sri Lanka, Thailand, Vietnam; Africa, Australia

**Specimen examined:** Grows around paddy field and marshy places. Chizami. NLNU 0947.



***Fimbristylis*** Vahl., Enum. Pl. 2: 285. 1805

Herbs, annual or perennial, often rhizomatous. Culms usually tufted, slender. Leaves basal, sometimes reduced to a bladeless sheath. Inflorescence terminal, a simple, compound, or reduced to 1 terminal spikelet. Spikelets solitary or fascicled. Glumes spirally imbricate. Flowers bisexual. Stamens 1-3. Nutlet biconvex, 3-sided.

***Fimbristylis dichotoma*** (L.) Vahl, Enum. 2:287. 1906; Balakr. Fl. Jowai. 2:580. 1983; *Scirpus dichotoma* L. Sp. Pl. 50. 1753; *Fimbristylis diphylla* (Retz.) Vahl, Enum. Pl. 2: 289. 1806; C.B. Clarke in Hook.f., Fl. Brit. Ind. 6: 636. 1893.

Grass-like rhizomatous, tufted herbs. Culms flattened striate. Leaves equaling the culms, margin scabrid towards the apex. Ligule a ring of cilia. Bracts leaf-like. Spikelets in compound or decompound umbel. Glumes imbricate, with strong keel. Rachilla deeply pitted. Nuts ovoid, beaked, covered with thick membrane.

**Fl. & Fr.:** August - December

**Distribution:** All warm regions of the world

**Specimen examined:** Grows in open forest. Lozaphuhu. NLNU 0550.

***Scleria*** Berg., Kongl. Vetensk. Acad. Handl. 26: 142. 1765

Herbs, annual or perennial. Stem trigonous. Leaves linear, 3-veined, base sheathing. Inflorescences terminal, paniculate, sometimes reduced to a spike. Flowers unisexual, rarely bisexual. Nutlet shiny, white or yellowish, smooth or variously sculptured.

***Scleria terrestris*** (L.) Fas. Rhodora 26: 159. 1924; Balakr. Fl. Jowai. 2:578. 1983; *Zizania terrestris* L. Sp. Pl. 991. 1753; *S.elata* Thw. Enum. Pl. Zeyl. 353. 1864; C.B. Clarke in Hook.f., Fl. Brit. Ind. 6: 690. 1893.

Erect or scrambling herbs. Rhizomes woody. Culms about 3m high. Leaves 20-70 x 0.5-2 cm, scabrous, acuminate. Inflorescences terminal, paniculate. Spikelets numerous on the spreading branches of pyramidal panicle. Glumes 3. Nuts globose, apiculate, glossy white or purplish black.

**Fl. & Fr.:** February - December

**Distribution:** India (throughout), Tropical & Subtropical Asia to Australia

**Specimen examined:** Grows around paddy field and wastelands. Chizami. NLNU 0869.

## **POACEAE**

Barnhart, Bull. Torrey Bot. Club 22: 7. 1895

Annual or perennial herbs, rarely shrubs or arborescent, rhizomatous or stoloniferous. Culms jointed, nodes solid; internodes usually hollow, occasionally solid at the lower internodes, generally rooting from the lower nodes. Nodes with culm-sheaths. Leaves simple, solitary at nodes, basal, at branch ends or arranged distichously along the culm-sheath with ligules at the joining with the blade. Inflorescence composed of spikelets arranged in panicle spike or racemes or pseudo-racemes, inflorescence sometimes interrupted by spathes. Spikelets made up of distichously arranged bracts, the two lower glumes sterile, the two lower and upper glumes (occasionally one of the glume reduced or absent), succeeded by one to several lemmas each enclosing a floret, opposed by a scale the palea. Rachilla often produced beyond the upper floret. Flowers usually bisexual, occasionally unisexual or sterile. Perianth represented by 1-3 hyaline or fleshy scales, the lodicules. Stamens usually 3, sometimes 1, 2, 6 or more with delicate filaments. Fruit an indehiscent grain (caryopsis) with its seed-coat and pericarp fused, rarely free, occasionally fleshy.

- 1a. Spikelets 1-many flowered, breaking up at maturity above  
the more or less persistent glumes
- 2a. Shrubs or trees with woody often tall persistent culms; leaf blade flat,  
many nerved, often with transverse veins; spikelets bisexual
- 3a. Shrubby bamboo; nodes armed with a  
circle of spines; stamens 3 *Chimonobambusa*
- 3b. Arborescent bamboo; nodes unarmed; stamens 6 *Dendrocalamus*
- 2b. Perennial or annual herbs with herbaceous, very rarely woody culms;  
leaf blades sessile and not articulated with sheaths
- 3a. Spikelets with 2 or more fertile florets or if with one fertile floret,  
then sterile florets above it
- 4a. Tall grasses with large plume like panicles; lemmas or  
rachilla joints bearing long silky hairs *Phragmites*
- 4b. Low grasses; lemma and rachilla glabrous or hairy
- 5a. Spikelets loosely to densely imbricate in digitate spikes or  
spikelike racemes *Eleusine*
- 5b. Spikelets in open contracted or spike like panicles *Eragrostis*
- 3b. Spikelets with 1 fertile floret, with or without 1 or 2 male or barren florets below it
- 6a. Spikelets with 2 florets; the lower male or barren,  
the upper bisexual *Thysanolaena*
- 6b. Spikelets with 1 fertile florets
- 7a. Lemmas 3-5-veined, awned *Alopecurus*
- 7b. Lemmas 1-3-veined, awnless
- 8a. Inflorescence digitate; spikelets laterally compressed *Cynodon*

- 8b. Inflorescence compressed panicle; spikelets gaping *Sporobolus*
- 1b. Spikelets 2-flowered, falling entire at maturity, usually with the upper floret bisexual and the lower male
- 9a. Spikelets solitary or paired; upper lemma awnless
- 10a. Spikelets with an involucre of bristles,  
falling with or without the bristles *Setaria*
- 10b. Spikelets falling singly, not subtended by bristles
- 11a. Lemma of upper floret thinly cartilaginous *Digitaria*
- 11b. Lemma of upper floret more or less coriaceous *Paspalum*
- 9b. Spikelets often paired, with one sessile and the other  
pedicelled; upper lemma awned
- 12a. Spikelets awned *Chrysopogon*
- 12b. Spikelets unawned
- 12a. Raceme spiciform; spikelets all pedicelled *Imperata*
- 12b. Raceme paniculate; spikelets paired, one sessile  
and the other pedicelled *Saccharum*

***Chrysopogon*** Trin., Fund. Agrost. 187. 1820

Perennials with tuft or spreading rhizomes. Inflorescence a lax panicles, branches bearded, usually whorled, sometimes solitary or paired, with spikelets at the apex in groups of threes, one sessile awned and two pedicelled, unawned or aristate. Pedicelled spikelet florets 1 or 2, the lower sterile, when present, the upper male or bisexual. Stamens 3.

***Chrysopogon aciculatus*** (Retz.) Trin., Fund. Agrost. 188. 1820; Bor, Fl. Assam 5: 357. 1940; Balakr., Fl. Jowai 2: 628. 1983; U. Shukla, Grasses N.E. India 7. 1996. *Andropogon aciculatus* Retz., Obs. Bot. 5:22. 1789; Hook.f., Fl. Brit. India 7: 188. 1896.

Perennials. Culms rhizomatous, ascending from a creeping stem base, 20-60 cm high. Leaves linear, obtuse or acute, glaucescent, without hairs or scattered hairs at the base. Inflorescence an erect panicle, narrow to oblong or linear-oblong, 2.5-10 cm long. Branches fragile, 4-5, slender. Spikelets often purplish, 2-4 mm long; lower floret sterile; upper hermaphrodite. Pedicelled spikelets 5-6 mm long.

**Fl. & Fr.:** April - October

**Distribution:** India (throughout), Southeast Asia

**Specimen examined:** Forest edges, roadsides and wastelands. Chozuba. NLNU 0858.

***Imperata*** Cyrill, Pl. Rar. Neap. 2: 26. t. 11. 1792

Perennial with creeping rhizomes. Inflorescence a dense, silvery spike-like panicle, bearing a single pair of unequal pedicelled spikelets; florets 2; lower sterile, upper bisexual. Stamens 2.

***Imperata cylindrica*** (L.) P.Beauv., Ess. Agrost. 165. 1812; Bor, Fl. Assam 5: 310.1940; Balakr., Fl. Jowai 2: 625.1983; *Imperata arundinacea* Cyr., Pl. Rar. Neap. 2: 26.1792; Hook.f., Fl. Brit. India: 7. 106. 1896.

Perennial grasses. Culms solid, 0.1-2.5 m or more higher. Leaves about 1.7 m long, base narrowed, margins scabrid, glabrous with only some long hairs at the base or slightly pubescent; ligule a ciliate membrane. Inflorescence spike-like, cylindrical panicle, dense, silvery, 3-30 cm long. Spikelets lanceolate about 4.5 mm long. Glumes membranous: the lower lanceolate, 3-9-nerved, hairs silvery on the back. Upper glume keeled. Lower floret

sterile; lemma hyaline, 1.5-2.0 mm long; palea absent. Upper floret hermaphrodite; lemma hyaline, ca 2 mm long, ciliate or glabrous. Stamens 2.

**Fl. & Fr.:** May – November

**Distribution:** Warm and temperate parts of Asia, Australia and SE Africa

**Habitat:** Abundant in grasslands and wastelands. Thetsumi. NLNU 0967.

*Saccharum* L., Sp. Pl. 1: 54. 1753

Rhizomatous perennials. Culms erect, solid. Leaves flat, oblong-lanceolate, margin serrate. Inflorescence a plumose paniculate raceme with sessile and pedicelled spikelets. Florets 2.

*Saccharum arundinaceum* Retz., Obs. Bot. 4; 14. 1786; Hook.f., Fl. Brit. India 7: 119. 1986; Bor, Fl. Assam 5; 320. 1940 & Grass. Ind. 211. 1960; N.P. Balakr., Fl. Jowai 2: 623. 1983; U. Shukla, Grasses N.E. India: 123. 1996.

Perennial grasses. Culms about 6.5m long. Leaves 1.5 x 4.5cm, villous at the base, broader than the mid-rib; stripes of green blades broader than the mid-rib. Peduncle glabrous below; joint of the rachis 3.5-4.0mm long. Spikelets 2.5-4.0mm long; callus hairs as long as the lower neuter floret; the upper hermaphrodite.

**Fl. & Fr:** October - February

**Distribution:** India (throughout), Southeast Asia

**Specimen Examined:** Grows in open places, roadsides, wastelands. Lozaphuhu. NLNU 0536.

*Digitaria* Haller, Hist. Strip. Helv. 2: 244. 1768

Perennials or annuals. Culms usually decumbent at base and rooting from lower nodes. Leaf blade flat, linear; ligule membranous. Inflorescence of linear raceme, raceme digitate or

inserted along a short axis. Spikelets borne in pairs or groups of 3-5 on lower side of rachis.

Lower floret sterile; upper floret bisexual. Stamens 3.

***Digitaria ciliaris*** (Retz.) Koeler, Descr. Gram. 27. 1802; *Panicum ciliare* Retz., Obs. Bot. 4: 16. 1786; *P. adscendens* Kunth., Nov. Gen. Sp. 1: 97. 1816; *Digitaria adscendens* (Kunth) Henr., Blumea 1: 92. 1934; Bor, Fl. As. 5: 204, 1940.

Annual or biennial herbs; culm erect or decumbent. Leaves flat, acute; sheath 5-10 cm long. Inflorescences conjugate or false whorled racemes, rachis short, compressed; spikelets lanceolate to oblong-elliptic, glabrous; upper glume deltoid, hairy, 3-nerved; lower lemma smooth; upper florets fertile, grains oblong, pale.

**Fl. & Fr.:** June – November

**Distribution:** Cosmopolitan

**Specimen examined:** Roadsides and wastelands. Lozaphuhu. NLNU 0539.

***Paspalum*** L., Syst. Nat. ed. 10, 2: 855. 1759

Perennials or annuals, tufted or spreading by creeping rhizomes. Inflorescence in a simple panicle or raceme usually upper in pairs, with spikelets second and usually 2-nate on the flattened or triquetrous rachis. Spikelets plano-convex, shortly pedicelled. Florets 2, the lower floret sterile, the upper floret bisexual; lodicules 2. Stamens 3.

1a. Spikelets solitary, glabrous *P. distichum*

1b. Spikelets 2-seriate, ciliate *P. conjugatum*

***Paspalum conjugatum*** P.J.Bergius, Acta. Helv. Phys.-Math. 7: 129. 1772; Hook.f., Fl. Brit. Ind. 7: 11. 1896; Bor, Fl. As. 5: 255. 1940; Balakr. Fl. Jowai 2: 616. 1983.

Annual or perennial, stoloniferous herbs; culms erect, up to 60 cm tall. Leaves lanceolate-oblong, cordate at base, compressed, pubescent above; densely ciliate at margin; sheaths ciliate at margin and at base; ligule with pubescent ridges. Racemes 3-4, spikelets 2-seriate, orbicular-ovate, pedicels hairy at base. Upper glumes ovate, ciliate, hairy. Lemmas ovate-rounded, hairy at tip.

**Fl. & Fr.:** July - December

**Distribution:** Cosmopolitan

**Specimen examined:** Common in shady places, and wet areas. Lozaphuhu. NLNU 0540.

*Paspalum distichum* L., Syst. Nat. ed. 10, 2: 855. 1759; Bor, Fl. As. 5: 255. 1940.

Tufted perennial; culms 15 cm high. Leaves lanceolate, acuminate at apex, rounded at base, glabrous. Inflorescences racemose spikes, usually 2, spikelets 2-3 per spike, terminal, alternate, unequal in two rows, rachis flat, orbicular, obtuse-rounded, glabrous; lower glume absent, upper glumes 3-nerved, membranous, lemma equal to the length of spikelets; palea membranous. Caryopsis biconvex, enclosed by hardened lemma and palea.

**Fl. & Fr.:** June - December

**Distribution:** Cosmopolitan

**Specimen examined:** Common in moist areas or open places. Lozaphuhu. NLNU 0543.

*Setaria* P. Beauv., Ess. Agrostogr. 51. 1812

Loosely tufted or rhizomatous annuals or perennials. Inflorescence a terminal spike-like panicle, branches short or long. Spikelets borne singly, often subtended by one or more bristles; florets 2, the lower floret male or sterile, the upper floret bisexual. Stamens 3.



*Setaria palmifolia* (J.Koenig) Stapf, J. Linn. Soc., Bot. 42: 186. 1914; Bor, Fl. As. 5: 284. 1940; Balakr., Fl. Jowai. 2:609. 1983 *Panicum palmifolium* Koen., Naturf. 23: 208. 1788; *P. plicatum* (non Lamk. 1791) Willd. Enum. Pl. 1033. 1809; Hook.f., Fl. Brit. Ind. 7: 55. 1896.

Stout perennial herbs, rhizome woody; culms up to 2 m tall, lower parts rooting at nodes. Leaves elliptic, abruptly acuminate at apex, glabrous or sparsely hairy; sheaths smooth or hispid, often with tubercled based hairs. Inflorescences loose, speculate panicle; spikelets solitary, subtended by single bristle.

**Fl. & Fr.:** July - November

**Distribution:** Cosmopolitan

**Specimen examined:** Grasslands and forest edges in shaded places. Lozaphuhu. NLNU 0549.

*Alopecurus* L., Sp. Pl. 60. 1753

Tuft annuals or perennials. Inflorescence a dense, cylindric, spike-like. Spikelets laterally compressed, falling entire at maturity; floret one.

*Alopecurus arundinaceus* Poir., Encycl. 8: 766. 1808; Hook.f., Fl. Brit. Ind. 7:238. 1896.

Root stock creeping. Culm erect, slender, strait, glabrouse, up to 1.5 m tall. Leaves linear-lanceolate, acuminate, 10-14 x 0.2-0.4 cm. Panicles green, cylindric, silky, up to 8 cm long. Spikelets silky, densely crowded. Glumes membranous, lanceolate, acuminate, villous hairs on the dorsal side; lower and upper glumes fused at the base. Lemma acute. Awn sub-basal.

**Fl. & Fr.:** March - August

**Distribution:** Cosmopolitan

**Specimen examined:** Grows in open areas. Chizami. NLNU 0853.

***Chimonobambusa*** Makino, Bot. Mag. (Tokyo) 28: 153. 1914

Shrubby bamboos. Rhizomes with running underground stems. Culms usually diffuse, sometimes tillering, erect; internodes terete; nodes prominent, basal nodes often with a ring of sparse or dense root thorns. Leaves 2-5 per ultimate branch; blade lanceolate, base cuneate. Inflorescence fully bracteate. Stamens 3. Fruit a nutlike caryopsis with a hardened pericarp.

***Chimonobambusa callosa*** (Munro) Nakai, J. Arnold. Arbor. 6: 151. 1925; *Arundinaria callosa* Munro, Trans. Linn. Soc. London 26: 30. 1868; Hook.f., Fl. Brit. Ind. 7: 380. 1896. *Chimonocalamus callosus* (Munro) Hsueh & T.P. Yi, Acta Bot. Yunnan. 1: 84. 1979.

Shrubby, culms 4-7 m tall, nodes pubescent, with ring of thorns; internodes smooth. Culm sheaths loose, lightly pubescent, blade subulate, hairy, auricles small. Inflorescences branched panicle ending in leafy branchlet; spikelets 6-12 flowered, subtended by narrow bracts.

**New shoots:** May – November

**Distribution:** India (NE India), Bhutan, Myanmar

**Specimen examined:** Primary and secondary forest. Tsupfume. NLNU 0998.

***Cynodon*** Rich., Syn. Pl. 1: 85. 1805

Perennials, usually stoloniferous. Culms leafy throughout, much branched, decumbent and rooting, each nodes bearing 2-3 leaves. Leaf blade linear, flat. Inflorescence digitate, racemes linear, secund, spikelet sessile. Spikelets laterally compressed. Glumes shorter than spikelet. Lemma lanceolate, conduplicate. Palea oblong-elliptic.

***Cynodon dactylon*** (L.) Pers., Syn. Pl. 1: 85. 1805; Hook.f., Fl. Brit. Ind. 7: 288. 1896; Bor, Fl. As. 5: 125. 1940; *Panicum dactylon* L., Sp. Pl. 1: 58. 1753.

Slender perennials. Culms erect with creeping stolon. Leaves linear; sheath rounded, compressed, glabrous; ligule bearded, acuminate. Spikes 2-6, up to 6 cm long, digitate, rachis pubescent at base; spikelets 1-3 mm, sessile, 1-flowered, glumes similar, lanceolate, acute to subulate; lemma oblique, strongly compressed, keeled; palea linear, oblong, obtuse, anther 3. Caryopsis 1 mm long.

**Fl. & Fr.:** February - October

**Distribution:** All warm regions of the world.

**Specimen examined:** Common in open areas, fallow lands and wastelands. Chizami. NLNU 0845.

*Dendrocalamus* Nees, Linnae 9: 476. 1835

Arborescent bamboos, large sized. Rhizomes pachymorph, without extended necks. Culms often large, up to 60 m tall. Culm sheaths with small auricles. Leaves shortly petioled. Stamens 6; filaments free. Lodicules 3, sometimes absent.

*Dendrocalamus giganteus* Munro, Trans. Linn. Soc. London 26: 150. 1868; Gamble in Hook.f., Fl. Brit. Ind. 7:406. 1896; Shukla, Grass. North East. Ind. 198. 1996; Bor, Fl. As.5:11. 1940.

Rhizomes pachymorph, neck short. Culms up to 25 m tall, grey green, young pubescent, mature glabrous, diameter 20-27 cm, internodes 30-46 cm long, hollow 2.5-3.3 cm. Clump closely packed. Leaves pubescent on both surfaces, 5.0-7.6 x 2.5-3.8 cm; Leaf sheath auricles absent. Branches from upper nodes. Culm sheath pale-brown, hairy. Caudex, 40-44 x 38-48 cm; blade horizontal. Auricles 2, narrow, wavy.

**Distribution:** India (throughout), China, Myanmar

**Specimen examined:** Primary forest, cultivated. Chizami. NLNU 0860.

***Eleusine*** Gaertn., Fruct. Sem. Pl. 1: 7. 1788

Tufted annuals. Culms branched or erect. Leaf blade linear, flat or folded, inserted regularly along culm, sheaths compressed; ligule membranous. Inflorescence digitate, or lowest raceme slightly distant, racemes oblong, spikelets subsessile. Grain with free, membranous pericarp.

***Eleusine indica*** (L.) Gaertn.. Fruct. 1: 8. 1789; Hook.f., Fl. Brit. Ind. 7: 293. 1896.; Bor, Fl. As. 5: 108. 1940; *Cynosurus indicus* L., Sp. Pl. 72. 1753.

Culms tufted; leaves crowded at base, erect; spikes 2-4, digitate, subumbellate; rachis pubescent, villous at base; spikelets ovate or oblong; glumes lanceolate, acute; lower 2-3 mm; upper 3-4 mm; lemmas lanceolate, acute, 3-4 mm. Palea 2 keeled. Stamens 3, styles 2, stigmas feathery.

**Fl. & Fr.:** June – November

**Distribution:** Tropical and subtropical regions

**Specimen examined:** Roadsides and wastelands. Lozaphuhu. NLNU 0896.

***Eragrotis*** Wolf, Gen. Pl. 23. 1776

Tufted annuals or perennials. Inflorescence a compound panicle or cylindrical spike. Spikelets laterally compressed, borne singly, sometimes terete, awnless, several-flowered; florets bisexual. Stamens 2 or 3.

***Eragrostis nigra*** Steud. Syn. Pl. Glum. 1: 267. 1854; Hook.f., Fl. Brit. Ind. 7: 324. 1896; Bor, Fl. As. 5: 101. 1940.

Culms simple or branched; leaves mostly basal, elongate-lanceolate, tapering; sheaths bearded at mouth; ligules ciliate; panicles spreading, ovate-oblong, up to 60 cm;

branches in whorls of 3-5; spikelets linear-oblong, olive grey; pedicels 4-6 mm; glumes acuminate, strongly 1-nerved; lemmas ovate-acute.

**Fl. & Fr.:** May-October.

**Distribution:** India (throughout), Bangladesh, China, Myanmar, Nepal, Pakistan, Sri Lanka, Tibet, Vietnam

**Specimen examined:** Open grasslands, in moist places. Thetsumi. NLNU 0981.

*Phragmites* Adans., Fam. Pl. 2: 34, 559. 1763

Perennials with creeping rhizomes. Inflorescence a branched compound plumose panicle. Spikelets borne singly, pedicelled, gaping between florets; florets dissimilar, the lowest male, longer, the upper 2-4 bisexual, uppermost often reduced. Stamens 1-3. Lodicules 2.

*Phragmites karka* (Retz) Trin. ex Steud., Nomencl. Bot., ed. 2, 2: 324. 1841; Hook.f., Fl. Brit. Ind. 7:304. 1896; Balakr., Fl. Jowai. 2:605. 1983; Shukla, Grass. North-East. Ind. 149. 1996; Bor, Fl. As. 5:88. 1940; *Phragmetis vallatoria* (Pluk. ex L.) Velk., Yadav & Sardesai, Fl. Kolh. Dist. 601. 2002.

Culms tufted, stout, smooth, up to 7 m. Leaves lanceolate, acuminate. Panicles lax, branches fascicled, hairy at the base, 20-60 cm long. Spikelets many-flowered. Lower glume oblong-lanceolate, 3-5 nerved. Upper glume narrowly oblong-lanceolate, 3-nerved. Fertile florets 2-4. Lowest lemma up to 1.1-1.3 cm long, the upper shorter than the lower. Palea much shorter than the lemma. Rachilla with white long hairs.

**Fl. & Fr:** November-March

**Distribution:** India (throughout), Southeast Asia, Australia

**Specimen Examined:** Grows in open places and in forest edges. Tsupfume. NLNU 0985.

***Sporobolus*** R. Br., Prodr. Fl. Nov. Holland. 169. 1810

Tufted perennials, rarely annuals. Inflorescence compound panicle or spike-like, branches spreading or sub-erect, solitary or whorled. Spikelets gaping, pedicelled, 1-flowered, bisexual. Stamens 2-3. Grain free between the lemma and palea.

***Sporobolus piliferus*** (Trin.) Kunth, Enum. Pl. 1: 211. 1833; Hook.f., Fl. Brit. Ind. 7:251. 1896; Shukla, Grass. North-East. Ind. 370. 1996; Bor, Fl. As. 5:119. 1940; Balakr., Fl. Jowai. 2:604. 1983; *Vilfia pilifera* Trin. Diss. Bot. 157. 1824.

Annuals. Culms erect, tufted, up to 35 cm tall, often with geniculate base. Leaves linear-lanceolate, flat or convolute, caudate acuminate, margin serrulate near the base. Panicles slender, spike-like with erect branches, often interrupted, up to 9 cm long. Spikelets densely crowded. Lower glume lanceolate-truncate, without nerves. Upper glume lanceolate, 1-nerved. Lemma almost equal to upper glume in length. Palea narrowly oblong, truncate.

**Fl. & Fr:** November-February

**Distribution:** Cosmopolitan

**Specimen Examined:** Grows in open places, roadsides, wastelands. Lozaphuhu. NLNU 0949.

***Thysanolaena*** Nees, Edinb. New Phil. J. 18: 180. 1835

Robust rhizomatous perennials. Inflorescence a large, dense branched panicle with appressed branches to primary branches. Spikelets borne singly, pedicelled, laterally compressed, gaping, falling with pediceels; florest 2, sometimes 3, dissimilar, the lowest sterile, the upper bisexual, sometimes a reduced terminal one present. Stamens 2-3.

***Thysanolaena latifolia*** (Roxb.ex Hornem.) Honda, J. Fac. Sci. Univ. Tokyo, Sect. 3, Bot. 3: 312. 1930; *T. maxima* (Roxb.) Kuntze, Revis. Gen. Pl. 2: 784. 1891; Bor, Fl. As. 5:176. 1940; Balakr., Fl. Jowai. 2: 602. 1983; *T. agrostis* Nees, Edin. New Phil. J. 18: 180. 1835;

Hook.f., Fl. Brit. Ind. 7: 61. 1896.

Clums smooth, glabrous, up to 3.5 m tall. Leaves broadly lanceolate, acuminate, base sub-amplexicual, 30-60 x 3-8 cm, margin scabrid. Panicles 30-60 cm long, profusely branched and spreading. Spikelets 2-flowered, ovate-lanceolate, acuminate, pedicellate; rachilla produced into a short stipe. Glumes sub-equal, ovate, 1-nerved. Lower floret sterile; palea absent. Upper floret bisexual; palea short.

**Fl. & Fr:** September - March

**Distribution:** India (throughout), Southeast Asia

**Specimen Examined:** Grows in open places, roadsides, wastelands. Lozaphuhu. NLNU 0969.

## CHAPTER 4

### RESULTS AND DISCUSSION

The type of vegetation of a region depends on the topography, climate and soil of the particular region. Based on the present study area on its geographical location, climate, topography, dominant species composition and works on the vegetation cover of North East India by eminent botanists such as Hooker (1854, 1872-97), Kanjilal *et al.*, (1934-40), Champion & Seth (1968), Balakrishnan (1981), Giri *et al.*, (2006), the forest types of Phek district may be classified into the following forest types:

- a. Tropical deciduous forest
- b. Tropical semi-evergreen forest
- c. Sub-tropical evergreen forest
- d. Temperate broad leaved forest

**Tropical deciduous forest:** This type of forest are found in area receiving rainfall of about 200cm and found upto an elevation of 900m. Trees such as *Erythrina stricta*, *Bischofia javanica*, *Artocarpus lakoocha*, *Albizia lebbeck*, *Bombax cieba*, *Gmelina arborea*, *Melia azedarach*, *Terminalia myriocarpa*, *Kydia calycina*, *Pterospermum acerifolium*, *Schima walichii*, *Firmiana colorata*, etc. are found in abundance. The second storey is composed of *Bauhinia variegata*, *Callicarpa arborea*, *Sambucus javanicus*, *Ardisia griffithii*, *Grewia abutifolia*, *Breynia retusa*, *Macaranga denticulata*, *Micromelum integerrimum*, *Mallotus philippensis*, *Rhus chinensis*, *Phyllanthus emblica*.

The shrubby layer consists of species such as *Antidesma acidum*, *Chielocostus speciosus*, *Leea asiatica*, *Phlogacanthus thyrsiflorus*, *Solanum torvum*, *Clerodendron*



*serratum*, *Osbeckia* spp., *Desmodium sequax*, *Flemingia macrophylla*, *Maesa indica*, *Maesa chisia*, *Sida cordifolia* etc.

The scandent shrub species are *Mussaenda glabra*, *Entada rheedei*, *Cissus repens*, *Cayratia japonica*, etc. The herbaceous species comprises of *Ageratum conyzoides*, *Alternanthera viridis*, *Ageratina odoratum*, *Galingsoga parviflora*, *Commelina benghalensis*, *Crotalaria feruginea*, *Torenia* spp., etc. Growth of bamboo species like *Dendrocalamus hamiltonii*, *Bambusa tulda*, *B. pallida*, etc. are also found.

**Tropical semi-evergreen forest:** This type of forest consists of deciduous as well as evergreen tree species. These forests are confined to elevation of about 1200 m above sea level with an average rainfall of 300-500 cm. The common tree species are *Castanopsis tribuloides*, *Duabanga grandiflora*, *Stereospermum chelenoides*, *Elaeocarpus floribundus*, *Ficus oligodon*, *Macaranga peltata*, *Bischofia javanica*, *Trema orientalis*, *Engelhardtia spicata*, *Ficus curtipes*, *Bischofia javanica*, *Macaranga peltata*, *Melia azaderach*, *Schima walichii*, *Terminalia myriocarpa*, *Firminia colorata*, *Kydia calycina*, *Colona floribunda*, *Alangium chinensis*, *Trevesia palmata*, *Styrax serrulatum*, etc.

The shrubs, herbs and climbers consists of *Abroma agusta*, *Boehmeria macrophylla*, *B. ternifolia*, *Callicarpa rubella*, *Leea asiatica*, *Solanum torvum*, *Mussaenda roxburghii*, *M. glabra*, *Mycetia longifolia*, *Pavetta indica*, *Justicia adhatoda*, *Phlogacanthus asperulus*, *Persicaria chinensis*, *Strobilanthes paniculata*, *Viola pilosa*, *Torenia violaceae*, *Mazus pumilus*, *Bidens biternata*, *Impatiens* spp., *Triumfetta pilosa*, *Bonnaya antipoda*, *Begonia* spp., *Acacia pennata*, *Ampelocissus divaricata*, *Cayratia japonica*, *Dioscorea pentaphylla*, *D. glabra*, *D. alata*, *D. bulbifera*, *Hodgsonia macrocarpa*, *Paederia scandens*, *Piper*

*mulliesua*, *Mucuna sempervirens*, *M. pruriens*, etc. Epiphytic plants comprises of *Aeschynanthus parviflorus*, *A. parasiticus*, *Pothos scandens*, *Remusatia hookeriana*, *Piper mulliesua*, *Agapetes salicifolia*, etc. Stem parasitic plants like *Helixanthera ligustrina*, *Macrosolen cochinchinensis*, *Taxillus umbellifer* etc are found. The tree trunks in the forest are also laden with mosses, ferns and numbers of epiphytic orchids.

**Sub-tropical evergreen forest:** This type of forest occurs between 900-1800 m above sea level. The dominant tree species in this forest are from the members of Fagaceae. The tree species are *Lithocarpus pachyphylla*, *Castanopsis tribuloides*, *Quercus lamellosa*, *Magnolia doltsopa*, *Quercus griffithii*, *Quercus acutissima*, *Elaeocarpus* spp., *Engelhardtia* spp., *Docynia indica*, *Pyrus pashia*, *Litsea* spp., *Acer* spp., *Alangium chinense*, *Albizia julibrissin*, *Ficus* spp., *Rhus chinensis*, *Dysoxylum* spp., *Alnus nepalensis*, *Betula* spp., *Phoebe* spp., *Persea* spp., *Rhododendron arboreum*, etc.

The shrub species are *Ardesia griffithii*, *Breynia retusa*, *Debregeasia longifolia*, *Leucosceptrum canum*, *Neillia thyrsiflora*, *Rubus* spp., *Buddleja* spp., *Mahonia nepalensis*, *Boehmeria* spp., *Viburnum* spp., *Urtica dioica*, *Gerardinia diversifolia*, etc. The herbaceous common plants are *Anaphalis* spp., *Swertia bimaculata*, *Ranunculus* spp., *Thalictrum foliolosum*, *Commelina* spp., *Cyanotis vaga*, etc. Climbers such as *Herpetospermum pedunculatum*, *Dioscorea* sp., *Holboellia latifolia*, *Jasminum* spp., *Thladiantha* spp., *Senecio scandens*, *Streptolirion volubile*, etc are common. The forest floor is covered with ferns, mosses, fungi, and various herbaceous plants such as *Impatiens* spp., *Begonia* spp., *Polia* spp., *Arisaema* spp., *Elatostema* spp., etc. Epiphytic species such as *Vaccinium* spp., *Aeschynanthus* spp., *Agapetes* spp. along with several orchid species covers the tree trunk.

**Temperate broad leaved forest:** This type of forest is found in the altitude between 1800-2500 m. The top canopy tree species are *Quercus lamellosa*, *Phoebe* sp., *Betula alnoides*, *Acer* spp., *Lithocarpus pachyphylla*, *Quercus griffithii*, *Magnolia doltsopa*, *Magnolia insignis*, etc. The middle story trees are *Lyonia ovalifolia*, *Alnus nepalensis*, *Mahonia napaulensis*, *Eurya* spp., *Illicium griffithii*, *Docynia indica*, *Pyrus pashia*, *Prunus* spp., *Macropanax dispermus*, etc. The lower storey plants are *Leycesteria formosa*, *Debregeasia longifolia*, *Leucosceptrum cannum*, *Viburnum* sp., *Actinidia callosa*, *Rosa* spp., *Rubus* spp., *Boehmeria* spp., *Hypericum* spp., *Astilbe rivularis*, etc. Common epiphytic shrubs are *Vaccinium vacciniaceum*, *Rhododendron formosum*, *Agapetes odontocera*, *Aeschynanthus* spp., etc. Dense patches of *Chimonobambusa callosa* are also found in the hilltops as under storey in such forest types. The tree trunks and branches are covered with mosses and lichens which offers rich habitat for the growth of epiphytic species such as *Rhododendron* spp., *Aeschynanthus* spp., orchids such as *Dendrobium*, *Pleione*, *Bulbophyllum*, *Coelogyne*, *Cymbidium*, *Vanda*, *Eria*, *Pholidota*, etc. The rich forest floors harbors species such as *Potentilla* spp., *Rubus* spp., *Begonia* spp., *Bergenia ciliata*, *Corydalis* spp., *Polygonum* spp., *Valeriana* spp., *Gentiana* sp., saprophytes like *Monotropa indica*, ground orchids such as *Calanthe*, *Epipogium*, *Satyrium* etc.

## ANALYSIS OF THE FLORA

The present study enumerated a total of 665 taxa of flowering plants belonging to 449 genera and 124 families. Out of 665 taxa, are 657 species, 3 subspecies and 5 variety. Of the 664 species, 510 species belongs to dicotyledons and 155 species belongs to monocotyledons. The 510 species of dicots are distributed over 350 genera and 103 families. The 155 species of monocots are distributed over 99 genera and 21 families.

Table 2 gives the comparative floristic analysis of Monocot and Dicot. Comparison of the ten dominant families of the present study area with the Flora of British India (Hooker, 1872-1897) and the Checklist of Flora of Nagaland (Mao *et al.*, 2017) is shown in Table 3. Table 4 gives a list of the ten dominant families by number of species. Table 5 gives a list of the ten dominant families by number of genus. Table 6 gives the ten dominant Dicot families by number of species in comparison to Flora of Nagaland. Table 7 gives the ten dominant Monocot families by number of species in comparison to Flora of Nagaland. Table 8 gives an overview of the families in alphabetical order with number of genera and species. Table 9 gives an overview of the floristic diversity of Phek district.

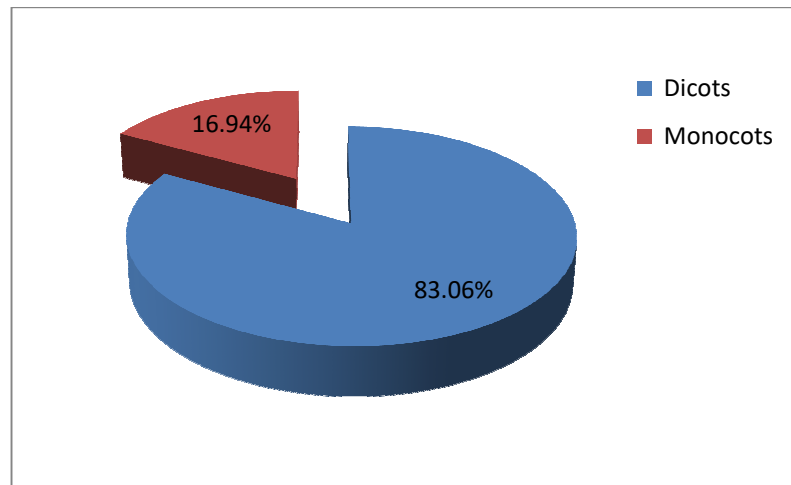
Out of the total 665 taxa, 108 trees, 132 shrubs, 262 herbs, 89 climbers, 64 epiphytes, 9 parasitic and 1 insectivorous plant have been studied. Out of 124 families, 57 families are represented by single genus and 39 families are represented by single species each.

**Table 2:** Comparative floristic analysis of Monocots and Dicots

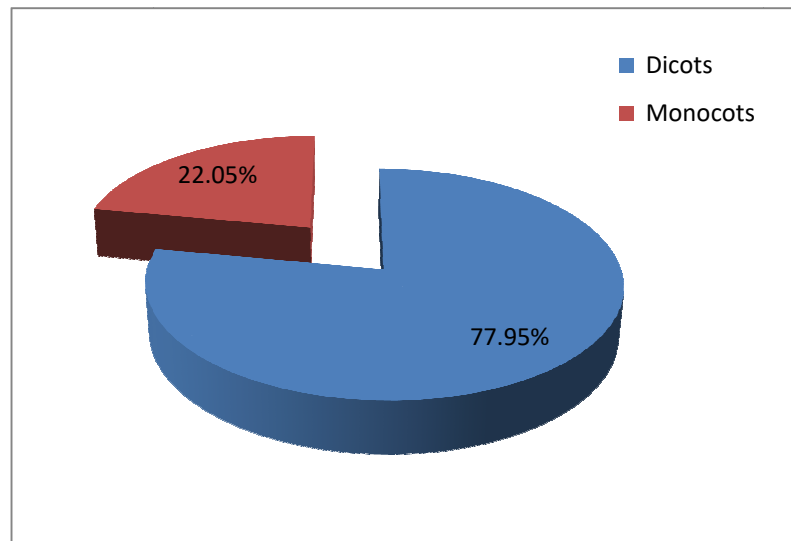
Groups	Families	Genera	Species	Subspecies	Variety
<b>Dicots</b>	103	350	504	3	3
<b>Monocots</b>	21	99	153	-	2
<b>Total</b>	120	449	656	3	5

**Table 3:** Percentage composition of Monocots and Dicots

Groups	Dicots	% of Dicots	Monocots	% of Monocots	Total
Family	103	83.06	21	16.94	124
Genera	350	77.95	99	22.05	449



**Fig. 1.** Pie chart showing the Family percentage of Dicots and Monocots



**Fig. 2.** Pie chart showing the Genera percentage of Dicots and Monocots

**Table 4:** Ten dominant Families (Comparison with Flora of British India and Flora of Nagaland)

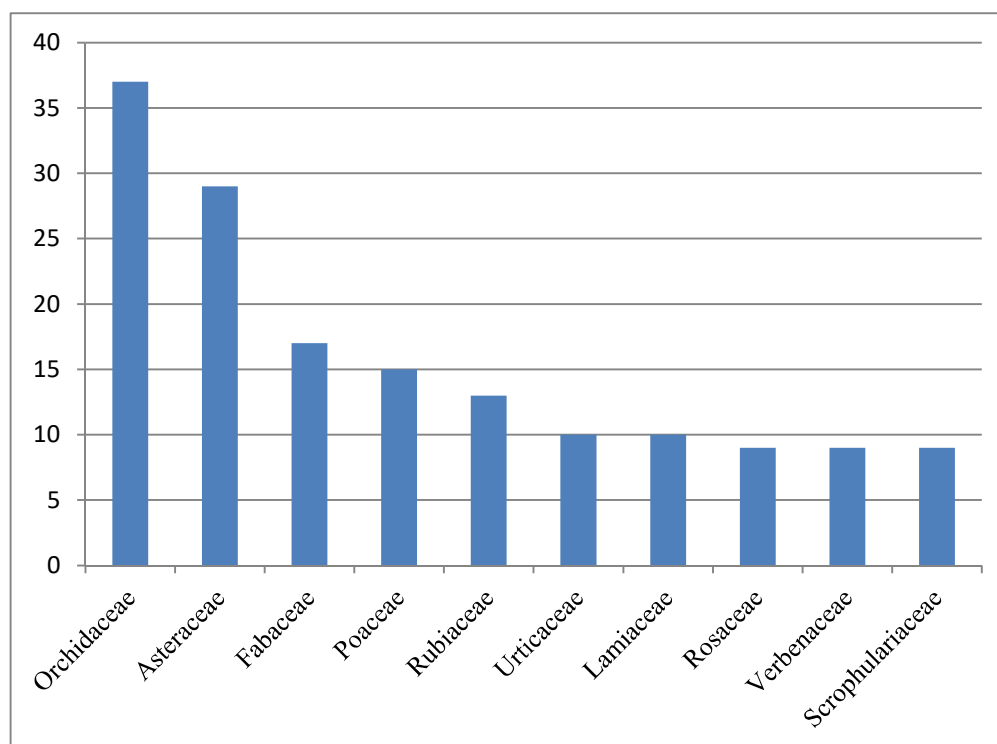
Sl. No	Flora of Phek	Flora of British India	Flora of Nagaland
1	Orchidaceae	Orchidaceae	Orchidaceae
2	Asteraceae	Leguminosae	Poaceae
3	Fabaceae	Graminae	Asteraceae
4	Rubiaceae	Rubiaceae	Rubiaceae
5	Acanthaceae	Euphorbiaceae	Rosaceae
6	Urticaceae	Acanthaceae	Lamiaceae
7	Euphorbiaceae	Compositae	Acanthaceae
8	Zingiberaceae	Cyperaceae	Euphorbiaceae
9	Poaceae	Labiatae	Zingiberaceae
10	Rosaceae	Urticaceae	Papilionaceae

**Table 5:** Ten dominant families by the number of Species of the present work

Sl. No	Family	Genera	Species
1	Orchidaceae	37	69
2	Asteraceae	29	34
3	Fabaceae	17	30
4	Rubiaceae	13	25
5	Acanthaceae	8	18
6	Urticaceae	10	17
7	Euphorbiaceae	13	16
8	Zingiberaceae	8	16
9	Poaceae	15	16
10	Rosaceae	9	15

**Table 6:** Ten dominant families by the number of Genus of the present work

Sl. No	Family	Genera	Species
1	Orchidaceae	37	70
2	Asteraceae	29	34
3	Fabaceae	17	30
4	Poaceae	15	16
5	Rubiaceae	13	25
6	Urticaceae	10	17
7	Lamiaceae	10	14
8	Rosaceae	9	15
9	Verbenaceae	9	12
10	Scrophulariaceae	9	11



**Fig 3:** Column chart showing 10 largest families by number of Genera in the present work

**Table 7:** Ten dominant Families of Dicots by number of Species (Comparison with Flora of Nagaland)

Sl. No	Flora of Phek	Species	Flora of Nagaland	Species
1	Asteraceae	34	Asteraceae	100
2	Fabaceae	30	Rubiaceae	70
3	Rubiaceae	25	Rosaceae	54
4	Acanthaceae	18	Lamiaceae	48
5	Urticaceae	17	Acanthaceae	44
6	Euphorbiaceae	16	Euphorbiaceae	44
7	Rosaceae	15	Papilionaceae	39
8	Lamiaceae	14	Ericaceae	39
9	Moraceae	12	Lauraceae	33
10	Verbenaceae	12	Urticaceae	33

**Table 8:** Ten dominant Families of Monocots by number of Species (Comparison with Flora of Nagaland)

Sl. No	Flora of Phek	Species	Flora of Nagaland	Species
1	Orchidaceae	69	Orchidaceae	388
2	Poaceae	16	Poaceae	141
3	Zingiberaceae	16	Zingiberaceae	41
4	Araceae	9	Cyperaceae	39
5	Liliaceae	9	Commelinaceae	20
6	Commelinaceae	7	Liliaceae	17
7	Cyperaceae	7	Araceae	14
8	Dioscoreaceae	3	Convallariaceae	9
9	Musaceae	3	Smilacaceae	9
10	Arecaceae	3	Juncaceae	9



**Table 9:** Comparative account of taxonomic works on Nagaland and Phek District

<b>Book &amp; Author</b>	<b>Families</b>	<b>Genera</b>	<b>Species</b>	<b>Subspecies</b>	<b>Variety</b>
Check List of Flora of Nagaland, Mao <i>et al.</i> , 2017 (excluding pteridophytes and gymnosperms)	153	836	1960	10	38
Phek District	<b>124</b>	<b>449</b>	<b>657</b>	<b>3</b>	<b>5</b>

**Table 10:** An overview of the families in alphabetical order with number of genera, species, subspecies and variety.

<b>Sl. No</b>	<b>Family</b>	<b>Genera</b>	<b>Species</b>	<b>Subspecies</b>	<b>Variety</b>
1.	ACANTHACEAE	8	18	-	-
2.	ACERACEAE	1	2	-	-
3.	ACTINIDIACEAE	2	4	-	-
4.	AGAVACEAE	1	1	-	-
5.	AMARANTHACEAE	4	5	-	-
6.	AMARYLLIDACEAE	1	1	-	-
7.	ANACARDIACEAE	5	5	-	-
8.	ANNONACEAE	2	2	-	-
9.	APIACEAE	5	5	-	-
10.	APOCYANACEAE	3	4	-	-
11.	ARACEAE	5	9	-	-
12.	ARALIACEAE	6	7	-	-
13.	ARECACEAE	3	3	-	-
14.	ASCLEPIADACEAE	8	8	-	-
15.	ASTERACEAE	29	33	-	1
16.	BALANOPHORACEAE	1	1	-	-
17.	BALSAMINACEAE	1	7	-	-
18.	BEGONIACEAE	1	3	-	-

19.	BERBERIDACEAE	1	1	-	-
20.	BETULACEAE	1	1	-	-
21.	BIGNONIACEAE	3	3	-	-
22.	BOMBACACEAE	1	1	-	-
23.	BORAGINACEAE	4	6	-	-
24.	BRASSICACEAE	1	1	-	-
25.	BUDDLEJACEAE	1	2	-	-
26.	CAESALPINIACEAE	4	3	1	-
27.	CAMPANULACEAE	4	6	-	-
28.	CANNABACEAE	1	1	-	-
29.	CANNACEAE	1	1	-	-
30.	CAPPARACEAE	2	4	-	-
31.	CAPRIFOLIACEAE	4	5	-	-
32.	CARYOPHYLLACEAE	3	3	-	-
33.	CELASTRACEAE	1	2	-	-
34.	CLUSIACEAE	1	1	-	-
35.	COMMELINACEAE	5	7	-	-
36.	CONVOLVULACEAE	6	8	-	-
37.	CORNACEAE	2	3	-	-
38.	COSTACEAE	1	1	-	-
39.	CUSCUTACEAE	1	1	-	-
40.	CRASSULACEAE	1	1	-	-
41.	CUCURBITACEAE	8	10	-	-
42.	CYPERACEAE	4	7	-	-
43.	DIOSCOREACEAE	1	2	-	1
44.	DROSERACEAE	1	1	-	-
45.	EBENACEAE	1	2	-	-
46.	ELAEocarpaceae	1	2	-	-
47.	ERICACEAE	4	6	-	-
48.	EUPHORBIACEAE	13	16	-	-

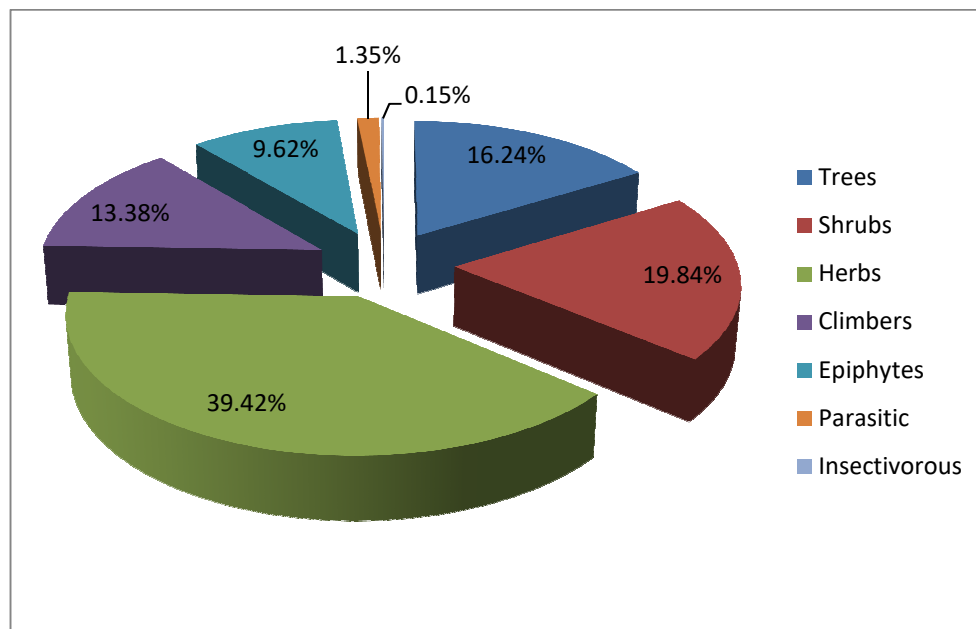
49.	FABACEAE	17	30	-	-
50.	FAGACEAE	3	8	-	-
51.	FLACOURTIACEAE	1	1	-	-
52.	FUMARIACEAE	2	2	-	-
53.	GENTIANACEAE	2	3	-	-
54.	GERANIACEAE	1	1	-	-
55.	GESNERIACEAE	4	7	-	-
56.	HELWINGIACEAE	1	1	-	-
57.	HERNANDIACEAE	1	1	-	-
58.	HYDRANGEACEAE	1	1	-	-
59.	HYPERICACEAE	1	3	-	-
60.	HYPOXIDACEAE	1	2	-	-
61.	JUGLANDACEAE	2	2	-	-
62.	JUNCACEAE	1	1	-	-
63.	LAMIACEAE	10	14	-	-
64.	LARDIZABALACEAE	1	1	-	-
65.	LAURACEAE	5	7	-	-
66.	LEEACEAE	1	1	-	-
67.	LILIACEAE	9	9	-	-
68.	LORANTHACEAE	4	4	-	-
69.	LYTHRACEAE	2	2	-	-
70.	MAGNOLIACEAE	1	2	-	-
71.	MALVACEAE	5	4	-	1
72.	MARANTACEAE	1	1	-	-
73.	MELASTOMATACEAE	4	3	1	-
74.	MELIACEAE	4	4	-	-
75.	MENISPERMACEAE	2	1	-	1
76.	MIMOSACEAE	5	7	-	-
77.	MONOTROPACEAE	1	1	-	-
78.	MORACEAE	3	12	-	-

79.	MUSACEAE	1	3	-	-
80.	MYRICACEAE	1	1	-	-
81.	MYRSINACEAE	3	6	-	-
82.	NYCTAGINACEAE	1	1	-	-
83.	OLEACEAE	2	5	-	-
84.	ONAGRACEAE	3	2	1	-
85.	ORCHIDACEAE	37	68	-	1
86.	OROBANCHACEAE	1	1	-	-
87.	OXALIDACEAE	1	2	-	-
88.	PASSIFLORACEAE	2	5	-	-
89.	PHYTOLACCACEAE	1	1	-	-
90.	PIPERACEAE	2	6	-	-
91.	PLANTAGINACEAE	1	1	-	-
92.	POACEAE	15	16	-	-
93.	POLYGALACEAE	1	3	-	-
94.	POLYGONACEAE	4	10	-	-
95.	PONTEDERIACEAE	1	1	-	-
96.	PRIMULACEAE	2	5	-	-
97.	RANUNCULACEAE	4	6	-	-
98.	RHAMNACEAE	3	3	-	-
99.	RHIZOPHORACEAE	1	1	-	-
100.	ROSACEAE	9	15	-	
101.	RUBIACEAE	13	25	-	-
102.	RUTACEAE	6	8	-	-
103.	SANTALACEAE	1	1	-	-
104.	SAURURACEAE	1	1	-	-
105.	SAXIFRAGACEAE	3	3	-	-
106.	SCHISANDRACEAE	1	2	-	-
107.	SCROPHULARIACEAE	9	12	-	-
108.	SMILACACEAE	1	2	-	-

109.	SOLANACEAE	6	8	-	-
110.	STACHYURACEAE	1	1	-	-
111.	STERCULIACEAE	5	5	-	-
112.	STYRACACEAE	1	1	-	-
113.	THEACEAE	2	2	-	-
114.	THYMELAEACEAE	1	1	-	-
115.	TILIACEAE	3	4	-	-
116.	TRILLIACEAE	1	1	-	-
117.	TYPHACEAE	1	1	-	-
118.	URTICACEAE	10	17	-	-
119.	ULMACEAE	1	1	-	-
120.	VALERIANACEAE	1	1	-	-
121.	VERBENACEAE	9	12	-	-
122.	VIOLACEAE	1	3	-	-
123.	VITACEAE	3	5	-	-
124.	ZINGIBERACEAE	8	16	-	-
Total		449	657	3	5

**Table 11:** An overview of the floristic diversity of Phek district

Sl. No	Habit	No. of species	Percentage
1	Trees	108	16.24
2	Shrubs	132	19.84
3	Herbs	262	39.42
4	Climbers	89	13.38
5	Epiphytes	64	9.62
6	Parasitic	9	1.35
7	Insectivorous	1	0.15



**Fig. 4.** Percentage showing floristic diversity in the present work

Of the 124 families, Orchidaceae has the maximum number with 69 species, followed by Asteraceae (34 spp.), Fabaceae (30 spp.), Rubiaceae (25 spp.), Acanthaceae (18 spp.), Urticaceae (17 spp.), Euphorbiaceae (16 spp.), Zingiberaceae (16 spp.), Poaceae (16 spp.) and Rosaceae (15 spp.). The top ten families constitute 256 species.

The first ten dominant families of Dicots by number of species are Asteraceae (34 spp.), Fabaceae (30 spp.), Rubiaceae (25 spp.), Acanthaceae (18 spp.), Urticaceae (17 spp.), Euphorbiaceae (16 spp.), Rosaceae (15 spp.), Lamiaceae (14) and Moraceae & Verbenaceae (12 spp.).

The first ten dominant families of Monocots by number of species are Orchidaceae (69 spp.), Zingiberaceae (16 spp.), Poaceae (16 spp.), Araceae (9 spp.), Liliaceae (9 spp.),

Commelinaceae (7 spp.), Cyperaceae (7 spp.), Dioscoreaceae (3 spp.), Musaceae (3 spp.) and Arecaceae (3 spp.) constituting a total of 142 species.

Out of the 124 families, 57 families are represented by single genus and 39 families by single species. The genus *Dendrobium* (14 species) is the most dominant genus followed by *Hedychium* (8 species) and *Strobilanthes* and *Persicaria* with 7 species each. Out of total 665 taxa, 39.42 % are herbs, 19.84% are shrubs, 16.24% are trees, 13.38% are climbers, 9.62% are epiphytes, 1.35% are parasitic or saprophytic and 0.15% is insectivorous. Dicots are represented by 83.06% and monocots are represented by 16.94%.

The monotypic species represented in Phek District are *Brachystemma calycinum* D. Don (Caryophyllaceae), *Streptolirion volubile* Edgew. (Commelinaceae), *Stilbanthus scandens* Hook. (Amaranthaceae), *Toddalia asiatica* (L.) Lamk. (Rutaceae), *Houttuynia cordata* Thunb. (Saururaceae), *Hodgsonia macrocarpa* (Blume) Cogn. (Cucurbitaceae), *Gynocordia odorata* R. Br. (Flacourtiaceae).

## IMPORTANT PLANTS OF THE FLORA

There are many economically important plant species found in the district. Following are few important plants which are grouped according to their products and uses:

### Timber yielding plants:

A good number of timber yielding plants used for house construction, carpentry work, utensils are found in the study area which are *Gmelina arborea* Roxb. ex Sm., *Toona ciliata* M. Roem., *Quercus lamellose* Sm., *Q. serrata* Thunb., *Lithocarpus pachyphylla* Rehder, *Bombax ceiba* L., *Engelhardtia spicata* Blume, *Schima wallichii* (DC.) Korth., *Bauhinia variegata* L., *Acer oblongum* Wall. ex DC., *Magnolia insignis* Wall., *M. doltsopa* (Buch.-Ham ex DC.) Figlar, *Melia azederach* L., *Mahonia napaulensis* DC., etc.

**Ornamental plants:** Many wild flowers are found in the region which can be used as valuable ornamental plants because of their showy and unique flowering such as, *Paphiopedilum hirsutissimum* (Lindl. Ex Hook.) Stein, *Dendrobium densiflorum* Lindl., *D.*

*chrysotoxum* Lindl., *D. wardianum* R. Warner, *D. williamsonii* Day & Rchb.f., *Aeschynanthus parasiticus* (Roxb.) Wall., *Hedychium coccineum* Buch.-Ham. ex Sm., *H. flavescens* Carey ex Roscoe, *H. spicatum* Buch.-Ham. ex Sm., *Pecteilis susannae* (L.) Rafinesque, *Holcoglossum amesianum* (Rchb. f.) Christenson, *Thunia alba* (Lindl.) Rchb.f., *Vanda coerulea* Griff. ex Lindl., *Bergenia ciliata* (Haw.) Sternb., *Disporum cantoniense* (Lour.) Merr., *Jasminum* spp., *Begonia* spp.

### **Wild edible vegetable plants:**

Many wild plants are consumed as vegetables by the locals such as *Fagopyrum cymosum* (Trevir.) Meisn., *Oenanthe javanica* DC., *Houttuynia cordata* Thunb., *Koenigia mollis* (D. Don) T.M.Schust. & Reveal, *Cardamine hirsuta* L., *Gynura nepalensis* DC., *Clerodendrum colebrookianum* Walp., *Musa sikkimensis* Kurz, *Bauhinia variegata* L., *Alternanthera sessilis* (L.) DC., *Centella asiatica* (L.) Urb., *Streptolirion volubile* Edgew., *Zanthoxylum acanthopodium* DC., *Z. armatum* DC., *Herpetospermum pedunculatum* (Ser.) C.B. Clarke, *Elatostema lineolatum* Wight, *Solanum torvum* Sw., etc.

### **Wild edible fruits:**

Wild fruits are found abundantly in the study area, such as, *Docynia indica* (Wall.) Decne., *Debregeasia longifolia* Wedd., *Castanopsis tribuloides* (Roxb.) DC., *Actinidia callosa* Lindl., *Garcinia xanthochymus* Hook.f., *Pyrus pashia* Buch.-Ham. ex D. Don, *Myrica esculenta* Ham. ex D. Don, *Elaeocarpus floribundus* Blume, *Spondias pinnata* (L.f.) Kurz, *Juglans regia* L., *Choerospondias axillaris* (Roxb.) B.L. Burtt & A.W.Hill, *Phyllanthus emblica* L., *Ficus semicordata* Buch.-Ham. ex Sm., *F. auriculata* Lour., *Stixis suaveolens* (Roxb.) Pierre, *Diospyros kaki* L.f., *Rhus chinensis* Mill., *Rubus ellipticus* Sm., *Toddalia asiatica* (L.) Lam., etc.



**Plants used as spices:**

Seeds of *Zanthoxylum acanthopodium* DC., *Z. armatum* DC., *Litsea citrata* Blume are extensively used as spices and condiments.

**Fiber yielding plants:**

Barks of various plants are used for yielding fibres for making ropes, nets, mats, etc, are obtained from *Abelmoschus moschatus* Medik., *Trema orientale* (L.) Blume, *Debregeasia longifolia* (Burm.f.) Wedd., *Grewia abutifolia* Vent. ex Juss., *Girardinia diversifolia* (Link) Friis, etc. Cotton fibres are obtained from *Bombax ceiba* L. pods.

**Beverage and drinks:**

Fruits of *Docynia indica* (Wall.) Decne., *Phyllanthus emblica* L., *Myrica esculenta* Buch.-Ham. ex D. Don, etc are used in the preparation of drinks and beverages.

**Broom plants:**

*Sida acuta* Burm.f., *Thysanolaena latifolia* (Roxb. ex Hornem) Honda, are used for making brooms.

**Fish poisoning plants:**

Bark of *Juglans regia* L., *Schima wallichii* (DC.) Korth., are used for fish poisoning.

**Medicinal plants:**

Some of the important medicinal plants are *Paris polyphylla* Sm., *Valeriana jatamansi* D. Don, *Phyllanthus emblica* L., *Centella asiatica* (L.) Urb., *Cheilocostus speciosus* (J. Koenig) C.D.Specht, *Zanthoxylum acanthopodium* DC., *Swertia bimaculata* Hook.f. & Thomson ex C.B. Clarke, *Rhus chinensis* Mill., *Litsea citrata* Blume, *Elsholtzia blanda* Benth., *Plantago indica* L., *Mimosa pudica* L., *Bidens pilosa* L., *Clerodendrum*

*colebrokianum* Walp., *Alangium chinense* (Lour.) Harms., *Cannabis sativa* L., *Justicia adhatoda* L., *Ricinus communis* L., *Thalictrum foliolosum* DC., *Paederia foetida* L., etc.

**Endemic (End), Rare (R), Threatened (T) and Vulnerable (V) plants of the study area:**

Due to the clearing of vegetation for different developmental activities many plant species are threatened and has led to the lost of their habitation, and the result of which has led to their smaller population confined in small pockets. Following are list of some plants falling in such categories which has been categorized as recognized and defined by IUCN.

**Table 12:** List of Rare, Threatened, Endangered and Endemic Plants of Phek District

Sl. No	Name of the species	Family	Status
1	<i>Dendrobium densiflorum</i> Wall. ex Lindl.	Orchidaceae	Vulnerable
2	<i>Illicium griffithii</i> Hook.f. & Th.	Illiciaceae	Endangered
3	<i>Helwingia himalaica</i> Hook.f. & Th. ex Cl.	Helwingiaceae	Rare
4	<i>Aeginetia indica</i> Linn.	Orobanchaceae	Rare
5	<i>Renanthera imschootiana</i> Rolfe.	Orchidaceae	Endangered
6	<i>Vanda coerulea</i> Griff. ex Lindl.	Orchidaceae	Rare & Endangered
7	<i>Paphiopedilum hirsutissimum</i> (Lindl. Ex Hook.) Stein	Orchidaceae	Threatened
8.	<i>Pleione humilis</i> (Sm.) D. Don	Orchidaceae	Rare
9	<i>Balanophora dioica</i> R. Br.	Balanophoraceae	Rare & Endangered
10	<i>Cymbidium tigrinum</i> Parish	Orchidaceae	Rare & Vulnerable

11	<i>Paris polyphylla</i> Sm.	Trilliaceae	Vulnerable
12	<i>Valeriana jatamansi</i> Jones	Valerianaceae	Endangered
13	<i>Kaempferia rotunda</i> L.	Zingiberaceae	Rare

### Other significant plants:

*Imperata cylindrical* (L.) P. Beauv. is used for thatching of house; *Entada purseatha* DC.

fruit is used as soap and also used in indigenous games, sticky fruit of *Loranthus scurula* L. are used as bird trap.

### Primitive plants:

Some primitive families such as Magnoliaceae (*Magnolia doltsopa* (Buch.-Ham ex DC.) Figlar, *M. insignis* Wall.), Illiciaceae (*Illicium grifithii* Hook.f. & Thomson), Betulaceae (*Betula alnoides* Buch.-Ham., *Alnus nepalensis* D. Don), Lardizabalaceae (*Holboellia latifolia* Wall.), Lauraceae (*Machilus duthei* King ex Hook.f., *Actinodaphne obovata* (Nees) Blume, *Lindera pulcherrima* (Nees) Benth. ex Hook.f., *Phoebe lanceolata* (Nees) Nees, Annonaceae (*Goniothalamus sesquipedalis* Hook.f. & Thomson), Saururaceae (*Houttuynia cordata* Thunb.) are observed in the study area.

### Biologically curious plants:

Besides many important plants the district harbours some curious plants such as:

- a. Root parasites
  - i. *Balanophora dioica* R.Br. (Balanophoraceae)
  - ii. *Aeginetia indica* Roxb. (Orobanchaceae)
- b. Saprophytic plants
  - i. *Monotropa uniflora* L. (Monotropaceae)

ii. *Epipogium roseum* (D. Don) Lindl. (Orchidaceae)

**Floristic affinities**

The species of Phek district shows affinities with the neighboring states of Assam, Manipur, Mizoram, Meghalaya and Arunachal Pradesh. The flora of Phek district also exhibits greater affinities with the Indo-Malayan flora. Some of the species occurring in the district are *Balanophora dioica* R. Br., *Justicia adhatoda* L., *Antidesma acidum* Retz., *Toona ciliata* M. Roem., *Cheilocostus speciosus* (J. Koenig) C.D. Specht, *Bombax ceiba* L., *Vaccinium exaristatum* Kurz, *Engelhardtia spicata* Blume., *Firmiana colorata* R.Br., *Hodgsonia macrocarpa* Cogn., *Trevesia palmata* Vis., etc.

The Himalayan and Indo-Chinese elements found are *Astilbe rivularis* Buch.-Ham, *Geranium nepalense* Sweet, *Helwingia himalaica* Hook.f. & Thomson ex C.B. Clarke, *Pyrus pashia* Buch.-Ham. ex D. Don, *Valeriana jatamansii* D. Don, *Callicarpa rubella* Lindl., *Buddleja asiatica* Lour., *Milletia pachycarpa*.

Japanese elements such as *Schima wallichii* (DC.) Korth., *Quercus* spp.; some North American weeds elements commonly found are *Lantana camara* L., *Mikania micrantha* Kunth.

Cosmopolitan elements in the study area are *Cynodon dactylon* (L.) Pers., *Cuscuta reflexa* Roxb., *Oxalis corniculata* L., *Cyperus rotundus* L., *Ageratum conyzoides* L., *Eupatorium adenophorum* Spreng., etc.

The amalgamation of plant species from different elements indicates the species richness of the study area. The occurrence of primitive families such as Annonaceae, Flacourtiaceae, Saururaceae, Piperaceae indicates the centre of origin of temperate angiosperm flora.

## Factors Affecting the Vegetation

The vegetation of an area is greatly influenced by the various surrounding factors. The biotic as well as abiotic factors regulates the vegetation in ways such as:

**Abiotic factors:** Wind and rain storm during the rainy season causes landslides, uprooting of trees, destroying flowers and immature fruits, which affects the vegetation.

**Biotic factors:** Anthropogenic pressure coupled with developmental works such as expansion of roads, human settlements, leads to the disturbance and depletion of forest cover. Collection of excessive non-timber forest products from the forested areas coupled with logging and firewood collection by local villagers are also main reasons for thinning of the forest cover.

Sustainable conservation of biological resources is the need of the hour for the present and future generations without hampering the existence of plants and their habitat. *In situ* as well as *ex situ* conservation method has to be taken up to preserve the plant wealth of any region. The public too must be made aware of the depleting forest cover, thus conservation programs should aim to involve the local communities by creating awareness. Introduction of exotic species, encroachment of protected areas, rampant foraging of the vegetation should be monitored by the Forest Departments along with the help of village headman.

## CHAPTER 5

### CONCLUSION

The present study was undertaken with the aim to bring out firsthand information on the comprehensive flora of Phek District of Nagaland, of different taxa based on extensive survey and exploration during all seasons of the year. Survey and exploration work was carried out during the period from 2014-2019 covering the different seasons and location of the district. However, some of the remote areas could not be assessed due to difficult terrain, and other constraints.

During the study a total of 665 taxa of flowering plants, belonging to 124 families and 449 genera has been recorded. The dicots with 504 species, 3 subspecies and 3 variety are distributed over 350 genera and 103 families. The 153 species and 2 variety of monocots are distributed over 99 genera and 21 families.

The study has helped in finding one new record of orchid species (*Holcoglossum amesianum* (Rchb. f.) Christenson) for the state. The present study reveals that the district harbors a rich diversity of species comprising of endemic, threatened and botanically interesting species in a rather small area. Many economically important and wild ornamental, edible and medicinal plants were also documented.

The present study has also helped in better understanding of the flora of the district in particular and country in general. The study will be helpful in conservation and management of floristic wealth of the district. Sustainable conservation of biological resources is the need of the hour for the present and future generations without hampering the existence of plants and their habitat.

The community is dependent on forest resources for their livelihood. Forest not only provides resources for economic sustenance, but is also a way of life in every aspect be it social, cultural, or religion. It meets their basic needs like fuel, wood, fodder and timber. However, there is increase in exploitation of forest resources which threatened not only flora but fauna of the district. There is an urgent need to reach out to the community in creating awareness on the importance of conservation. This can be made possible only when the government comes in and is supported by the community leaders.

The floristic diversity of Phek district show great affinity with Indo-Chinese, Indo-Myanmar and Indo-Malayan flora. The presence of many primitive flowering plants and wild relatives supports the view of Takhtajan (1969) who considered the Eastern Himalayas as the cradle of flowering plants.

The present research work on “studies on the angiospermic flora of Phek district” is a humble attempt in documenting the plant species of Phek district. It is hoped that it will benefit the students, teachers and researchers in floristic studies and for further research activities.

## REFERENCES

- Acosta, C. 1578. *Tractado de las drogas, y medicinas de las Indias Orientales*. Burgos: M.de Victoria.
- Balakrishnan, N.P. 1981-1983. *Flora of Jowai and Vicinity Meghalaya*, Vol. 1-2. Botanical Survey of India, Howrah.
- Beddome, R.H. (1865-70). *The Ferns of British India*. Allied Publisher. Dehradun Dun, India.
- Benniamin, A., Chaturvedi, S. K., Dey, S. & Moaakum. 2012. Supplements to the Root Parasitic Plant in India. A New Recorded Species *Christisonia siamensis* Craib. (Orobanchaceae) *Taiwania*, 57(2): 217-221.
- Bor, N.L. 1940. Gramineae (Vol. 5) In: Kanjilal, U.N., Kanjilal, P.C., Das, A., De, R.N. & Bor, N.L. *Flora of Assam*. Government Press, Shillong. India.
- Bor, N.L. 1942. Some remarks on the Geology and Flora of the Naga and Khasi Hills, *Roy. Bot. Gard. Calcutta*, part 11: 129-195.
- Bora P.J. & Kumar, Y. 2003. *Floristic Diversity of Assam*. Daya Publishing House, Delhi.
- Brandis, D. 1906. *Indian Trees*. Archibald constable & co. Ltd., 16 James Street Haymarket, S.W. London.
- Burkill, I.H. 1924-1925. The Botany of the Abor expedition. *Rec. Bot. Surv. India* 10(1): 1-154. 1924: 10(2): 155-420. 1925.
- Changkija, S., Kumar, Y. & Gurung, P. B. 1992. *Orchids of Nagaland*. Forest Department, Nagaland. India.
- Changkija, S., Ajungla, L., Rongsensashi & Mozhui, R. 2010. *Medicinal and Aromatic Flora of Nagaland*. Medicinal plant development agency, Department of Forest,



Ecology, Environment and Wildlife, Government of Nagaland. India.

Chaturvedi, S.K. & Moaakum. 2007. Extension of distributional range of genus *Mussaenda* L. to Zunheboto district, Nagaland. *Pleione* 1(2): 57-61.

Chaturvedi, S.K. & Moaakum. 2008. *Aeschynanthus* W. Jack (Gesneriaceae) in Mokokchung and Zunheboto districts of Nagaland, India. *Pleione* 2(1): 106-110.

Chaturvedi, S.K. & Moaakum. 2008. Diversity of genus *Hedychium* Koenig in the Mokokchung and Zunheboto Districts, Nagaland. *Folia Malaysiana* 9(2): 129-140.

Chaturvedi, S. K. & Moaakum. 2008. Diversity of the genus *Hedychium* Koenig in the Mokokchung and Zunheboto districts, Nagaland. *Folia Malaysiana*. Vol 9(2): 129-140.

Chauhan, A.S. 1996. North-Eastern India and North Bengal. In: Hajra, P.K., Sharma, B.D., Sanjappa, M. & Sastry, A.R.K. (eds.). *Flora of India*, Introductory Vol. (Part I). Botanical Society of India. Calcutta, India. Pp. 251-253.

Chowdhery, H.J., Giri, G.S., Pal, G.D., Pramanik, A. & Das, S.K. 2009. *Materials for the Flora of Arunachal Pradesh*. Vol. 3. Botanical Survey of India, Kolkata.

Chowlu, K., Rao, A. N., Angela, N. & Vij, J.P. 2013. A brief account of the genus *Bulbophyllum* (Orchidaceae) in Manipur, India. *Rheedea*. Vol. 23(2): 86-97.

Clarke, C. B. 1886. Botanical observations made in a Journey to the Naga Hills (between Assam and Munneypore); in a letter addressed to Sir J. D. Hooker. *J. Linn. Soc. (Bot.)* 22: 128-136.

Clarke, C.B. 1889. On the Plants of Kohima and Munneypore. *J. Linn. Soc. London* 25:1-107.

Collett, H. & Helmley, M.B. 1890. On a collection of plants from upper Burma and the Shan states. –Ibid. 20: 130 - 135, tt. 19-20.

- Convention on Biological Diversity 1992. *Convention on Biological Diversity*. Secretariat of the Convention on Biological Diversity, Montreal, Canada.
- Dash, S. S. & Singh, P. 2017. *Flora of Kurung Kumey District, Arunachal Pradesh*. Botanical Survey of India, Kolkata.
- Deb, C.R. & Imchen, T. 2008. *Orchid Diversity of Nagaland*. SciChem Publishing House. Udaipur, Rajasthan, India.
- Deb, C.R., Jamir, N.S., Jakha, H.Y., Kikon, Z.P. & Dey, S. 2014. *Esmeralda clarkei* Reichenbach f. (Orchidaceae): a new report for the flora of Nagaland, India. *Pleione* 8(1): 181-183.
- Deb, C.R., Jamir, N.S., Dey, S. & Longchar, T.B. 2016. Addition of *Bulleyia yunnanensis* Schltr., *Phalaenopsis yingjiangensis* (Z.H.Tsi) Kocyan & Schuit. and *Pholidota pygmaea* H.J. Chowdhery & G.D. Pal in the orchid flora of Nagaland, India. *Indian Journal of Plant Sciences*. Vol.5(3): 63-65.
- Deb, C. R., Jamir, N. S. & Temjensangba. 2003. Orchid diversity of Nagaland – A revised status. *J. Orchid Soc. India* 17: 5 – 15.
- Deb, D. B. 1981-1983. *The Flora of Tripura State*. Vol. 1-2. Today & Tomorrow's Printers & Publishers, New Delhi.
- Deb, C.R., Longchar, T.B, Kamba, J. & Jakha, H.Y. 2021. Wild orchid resources of Nagaland, India: updated status. *Pleione* 15(2): 113-122.
- Deorani, S. C. & Naithani, H. B. 1995. *Orchids of Nagaland*. Oriental Enterprises. Dehra Dun, India.
- de Orta, G. 1565. *Coloquinos dos Simples*, Goa. In: Sasidharan, S. Illustrated manual on tree flora of Kerala supplemented with computer-aided identification. *KFRI Research Report* No. 282.

- Dey, S. 2018. *Studies on the Diversity of Flowering Plants of Tuensang District, Nagaland*. Ph.D thesis (unpublished). Nagaland University, Lumami.
- Dey, S., Jamir, N.S., Gogoi, R., Chaturvedi, S. K., Jakha, H.Y., & Kikon, Z.P. 2014. *Musa nagalandiana* sp. Nov. (Musaceae) from Nagaland, Northeast India. *Nordic journal of Botany* 32(5): 584-588.
- GBIF.org (2020), GBIF Home Page. Available from: <https://www.gbif.org>; accessed November 2020.
- Giri, G.S., Pramanik, A. & Chowdhery, H.J. (eds.) 2008. *Materials for the Flora of Arunachal Pradesh*. Vol. 2. Botanical Survey of India, Kolkata.
- Gogoi, R., Odyuo, N. & Daimary, R. 2015. *Impatiens parkinsonii* C.E.C. Fisch. (Balsaminaceae), a new addition to flora of India and notes on its typification. *Telopea* 18:383-387.
- Grierson, A.J.C. & Long, D.G. 1983-2001. *Flora of Bhutan*. Vol.1 (1-3 parts) & 2 (1-3 parts). The Royal Botanic Garden, Edinburgh, London & The Royal Government of Bhutan.
- Griffith, W. 1847. *Journals of travel in Assam, Burma, Bootan, Afghanistan and the neighbouring countries*, ed. J. McClelland. Calcutta.
- Griffith, W. 1848. *Itinerary notes of plants collected in the Khasyah and Bootan mountains, 1837-38, in Afghanistan and the neighbouring countries, 1839-41*. ed. J. McClelland. Calcutta.
- Gurung, P.B. (1993). *Flora of Mokokchung District, Nagaland*. Ph. D. Thesis (unpublished), North Eastern Hill University, Shillong.
- Hajra, P.K., Verma, D.M. (ed.) 1996. *Flora of Sikkim*. Vol. 1. Botanical Survey of India. Calcutta.

- Hajra, P.K., Verma, D.M. & Giri, G.S. (eds.). 1996. *Materials for the flora of Arunachal Pradesh*. Vol-1. Botanical Survey of India. Calcutta.
- Haridasan, K. & Rao, R.R. 1985-1987. *Forest Flora of Meghalaya*. Vol-1 &2. Bishen Singh Mahendra Pal Singh. Dehra Dun, India.
- Hooker, J.D. 1872-1897. *The Flora of British India*. Vol. 1-7. Reeve & Co. Ltd., London.
- Hynniewta, T.M. 1999. *Nagaland*. In V. Mudgal and P.K. Hajra (eds.) *Floristic Diversity and Conservation strategies in India*. Vol. 3. Botanical Survey of India, Calcutta. Pp.1259-1292.
- Hynniewta, T. M., Kataki, S. K. & Wadhwa, B.M. 2000. *Orchids of Nagaland*. Botanical Survey of India. Calcutta, India.
- IPNI (2021). International Plant Names Index. Published on the Internet <http://www.ipni.org/>, The Royal Botanic Garden, Kew, Harvard University Herbaria & Libraries and Australian National Botanic Gardens.( Retrieved October 2021).
- Jain, S.K. & Rao, R.R. 1977. *Handbook of field and Herbarium methods*. Today and Tomorrow Publishers; New Delhi.
- Jakha, H.Y., Deb, C.R., Jamir, N.S. & Dey, S. 2015. *Arachnis labrosa* var. *zhaoi* (Orchidaceae): A new record for India. *Rheedea* 25(2): 120-122.
- Jamir, A.N., Jamir, N.S. & Deb, C.R. 2015. Three new distributional records of orchids from Intangki National Park, Nagaland, India. *International Journal of Research Studies in Biosciences (IJRSB)* 3(6): 7-9.
- Jamir, N.S. & Rao, R.R. 1988. *The Ferns of Nagaland*. Bishen Singh Mahindra Pal Singh. Dehra Dun, India.
- Joseph, J. 1982. *Flora of Nonghpoh and its vicinity*. Vol 1-3. Botanical Survey of India,

Howrah.

Kanjilal, U.N., Kanjilal, P.C., Das, A., De, R.N. & Bor, N.L. 1934-1940. *Flora of Assam*, Vol.1-5. Assam Government Press. Shillong. Avon Book Company, Ajmer Gate, Delhi-6.

Kapfo, W. & Puro, N. 2017. A checklist of orchids in two protected forests in Kohima district of Nagaland, India. *Pleione* 11(2): 349-366.

Kapfo, W. & Puro, N. 2018. Addition of *Habenaria pantlingiana* Kraenzi. in the orchid flora of Nagaland, India. *Annals Pl. Sci.* 7(3): 2107-2109.

Kataki, S.K. 1986. *Orchids of Meghalaya*. Government of Meghalaya, Shillong.

Lea, N., Limasenla & Kikon, Z.P. 2016. *Holcoglossum amesianum* (Reichenbach f.) Christenson (Orchidaceae): an addition to the flora of Nagaland. *Pleione*. Vol.10(1):180-182.

Lea, N. & Limasenla. 2020. Traditional knowledge of medicinal plants used by the Chakhesang Naga tribe in Phek district of Nagaland, India. *Pleione*. Vol.14(2): 237-247.

Lucksom, Z.S. 2007. *The Orchids of Sikkim and North East Himalaya*. S. Z. Lucksum. Siliguri.

Mao, A.A. & Gogoi, R. 2012. *Rhododendrons* of Manipur and Nagaland, India. *NeBio*. Vol. 3(1). 1-10.

Mao, A.A. & Gogoi, R. 2016. *Flora of Dzikou/Dzukou Valley*. Botanical Survey of India, Kolkata.

Mao, A.A., Odyuo, N., Verma, D. & Singh, P. 2017. *Check list of Flora of Nagaland*. Botanical Survey of India, Kolkata.

Masters, J.W. 1844. Observations on the Flora of Naga Hills. *J. Asiat. Soc. Bengal* 13(2):

707-734.

Masters, J.W. 1848. Extract from a memoir of some of the natural productions of the Angami Naga Hills and other parts of upper Assam. *J. Asiat. Soc. Bengal* 17 (1): 57-59.

Moaakum & Dey, Santanu, 2013. Rediscovery of *Heydygium longipedunculatum* A.R.K. Sastry & D. M. Verma [Zingiberaceae] from Nagaland India. *Pleione* 7(1):290-294.

Moaakum, Dey, S., Chaturvedi, S. K. and Jamir, N. S. 2014. Diversity of the genus *Hoya* R. Brown (Apocynaceae: Asclepiadoideae) in Tuensang and Zunheboto district of Nagaland, India. *Pleione* 8(2):391-395.

Moaakum. (2011). *Flora of Zunheboto District, Nagaland*. Ph. D. Thesis (unpublished), Nagaland University, Lumami.

Moaakum, Dey, S., Adamowski, W. & Gogoi, R. 2017. *Impatiens nagorum* sp. Nov. (Balsaminaceae) a new species from Nagaland, Northeast India. *Phytotaxa* 308(2): 275-282.

Mozhui, R. (2014). *Studies on Floristic Diversity of Dimapur District, Nagaland*. Ph. D. Thesis (unpublished), Nagaland University, Lumami.

Mudgal, V. & Hajra, P.K. 1997. *Floristic diversity and conservation strategies in India*. Vol-1. Botanical Survey of India. Calcutta, India. Pp. 4-38.

Nair, N.C., Nair, V.J. & Daniel, P. 1996. *Botanical History*. In: Hajra, P.K., Sharma, B.D. Sanjappa, M. & Sastry, A.R.K. (eds.). *Flora of India*, Introductory Vol. (Part I). Botanical Survey of India. Calcutta, India. Pp. 53-196.

Naithani, H. B. 2011. *Bamboos of Nagaland*. Nagaland Empowerment of People Through Economic Development. Nagaland, India.

Ningombam D.S. & Singh, P.K. 2013. Occurrence of less known species of *Strobilanthes*

- Blume (Acanthaceae) in Manipur, North East India. *NeBio*. Vol.4(6). 45-57.
- Noltie, H.J. 1994, 2000. *Flora of Bhutan*. Vol. 3(1-2 parts). Royal Botanic Garden, Edinburgh & The Royal Government of Bhutan.
- Odyuo, N., Roy, D.K., Dey, S. & Mao, A.A. 2015. *Sauromatum horsfieldii* (Araceae-Areace): an addition to the Flora of India. *Telopea* 18: 227-232.
- Odyuo, N., Roy, D.K. & Khamdi, H.B. 2016. *Molineria fakimense* (Hypoxidaceae), a new species from Nagaland, India. *Rheedea* 26(2): 49-53.
- Odyuo, N., Roy, D.K. & Averyanov, L. 2017. *Gleadovia konyakianorum* (Orobanchaceae), a new species from Nagaland, India. *Phytotaxa* 326(4): 274-278.
- Pearce, N.R. & Cribb, P.J. 2002. *Flora of Bhutan: The orchids of Bhutan*. Vol. 3 part 3. The Royal Botanic Garden Edinburgh & The Royal Government of Bhutan.
- Rao, A.S. & Verma, D.M. 1972. Materials towards a Monocot Flora of Assam –II. (Zingiberaceae & Marantaceae). *Bull. Bot. Surv. India* 14 (1-4): 114-143.
- Rao, A.S. & Verma, D.M. 1973. Materials towards a Monocot Flora of Assam –III. (Taccaceae, Dioscoreaceae & Stemonaceae). *Bull. Bot. Surv. India*. Vol. 15(3&4): 189-203.
- Rao, A.S. & Verma, D.M. 1982. *Cyperaceae of North East India*. Botanical Survey of India, Howrah.
- Rao, R.R. 1978. The Genus *Sonchus* Linn. (Asteraceae) in North-East India. *Acta. Bot. Indica*. 6: 94-97.
- Rao, R.R. 1981a. Ethnobotanical studies on the Flora of Meghalaya – some interesting reports on herbal medicines. In S.K. Jain (ed.) ‘*Glimpses of Indian Ethnobotany*’ pp. 137-148. Oxford and IBH Publishing co. New Delhi.
- Rao, R.R. 1981b. Ethnobotany of Meghalaya; medicinal plants used by Khasi and Garo

- tribes in Meghalaya. *Econ. Bot.* 35(1): 4-9.
- Rao, R.R. 1982. Forest types of North East India, in *Development without destruction* (eds.) Saratchandra, H.C., J. Joseph & N. Goswami, Shillong.
- Rao, R.R. & Chaudhary, L.B. 1999. Floras and Revisions. In: Rao, R.R. (ed.), *Training course on methods and approaches in Plant Taxonomy, Workshop Manual*. National Botanical Research Institute, Lucknow, India.
- Rao, R.R. & Haridasan, K. 1982. Notes on distribution of certain endangered or endemic plants of Meghalaya with brief remark on the Flora. *J. Bombay Nat. Hist. Soc.* 79(1): 93-99.
- Rao, R. R. & Jamir, N. S. 1982a. Ethnobotanical Studies in Nagaland – I. Medicinal plants.. *Econ. Bot.* 36(2): 176-181.
- Rao, R. R. & Jamir, N. S. 1982. Ethnobotanical Studies in Nagaland – II, 54 Medicinal plants used by Nagas. *J. Econ. Taxon. Bot.* 3: 11-18.
- Rheede, H.A.Van. 1678-1693. *Hortus malabaricus*, Vol. 1-12. Amsterdam.
- Robinson, W. 1841. *A descriptive account of Assam*. London.
- Rongsensashi. 2014. *Studies on the Floristic Studies of Fakim Wildlife Sanctuary, Nagaland*. Ph. D. Thesis (unpublished). Nagaland University, Lumami.
- Rongsensashi, Limasenla, Mozhui, R., Changkija, S. 2010. New distributional record of *Trachycarpus takil* Beccari from Nagaland, North East India. *Pleione* 4(2): 307-309.
- Rongsensashi, Limasenla, Mozhui, R., Changkija, S. 2011. *Chilochista parishii* Sciendenf and *Epipogium roseum* (D. Don) Lindl. (Orchidaceae): New records for Nagaland. *Journal of Economic and Taxonomic Botany*. 35(3): 602-605.
- Rongsensashi, Mozhui, R., Limasenla, Changkija, S. & Dey, S. 2016. Extended distributional record of *Calanthe hancockii* Rolfe (Orchidaceae): A critically



- endangered species from Nagaland, India. *Pleione* 10(2): 400-402.
- Roxburgh, W. 1820 & 1824. *Flora Indica*, Vol. 1-2. Serampore.
- Roy, D.K., Lytan, R., Biate, D.L. & Odyuo, N. 2021. *Stadiochilus* R.M.Sm. (Zingiberaceae: *Zingibereae*), a new generic record for India. *Turczaninowia* 24(4): 47-53.
- Sharma, B.D., Balakrishnan N.P., Rao R.R & Hajra P.K. (eds.) 1993. *Flora of India*. Vol-1 Ranunculaceae - Barclayaceae. Botanical Survey of India., Calcutta.
- Singh, K.P. & Sinha, G.P. 1994. *Lichen Flora of Nagaland*. Bishen Singh Mahendra Pal Singh. Dehra Dun, India.
- Singh, N. P., Chauhan, A. S. & Mondal, M.S. (eds.) 2000a. *Flora of Manipur*. Vol. 1. Botanical Survey of India, Calcutta.
- Singh, N.P., Singh, K.P. & Singh, D.K. (eds.) 2002. *Flora of Mizoram*. Vol-1. Botanical Survey of India, Kolkata.
- Singh, R.K., Lairenjam, C., Bharali, R., Dutta, P.R. & Rajkhowa, C. 2009. *Resource Inventory of District Phek – Nagaland*. Krishi Vigyan Kendra-NRC on Mithun Porba, Phek, Nagaland.
- Singh, W.A., Handique, P.J. & Devi, H.S. 2016. *Musa sikkimensis* Kurz (Musaceae): A note on the rediscovery from Manipur, India. *Folia malaysiana*. Vol. 17(1): 47-53.
- Sinha, G.P., Singh, D.K. & Singh, K.P. (eds.) 2012. *Flora of Mizoram*. Vol-2. Botanical Survey of India, Kolkata.
- Takhtajan, A. 1969. *Flowering Plants, Origin and Dispersal* (Tr. Jeffery), Edinburgh.
- Wallich, N. 1829-1832. *Plantae Asiaticae Rariores; or, Description and figures of a select number of unpublished East Indian plants*. Vol. 1-3. London.

## PAPER PUBLICATIONS

- Lea, N., Limasenla and Kikon, Z. P., 2016. *Holcoglossum amesianum* (Reichenbach f.) Christenson (Orchidaceae): an addition to the flora of Nagaland, India. *Pleione* 10(1): 180 - 182.
- Lea, N. and Limasenla, 2020. Traditional knowledge of medicinal plants used by the *Chakhesang* Naga tribe in Phek District of Nagaland, India. *Pleione* 14(2): 237-247.
- Lobeno Mozhui, Nelia Lea, L. N. Kakati, 2021. Commonly available edible insects and their food plants in Nagaland, North-East India: future prospect. *Indian Journal of Entomology*.

## PAPER PRESENTED

- Presented a paper at the National Seminar “Globalization, Development and Environment with special reference to North-East India” on the topic “wild edible plants of Phek District, Nagaland;”, at Nagaland University, March 19-20, 2015.
- Presented a paper at the National Seminar “Inventory, Sustainable Utilization and Conservation of Bioresources” on the topic “Medicinal plants of Razeaba Range of Phek District, Nagaland”, at Nagaland University, February 26-27, 2016.
- Presented a paper at the National Conference of Stakeholders on Conservation, Cultivation, Resource Development and Sustainable Utilization of Medicinal Plants of North-East India on the topic “Ethnomedicinal plants used by the Chakhesang Naga of Phek District, Nagaland, India” at Nagaland University, March 6-7, 2019.

## **SEMINAR AND TRAINING ATTENDED**

- Attended National Workshop on “Scientific Writing, Research Communication and IPR Issues”, August 28-29, 2014 at Nagaland University, Lumami.
- Attended National Workshop on “Database Designing for Biologists”, September 9-11, 2014 at Nagaland University, Lumami.
- Attended National Seminar on “Globalization, Development and Environment with special reference to North-East India”, March 19-20, 2015 at Nagaland University, Lumami.
- Attended Himalayan Young Researchers’ Meet-II, September 15-17, 2015, at G.B. Pant Institute of Himalayan Environment and Development, Kosi-Katarmal, Almora, Uttarakhand.
- Attended Conservation Assessment and Management Prioritisation (CAMP) of medicinal plants of Nagaland, September 22-25, 2015, at Dimapur, Nagaland.
- Attended National Seminar on “Inventory, Sustainable Utilization and Conservation of Bioresources”, February 26-27, 2016 at Nagaland University, Lumami.
- Participated in the “Training on Basics of Plant Identification and Nomenclature”, organised by Eastern Regional Centre, Botanical Survey of India, Shillong, November 7-9, 2016.
- Participated in the “Botanical Nomenclature Course” organised by Botanical Survey of India from 27-31 January, 2020.



*Clematis buchananiana* DC.



*Clematis puberula* Hook.f. & T.



*Thalictrum foliolosum* DC.



*Magnolia insignis* Wall.



*Magnolia doltsopa* (Buch.-Ham. ex DC.)  
Figlar

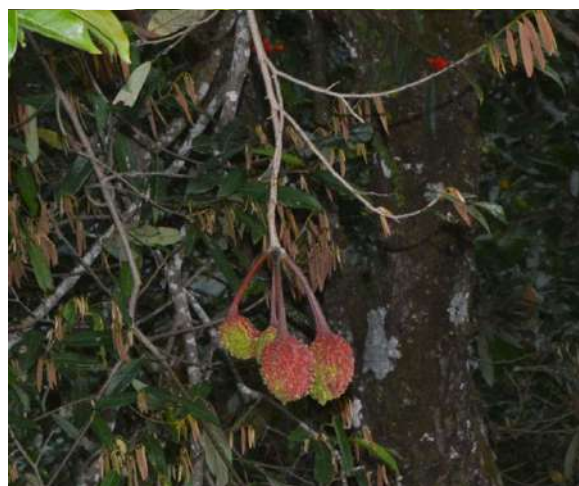


*Illicium griffithii* Hook.f. & Thomson





*Illicium simonsii* Maxim.



*Fissistigma verrucosum* (Hook.f & Thomson) Merr.



*Cissampelos pareira* var. *hirsuta* (Buch.-Ham. ex DC.) Forman



*Stephania japonica* var. *discolor* (Blume) Forman



*Stauntonia latifolia*(Wall.) R.B.ex Wall.



*Capparis acutifolia* Sweet





*Capparis multiflora* Hook. F & Thom.



*Capparis sikkimensis* Kurz



*Viola canescens* Wall.



*Viola hamiltoniana* D. Don



*Viola pilosa* Blume



*Gynocardia odorata* R. Br.



*Polygala arillata* Buch.-Ham. ex D. Don



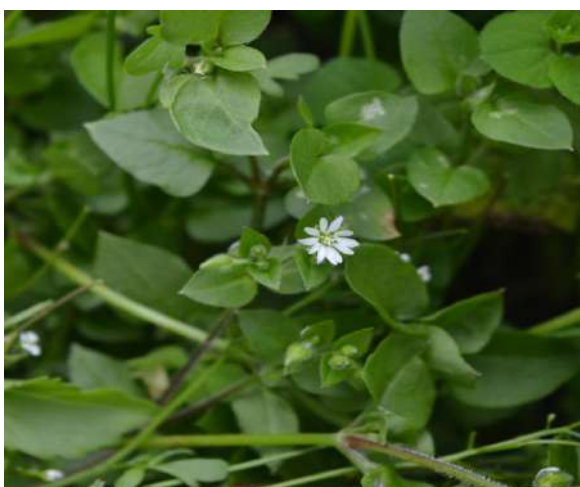
*Polygala persicariifolia* DC.



*Polygala sibirica* L.



*Brachystemma calycinum* D. Don



*Stellaria media*(L.) Vill.

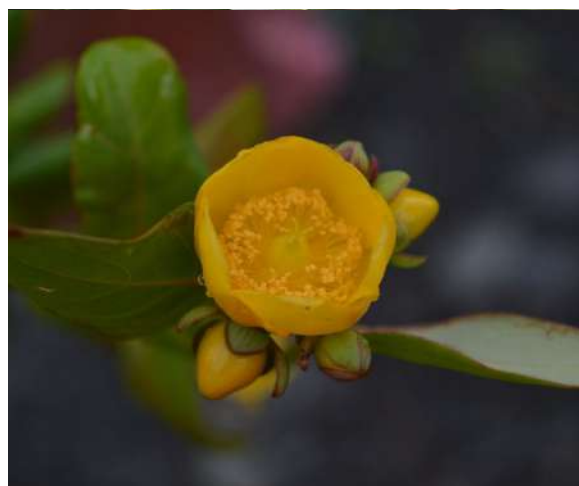


*Hypericum elodeoides* Choisy





*Hypericum japonicum* Thunb.



*Hypericum uralum* Buch.-Ham. ex D.  
Don



*Schima wallichii*(DC.) Korth.



*Actinidia callosa* Lindl.



*Saurauia napaulensis* DC.



*Saurauia punduana* Wall.





*Abelmoschus manihot* var. *pungens*  
(Roxb.) Hochr.



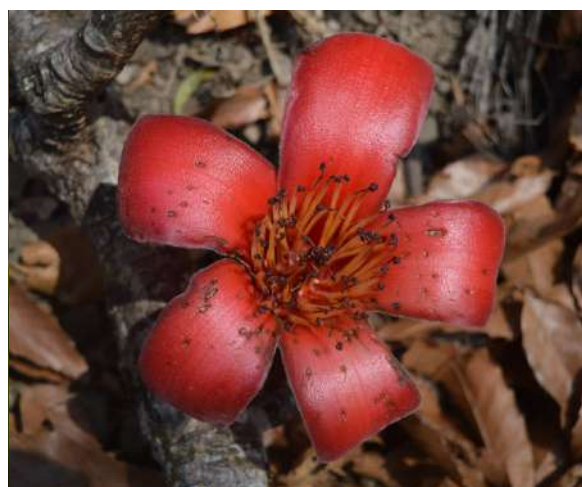
*Hibiscus syriacus* L.



*Kydia calycina* Roxb.



*Sida rhombifolia* L.



*Bombax ceiba* L.



*Abroma augustum* (L.) L.f.





*Firmiana colorata* (Roxb.) R. Br.



*Reevesia walichii* R. Br.



*Sterculia lanceolata* var. *coccinea* (Jack)  
Phengklai



*Colona floribunda* (Kurz) Craib



*Grewia abutilifolia* Vent. ex Juss.



*Grewia serrulata* DC.





*Triumfetta pilosa* Roth



*Elaeocarpus aristatus* Roxb.



*Elaeocarpus floribundus* Blume



*Impatiens arguta* Hook.f. & Thomson



*Impatiens graciliflora* Hook.f.



*Impatiens laevigata* Wall. ex Hook. f. & Thomson





*Impatiens pulchra* Hook.f. & Thomson



*Impatiens stenantha* Hook.f.



*Boenninghausenia albiflora*(Hook.)  
Rchb. ex Meisn



*Murraya paniculata* (L.) Jack



*Toddalia asiatica*(L.) Lamk.



*Zanthoxylum acanthopodium* DC.





*Zanthoxylum armatum* DC.



*Heynea trijuga* Sims.



*Munronia pinnata* (Wall.) W. Theob.



*Toona hexandra* (Wall.) M. Roem.



*Euonymus echinatus* Wall.



*Euonymus hamiltonianus* Wall.





*Gouania napalensis* Wall.



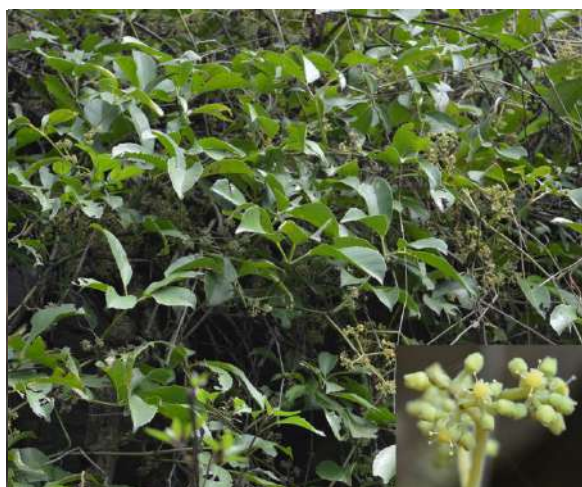
*Ziziphus incurva* Roxb.



*Causeria japonica* (Thunb.) Raf.



*Cissus repens* Lam.



*Tetrastigma leucostaphylum* (Dennst.)  
Alston



*Tetrastigma obovatum* Gagnep.





*Tetrastigma serrulatum* (Roxb.) Planch.



*Leea asiatica* (L) Ridsdale



*Acer oblongum* Wall.ex DC.



*Acer sikkimense* Miq.



*Choerospondias axillaris* (Roxb.) B. L.  
Burt & A.W. Hill



*Dobinea vulgaris* Buch.-Ham. ex D. Don





*Pegia nitida* Colebr.



*Rhus chinensis* Mill.



*Spondias pinnata* (L. f.) Kurz.



*Apios carnea* (Wall.) Benth. ex Baker



*Butea minor* Buch.-Ham. ex Wall.



*Callerya cinerea* (Benth.) Schot





*Crotalaria albida* B. Heyne ex Roth



*Crotalaria lejoloba* Bartl.



*Crotalaria sericea* Burm.f.



*Dalbergia stipulacea* Roxb.



*Desmodium concinnum* DC.



*Desmodium heterocarpon* (L.) DC.





*Desmodium laxiflorum* DC.



*Desmodium triquetrum* (L.) DC.



*Desmodium velutinum* (Willd.) DC.



*Indigofera atropurpurea* Buch.-Ham.ex  
Hornem.



*Indigofera nigrescens* Kurz ex King &  
Prain



*Millettia pachycarpa* Benth.





*Mucuna sempervirens* Hemsl.



*Pueraria montana* var. *thomsonii*  
(Benth.) M.R.Almeida



*Pueraria peduncularis* (Benth.) Graham  
ex Benth.



*Trifolium repens* L.



*Vigna radiata* (L.) R. Wilczek



*Vigna vexillata* (L.) A. Rich.





*Bauhinia variegata* L.



*Cheniella quinnanensis* subsp. *Gandhiana*  
(Gogoi & Bandyop.) R. Clark & Mackinder



*Chamaecrista mimosoides* (L.) Greene



*Senna septemtrionalis* (Viv.) H.S.Irwin  
& Barneby



*Albizia chinensis* (Osbeck) Merr.



*Albizia julibrissin* Durazz.



*Senegalia pennata* (L.) Maslin



*Agrimonia pilosa* Ledeb.



*Argentina lineata* (Trevir.) Sojak



*Docynia indica* (Wall.) Decne.



*Eriobotrya bengalensis* (Roxb.) Kurz



*Neillia thyrsiflora* D. Don





*Potentilla indica* (Andrews) Th. Wolf



*Potentilla sundaica* (Blume) W. Theob



*Prunus cerasoides* Buch.-Ham.ex  
D.Don



*Pyrus pashia* Buch.-Ham. ex D. Don



*Rubus calycinus* Wall. ex D. Don



*Rubus ellipticus* Sm.





*Rubus niveus* Thunb.



*Rubus pedunculatus* D. Don



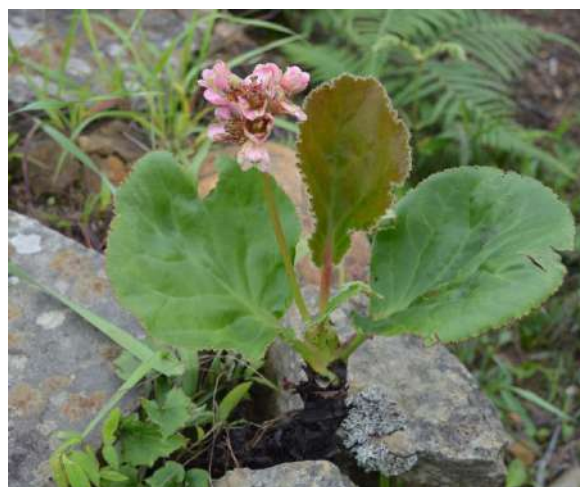
*Rubus rugosus* Sm.



*Rubus sumatranus* Miq.



*Astilbe rivularis* Buch.-Ham. ex D. Don



*Bergenia ciliata* (Haw.) Sternb.





*Chrysosplenium nepalense* D.Don



*Hydrangea febrifuga* (Lour.) Y.De  
Smet & Granados



*Sedum multicaule* Wall.ex Lindl.



*Drosera peltata* Thunb.



*Carallia brachiata* (Lour.) Merr.



*Illigera grandiflora* W. W Sm. & Jeffrey





*Melastoma malabathricum* subsp.  
*normale* (D.Don) Karst. Mey.



*Osbeckia stellata* Buch.-Ham. ex D.Don



*Oxyspora paniculata* (D. Don) DC.



*Sonerila tenera* Royle



*Cuphea carthagenensis* (Jacq.)  
J.F.Macbr.



*Rotala rotundifolia* (Buch.-Ham. ex  
Roxb.) Koehne.





*Circaea repens* Wall. ex Asch. & Magnus



*Epilobium brevifolium* subsp. *trichoneurum* (Hausskn.) Raven



*Oenothera rosea* Aiton



*Adenia trilobata* (Roxb.) Engl.



*Passiflora leschenaultii* DC.



*Passiflora napalensis* Wall.





*Passiflora subpeltata* Ortega



*Cucumis hystrix* Chakravarty



*Cucumis maderaspatana* L.



*Hemsleya macrocarpa* (Cogn.) C.Y.Wu  
ex C. Jeffrey



*Hodgsonia macrocarpa* Cogn.



*Momordica dioica* Willd.





*Thladiantha cordifolia* (Blume) Cogn.



*Trichosanthes wallichiana* (Ser.) Wight



*Begonia flaviflora* Hara



*Begonia palmata* D. Don



*Begonia roxburghii* (Miq.) A.DC.



*Centella asiatica* (L.) Urb.





*Oenanthe javanica* (Blume) DC.



*Sanicula elata* Buch.-Ham.ex D.Don



*Brassaiopsis glomerulata* (Blume)  
Regel



*Brassaiopsis hainla* (Buch.-Ham) Seem.



*Heteropanax fragrans* (Roxb.) Seem.



*Macropanax dispermus* (Blume) Kuntze





*Schefflera venulosa* (Wight & Arnott)  
—



*Helwingia himalaica* Hook. f. &  
Thomson ex C. B. Clarke



*Alangium chinense* (Lour.) Harms



*Cornus capitata* Wall.ex Roxb.



*Cornus macrophylla* Wall.



*Leycesteria formosa* Wall.





*Lonicera macrantha* (D. Don) Spreng.



*Sambucus javanica* Blume



*Viburnum coriaceum* Blume



*Viburnum foetidum* Wall.



*Leptodermis griffithii* Hook.f.



*Morinda angustifolia* Roxb.





*Mussaenda glabra* Vahl.



*Mussaenda macrophylla* Wall.



*Mycetia longifolia* (Wall.)Kuntze



*Mycetia mukerjiana* Deb & Ratna Dutta



*Neohymenopogon parasiticus* (Wall.)  
Bennet



*Rubia cordifolia* L.





*Uncaria macrophylla* Wall



*Wendlandia budleioides* Wall. ex Wight  
& Arn.



*Wendlandia wallichii* Wight & Arn.



*Valeriana jatamansii* Jones



*Ainsliaea latifolia* (D. Don)



*Anaphalis griffithii* Hook.





*Anaphalis margaritacea* (L.) Benth. & Hook.



*Bidens tripartita* L.



*Cirsium interpositum* Petrak



*Cyathocline purpurea* (D. Don) Kuntze



*Dichrocephala benthamii* Clarke



*Galinsoga parviflora* Cav.

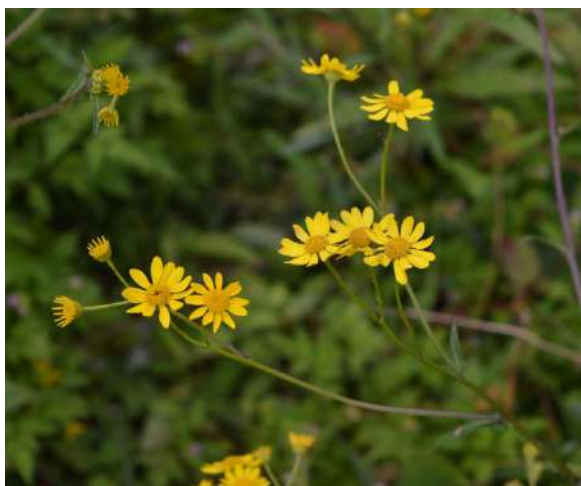




*Microglossa pyrifolia* (Lam.) Kuntze



*Rhynchospermum verticillatum*  
Reinw.ex Blume



*Senecio scandens* Buch.-Ham. ex D.  
Don



*Sigesbeckia orientalis* L.



*Synedrella nodiflora* (L.) Gaertn.



*Vernonia volkameriifolia* DC.





*Campanula pallida* Wall.



*Codonopsis gracilis* Hook.f. & Thomson



*Codonopsis javanica* (Blume) Hook. f.  
& Thomson



*Lobelia nummularia* Lam.



*Lobelia seguinii* H. Lev. & Vaniot



*Wahlenbergia marginata* (Thunb.) A.  
DC.





*Lyonia ovalifolia* (Wall.) Drude



*Rhododendron arboreum* Sm.



*Vaccinium exaristatum* Kurz.



*Vaccinium vacciniaceum* (Roxb.)  
Sleumer



*Monotropa uniflora* L.



*Lysimachia congestiflora* Hemsl.





*Lysimachia debilis* Wall.



*Lysimachia lobelioides* Wall.



*Primula filipes* G. Watt



*Ardesia macrocarpa* Wall.



*Ardesia polysticta* subsp. *polysticta*



*Embelia floribunda* Wall.





*Embelia ribes* Burm.f.



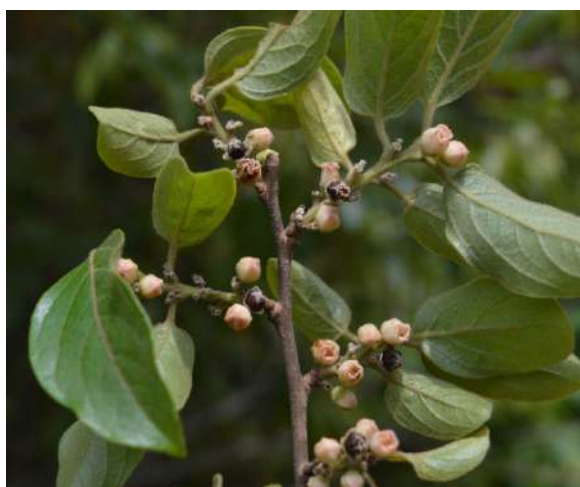
*Maesa indica* (Roxb.) A. DC.



*Maesa rugosa* C. B. Clarke



*Diospyros kaki* Thunb.



*Diospyros stricta* Roxb.



*Chrysojasminum subhumile* (W.W. Sm.)  
Banfi & Galasso





*Jasminum dispernum* Wall.



*Jasminum elongatum* (P.J.Bergius)  
Willd.



*Jasminum lanceolaria* Roxb.



*Jasminum laurifolium* Roxb.ex  
Hornem.

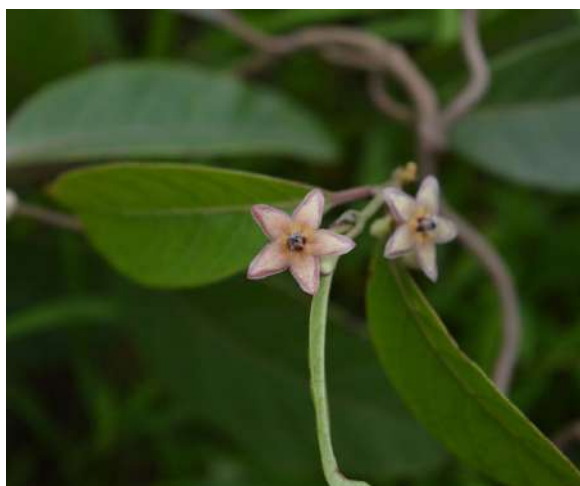


*Aganosma cymosa* (Roxb.) G. Don



*Chonemorpha griffithii* Hook.f.





*Decalepis khasiana* (Kurz) lonta ex  
Kambale



*Gomphocarpus physocarpus* E. Mey.



*Gongronema napalense* (Wallich)  
Decaisne



*Hoya longifolia* Wall.



*Myriopteron extensum* (Wight) K.  
Schum.



*Periploca calophylla* (Wight) Falc.



*Toxocarpus himalensis* Falc.ex Hook.f.



*Buddleja asiatica* Lour.



*Buddleja macrostachya* Benth.



*Gentiana pedicellata* (D.Don) Griseb.



*Swertia bimaculata* (Siebold & Zucc.)  
Hook.f. & Thomson ex C. B. Clarke



*Swertia nervosa* (G.Don) Wall.





*Cynoglossum lanceolatum* Forssk.



*Cynoglossum zeylanicum* (Sw.ex  
Lehm.) Thunb. ex Brand



*Ehretia macrophylla* Wall.



*Ehretia wallichiana* Hook.f. &  
Thomson ex C.B.Clarke



*Tournefortia montana* Lour.



*Trigonotis microcarpa* (DC.) Benth. ex  
C. B. Clarke

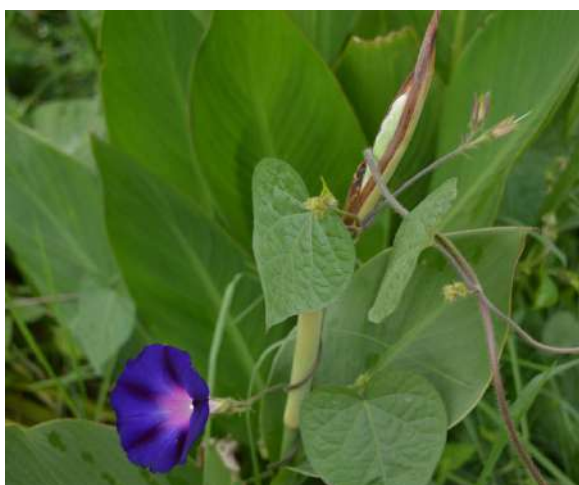




*Argyreia capitata* (Vahl) Arn. ex Choisy



*Erycibe paniculata* Roxb.



*Ipomoea nil* (L.) Roth



*Ipomoea purpurea* (L.) Roth



*Merremia umbellata* (L.) Hallier f.



*Merremia vitifolia* (Burm. f.) Hallier f.





*Poranopsis paniculata* (Roxb.) Roberty



*Brugmansia suaveolens* (Willd.) Sweet



*Physalis peruviana* L.



*Solanum erianthum* D. Don



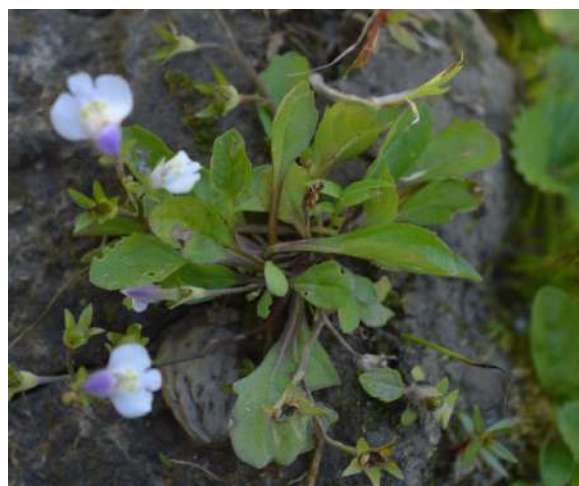
*Alectra avensis* (Benth.) Merr.



*Bonnaya ruellloides* (Colsm.) Spreng.



*Lindenbergia muraria* (Roxb. ex D. Don)  
Bruhl



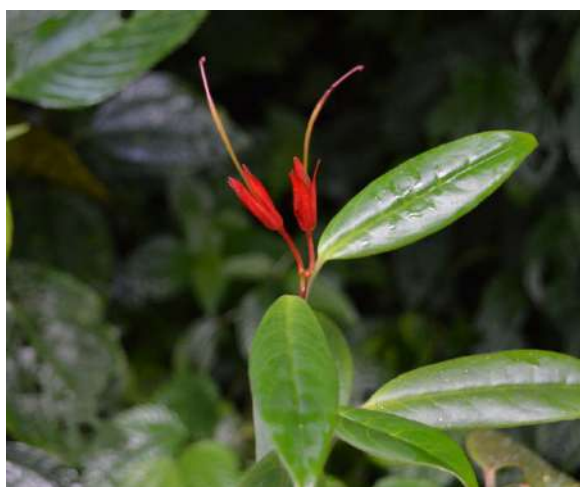
*Mazus pumilus* (Burm.f.) Steenis



*Wightia speciosissima* (D. Don) Merr.



*Aeginetia indica* L.



*Aeschynanthus bracteatus* Wall. ex. A.  
DC.



*Aeschynanthus hookeri* C.B. Clarke





*Aeschynanthus parasiticus* (Roxb.)  
Wall.



*Aeschynanthus parviflorus* (D.Don)  
Spreng.



*Henckelia pumila* (D.Don) A. Dietr.



*Lysionotus serratus* D.Don



*Radermachera sinica* (Hance) Hemsl.



*Barleria cristata* L.





*Hypoestes triflora* (Forssk.) Roem. & Schult.



*Justicia adhatoda* L.



*Justicia vasculosa* (Nees) T. Anderson



*Mackaya neesiana* (Wall.) Das



*Phlogacanthus asperulus* Nees



*Phlogacanthus tubiflorus* Nees





*Strobilanthes affinis* (Griff.) Terao ex  
J.R.I. Wood & J. R. Benn.



*Strobilanthes helicta* T. Anderson



*Strobilanthes mastersii* T. Anderson



*Strobilanthes pterygorrhachis* C. B.  
Clarke



*Strobilanthes recurva* C.B. Clarke



*Strobilanthes torrentium* Benoist





*Callicarpa arborea* Roxb.



*Callicarpa rubella* Lindl.



*Clerodendrum chinense* (Osbeck)  
Mabb.



*Clerodendrum colebrookianum* Walp.



*Clerodendrum laevifolium* Blume



*Gmelina arborea* Roxb.ex Sm.





*Pseudocaryopteris foetida* (C.B.Clarke)  
P. D. Cantino



*Rothea serrata* (L.) Steane & Mabb.



*Vitex quinata* (Lour.) F. N. Williams



*Colquhounia coccinea* Wall.



*Craniotome furcata* (Link) Kuntze



*Elsholtzia flava* (Benth.) Benth.





*Leucosceptrum canum* Sm.



*Pogostemon elsholtzioides* Benth.



*Scutellaria violacea* B. Heyne ex Benth.



*Achyranthes bidentata* Blume



*Amaranthus viridis* L.



*Stilbanthus scandens* Hook.f.





*Persicaria barbata* var. *gracilis* (Danser)  
H.Hara



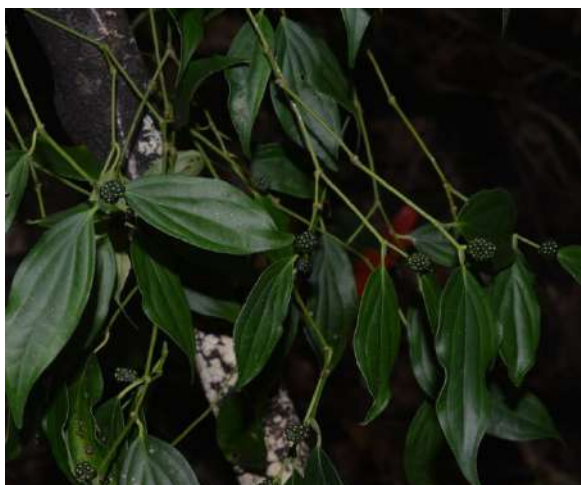
*Persicaria hydropiper* (L.) Delarbe



*Rumex nepalensis* Spreng.



*Peperomia tetraphylla* Hook. & Arn.



*Piper mullesua* Buch.-Ham.ex D.Don



*Piper pothoides* (Miq.) Wall.





*Lindera pulcherrima* (Nees) Benth. ex Hook. f.



*Litsea cubeba* (Lour.) Pers.



*Machilus duthiei* King ex Hook. f.



*Phoebe lanceolata* (Nees) Nees



*Daphne bholua* Buch.-Ham. ex D. Don



*Helixanthera parasitica* Lour.





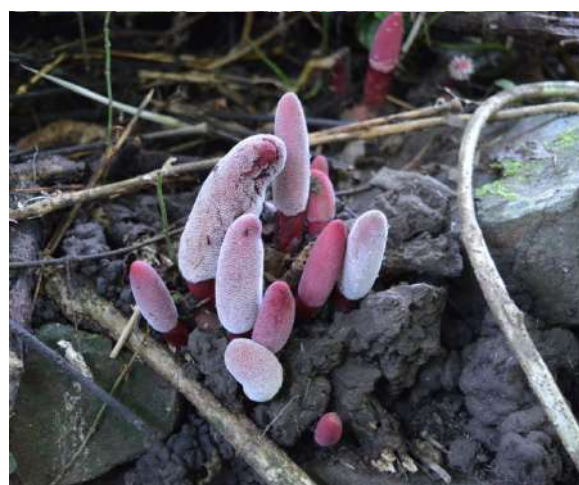
*Macrosolen cochinchinensis* (Lour.)  
Tiegh.



*Scurrula parasitica* L.



*Viscum articulatum* Burm.f.



*Balanophora dioica* R. Br. ex Royle



*Antidesma bunius* (L.) Spreng.



*Baliospermum calycinum* Muell.





*Breynia retusa* (Dennst.) Alston



*Bridelia glauca* Blume



*Croton caudatus* Geiseler



*Drypetes indica* (Mull.Arg.) Pax & K.Hoffm.



*Mallotus nepalensis* Mull. Arg.



*Mallotus philippensis* (Lam.) Muell. Arg.





*Ostodes paniculata* Blume



*Phyllanthus emblica* L.



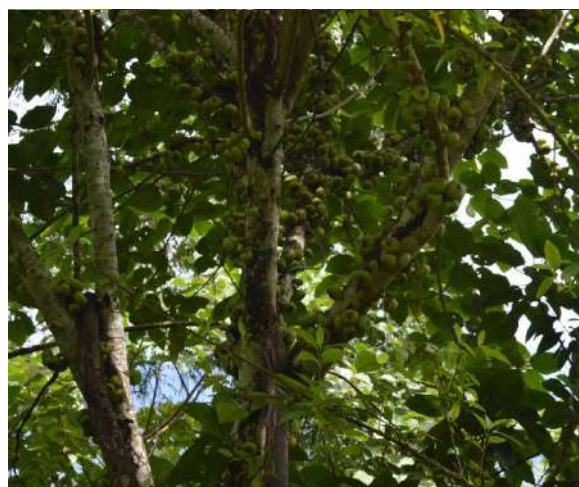
*Phyllanthus velutinus* (Wight) Mull.  
Arg.



*Trema orientale* (L.) Blume



*Cannabis sativa* L.



*Ficus auriculata* Lour.





*Ficus cyrtophylla* (Miq.) Miq.



*Ficus fulva* Reinw. ex Blume



*Ficus hederacea* Roxb.



*Ficus neriifolia* Sm.



*Ficus semicordata* Buch.-Ham. ex Sm.



*Ficus subincisa* Buch.-Ham. ex Sm.





*Morus indica* L.



*Morus macroura* Miq.



*Boehmeria clidemioides* Miq.



*Boehmeria depauperata* Wedd.



*Boehmeria penduliflora* Wedd. ex D. G.  
Long



*Pouzolzia hirta* (Bl.) Hassk.





*Pouzolzia sanguinea* (Blume) Merr.



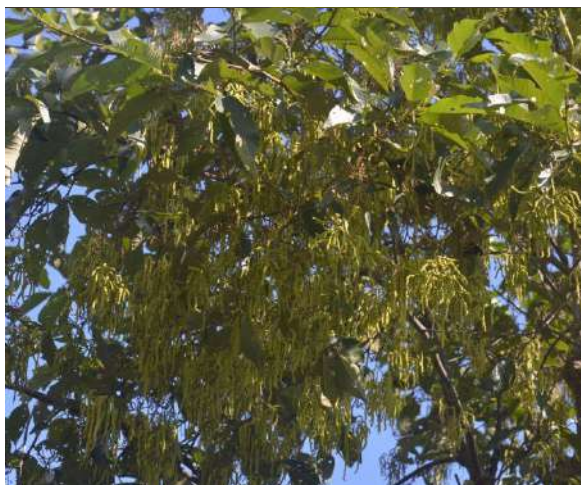
*Engelhardia spicata* Lechen ex Blume



*Juglans regia* L.



*Myrica esculenta* Buch.-Ham. ex D. Don

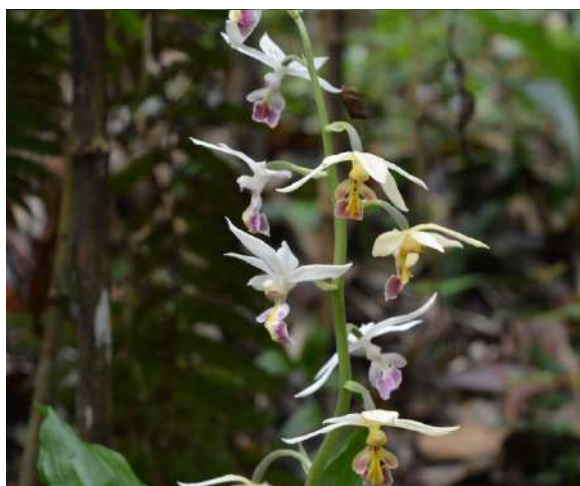


*Alnus nepalensis* D. Don



*Castanopsis tribuloides* A. DC.





*Calanthe brevicornu* Lindl.



*Coelogyne barbata* Lindl.ex Griff.



*Coelogyne corymbosa* Lindl.



*Dendrobium chrysotoxum* Lindl.



*Dendrobium denudans* D.Don



*Dendrobium farmeri* Paxton





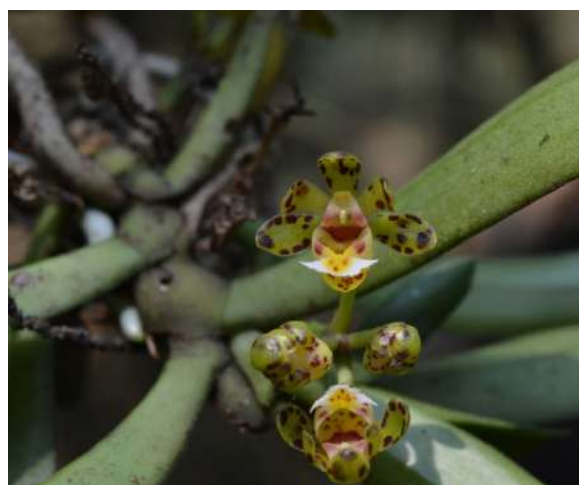
*Dendrobium fimbriatum* var. *oculatum*  
Hook.



*Dendrobium polyanthum* Wall.ex  
Lindl.



*Dendrobium wardianum* Warner



*Gastrochilus calceolaris* (Buch.-Ham.ex  
Sm.) D. Don



*Holcoglossum amesianum*  
(Reichenbach.f.) Christenson



*Paphiopedilum hirsutissimum* (Lindl.ex  
Hook) Stein



*Papilionanthe vandarum* (Rchb.f.)  
Garay



*Pecteilis susannae* (L.) Raf.



*Renanthera imschootiana* Rolfe



*Satyrium nepalense* D.Don



*Tainia viridifusca* (Hook.) Benth. ex  
Hook.f.



*Vanda pumila* Hook.f.





*Alpinia malaccensis* (Burm.f.) Roscoe



*Alpinia nigra* (Gaertn.) Burtt



*Hedychium coccineum* Sm.



*Hedychium ellipticum* Sm.



*Hedychium gardnerianum* Roscoe



*Hedychium greenii* W.W. Sm.

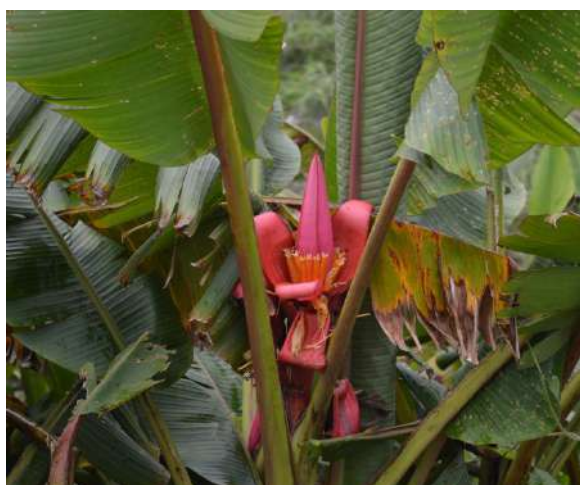




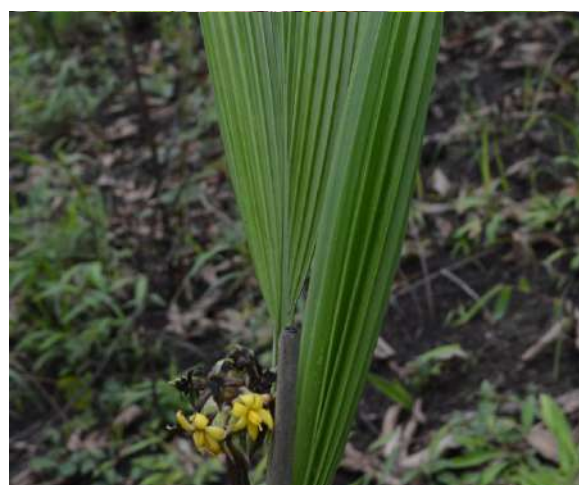
*Hedychium longipedunculatum* Sastry  
& D.M. Verma



*Kaempferia rotunda* L.



*Musa velutina* H.Wendl. & Drude



*Curculigo capitulata* (Lour.) Kuntze



*Curculigo orchiioides* Gaertn.



*Dioscorea bulbifera* L.





*Dioscorea pentaphylla* L.



*Cardiocrinum giganteum* (Wall.)  
Makino



*Dianella ensifolia* (L.) Redoute



*Disporum cantoniense* (Lour.) Merr.



*Polygonatum cirrhifolium* (Wall.) Royle



*Pontederia vaginalis* Burm.f.





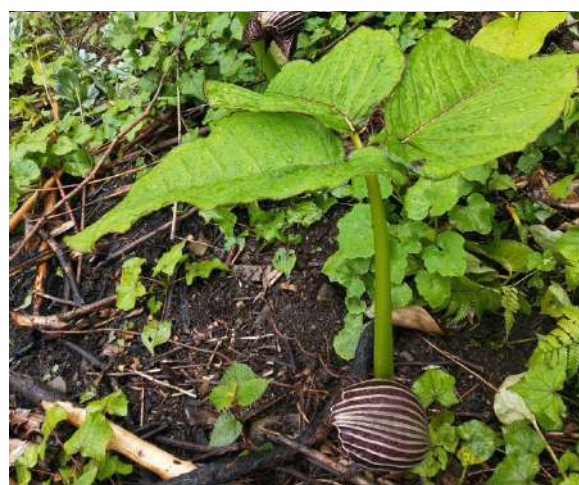
*Juncus effusus* L.



*Arisaema album* N.E.Br.



*Arisaema consanguineum* Schott



*Arisaema lingyunense* H. Li



*Pothos scandens* L.



*Typha elephantina* Roxb.