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Cinchona

Common Medicinal Plants of Darjeeling and the Sikkim Himalayas

By

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DEDICATED

TO

Dr. B. C. ROY, M.D., D.Sc., M.R.C.P., F.R.C.S. (Eng.)
F.R.C.P. (Lond.), F.S.M.E.

Chief Minister

West Bengal

AND

Chairman

Medicinal Plants Committee

West Bengal

as a token of high esteem and deep
gratitude, for much help and inspiration
received during my investigation on the
Medicinal Plants of
INDIA

FOREWORD

THAT THE FLORA of India is both abundant and rich in every kind and description of plants is well known. On account of the tremendous variability in climate and general features, our country is a veritable emporium of medicinal and other plants. This is particularly the case with the great chain of Himalaya mountains which stretches from the north-western to the north-eastern boundaries of the Indian Peninsula. At the north-western end, this range gradually merges with the Karakorum mountains described as the roof of the world, where the temperatures at higher altitudes resemble those of the arctic regions. On the north-eastern side the climate is dry and cold at higher altitudes which are beyond the range of the monsoon and which adjoin Tibet. At lower altitudes the climate is damp and warm such as is encountered in the tropical regions. It is not surprising, therefore, that vegetation practically from all parts of the world is represented along this vast range of mountains. In fact, these mountainous regions have always been considered to be the repositary of a vast variety of plants with potent medicinal properties.

From times immemorial many of these plants have been used by vaids and hakims in the treatment of disease. A considerable number have been investigated on modern scientific lines and found to be effective remedies against various diseases. There is no doubt, however, that so far only the fringe of this vast problem of medicinal plants has been touched and much remains to be investigated. It is for this reason that I welcome the present volume which Dr. K. P. Biswas, one of our distinguished Indian Botanists, has conceived. Although a good deal has been written with regard to Indian medicinal plants generally, there has been no systematic study of the distribution of medicinal plants occurring in the Sikkim Himalayas. This has now been done by Dr. Biswas who till recently was in charge of the duties of the Director of Botanical Survey of India and Superintendent of the Botanic Garden at Sibpur, Calcutta. Having been the worthy inheritor of a long tradition of very able and renowned botanists such as Roxburgh, "the father of Indian Botany", who was the first Superintendent of the Botanic Garden, Hooker, the renowned explorer of the Sikkim Himalayas, Prain, Gage and others, nobody is more fitted to undertake the writing of a monograph entitled *"Common Medicinal Plants of Darjeeling and Sikkim Himalayas"*. Not only has Dr. Biswas spent most of the active period of his life in this region, but he has contributed much to the botanical literature of this part. He has made extensive collections from this area and has carried out pharmacognostic and other studies. In recognition of his valuable contributions to Flora of India, he was awarded D.Sc. of Edinburgh University. He is the author of a number of monographs on several

genera of flowering plants. He has also taken very active part in encouraging cultivation of medicinal plants of this region, as member of the Sub-Committee of Medicinal Plants Scheme of the Indian Council of Agricultural Research. In the capacity of Editor of the Records of Botanical Survey of India, he has come intimately in contact with the work of other Indian Botanists.

The opening chapter of this Monograph entitled "Herbal Charms", forms an excellent introduction to this book. It is both readable and interesting from point of view of how the use of some plants in the treatment of disease has originated from the old-time medicine-man and herbalist who are fast disappearing. This brings out clearly how folklore, superstition, tradition, various rituals and tribal practices, which were in vogue, have helped in the discovery of plants with potent medicinal properties. Whether current scientific opinion entertains it or not, there is no doubt that from this the knowledge of the wonderful curative properties of many plants has originated and has led to their use in modern medicine.

The second chapter, "Important Work on Medicinal Plants", gives a brief survey of the literature on the subject of the Indian medicinal plants up to the present time. The description of the General Features of the Darjeeling and Sikkim Himalayas brings out clearly that these areas have distinctive peoples, climates, plants and animals, but types appear in common and tend to intermingle occassionally where the boundaries of these areas march together with those of Nepal, Tibet, Assam and Bengal.

Dr. Biswas has described 147 common medicinal plants found in the Darjeeling and Sikkim Himalayas and has dealt with these in a systematic manner. He has given brief botanical descriptions of plants, their botanical distribution and medicinal properties and uses. He has dealt with the subject in a lucid and concise manner which is easy of comprehension.

I have no doubt that this monograph will be of great practical value and form a very useful addition to the literature on Indian Indigenous Drugs. Dr. Biswas deserves the congratulation and gratitude of all those interested in the subject of medicinal plants, particularly those engaged in research work.

R. N. CHOPRA.

SRINAGAR:

The 22nd September 1955.

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PREFACE

VERY LITTLE attempt has so far been made towards utilising the vegetable resources of the Sikkim Himalaya. Although quite a large number of plants were and are still being collected by botanists, naturalists and mountaineers since Sir J. D. Hooker's visit to these hills in 1849, no systematic attempt has hitherto been made to employ the vast treasures of medicinal and economic plants of this part of the Himalaya for the benefit of the people in and outside the State of Sikkim. Sufficient knowledge on the cultivation on an up-to-date scientific basis of the different species of the medicinal plants indigenous to Sikkim is still lacking. During the last visit of the Prime Minister Shri Jawaharlal Nehru to Sikkim, he expressed his interest in the medicinal and other economic plants of the State of Sikkim. This matter was referred to me, and Shri J. S. Lall, I.C.S., the Dewan of Sikkim, discussed this point with me as desired by Dr. B. C. Roy, the Chief Minister, Government of West Bengal. I also realised the urgent need of a comprehensive treatise on the subject and undertook writing out the present book with a view to placing before the interested readers the information I was able to gather during many of my collecting trips to this part of the Eastern Himalaya.

The State of Sikkim covers an area of about 3,000 square miles, of which a major part remains under snow for most of the year. The other areas are highly fertile and sustain rich and luxurious vegetation in which many plants of medicinal value are found to grow wild. Chirata, Aconite, Ephedra, Manjista, Kuth, Podophyllum, Rheum, Lycopodium, Chalmogra, Rauwolfia and many others are at present ruthlessly and crudely collected and sold outside the State.

It is a rather difficult task to get hold of a genuine local herbalist and get authentic information out of him on each and every one of the medicinal plants occurring in the Sikkim Himalaya. The information on medicinal uses of the plants incorporated in this treatise was collected from experienced Lepchas and other hillmen. All such information has been checked with reference to the literature on the subject.

There are various places in this part of the Himalaya which have proved and are likely to prove suitable for the cultivation of well-known indigenous and foreign drugs such as Quinine, Emetine, Digitalin, Lobelin, Ephedrine, Berberine, Daturine, Hyoscine, Atropine, Cannabibine, Aconitine, etc., and several other resin and essential oil yielding plants. In such places various medicinal herbs indigenous and foreign can be grown first on an experimental scale as it is being done at present in the Rongo hill ranges. If the preliminary experiments yield promising results large scale cultivation would then be taken up. Some of them, such as Emetine and Quinine, have already proved to be quite successful and the State of West Bengal is the main source of supply of these two drugs in the country.

It may be mentioned here that after the Independence, India along with all-round developments has taken up in right earnest the investigation of her valuable treasures of vegetable drugs under the auspices of the Medicinal Plants Committee of the Indian Council of Agricultural Research. At present work is going on at the two important centres of the Himalayas—the West and the East. The Western Zone is located in Kashmir. This area is under the supervision of Col. Sir R. N. Chopra, KT., C.I.E., M.D., SC.D. (Cantab.), F.N.I., F.R.C.P. The Eastern Zone is located in the Rongo hills of the Darjeeling district. This area is under the supervision of the writer. The plantation in the former is a few miles away from Srinagar but the chemical and pharmaceutical work is done in the town and the botanical work at Jammu. The plantation in the latter is in the Rongo hills about 71 miles from Bagdogra, an airport in North Bengal. The botanical investigation is done in the Herbarium, Indian Botanic Garden, and the chemical in the School of Tropical Medicine, Calcutta.

This book is expected to serve as a concise account of the plants of medicinal importance found in the Sikkim Himalaya and Darjeeling. Moreover, the chapters on the History of the medicinal herbs, General features of the vegetation, Important literature on the medicinal plants, Glossary of botanic terms, the illustrations and last but not the least brief descriptions of almost all the common medicinal plants of the Sikkim Himalaya, together with authentic information on their distribution and medicinal properties will, it is hoped, prove to be useful to the students of Botany, medical men and all those interested in the medicinal plants of the Darjeeling district and the Sikkim Himalaya.

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CHAPTER I

Herbal Charms

THE PRE-HISTORIC men and women as they advanced towards civilisation in the lap of time depended on plants. Like the wild animals living in forests human beings too, in the days of yore used plants intuitively for food, shelter and even curing their many a malady and thereby kept their health in perfect state of fitness and lived a long life unlike the human folk of the present day trouble-ridden world. With the progress of civilisation from the dim past even before the present century various charms of herbals played a great role in human life, society and activities. No authentic record, however, of any kind, is available of the Pre-Vedic period in this country and before the early part of the Christian era in other countries.

Nevertheless, folk-lores, superstitions, traditions, various rituals, tribal practices in vogue then and even to the present day bear ample proof of the great influence herbal charms exerted and still exert over not only the illiterates but also over the so-called highly civilised men and women. Wearing of amulets, performance of rituals, witchcraft and chanting of *mantras* connected with the healing of diseases, warding of the influence of evil spirits, betterment of the conditions of individuals, families and localities, and changing of fortune in one's favour—all these are still followed by men and women of the East and the West, not to speak of the different tribes living in different parts of the world. From the time of which records are available in writing, a good number of remedies which are recognised as very effective even today, are practised by chanting spells and with various superstitious rites. Mother Goddesses Sitala and Kali are still propitiated to stop the spread of epidemic diseases, such as small-pox and cholera, and Rain God is worshipped for having showers of rain in times of drought for the dying crops and prevention of famine and pestilence.

In Egypt, India and China mines of information are available in the old literature, folk-lores, mythological stories, epic poems, medicinal treatises, thousands of years old manuscripts, copper plates, palm leaves and similar other records, many of which are kept preserved even to the present day. A vast field of knowledge on this subject still remains *terra-incognita* in the innumerable Tibetan manuscripts and writings on herbals preserved in the archives of the monasteries scattered all over Sikkim and Tibet. These are the vast store-houses of the charms of the herbals, and in fact, these hill tribes living peacefully in the far-flung mountain ranges surrounded by the ever-lasting snows rarely consult even now a modern physician for the treatment of their ailments. Thus the herbals and herbal charms play a great part in the every-day life of the inhabitants of the Sikkim Himalaya even to this day.

Application of various recipes of herbs and herbal charms which are most interesting and in some cases highly effective for curing many diseases seemed to have been in practice accompanied with chanting of spells as early a period as 4000 B.C. The earliest reference to the use of medicinal herbs as a cure for diseases and as charms is found in the manuscript of "Eber Papyrus" which dates from about 16th century B.C. The use of poppy, castor oil, squils, aloes, etc., are recorded in this valuable ancient work. Thus the science and art of herbal charms and efficacy of vegetable drugs are recognised from time immemorial, although the oldest science of medicine still remains wrapped up in mysticism.

The mysticism of the herbal charms is also mentioned in the *Atharva* and *Rig Vedas*. The works of Charaka and Susruta in the treatment of maladies in human beings and animals are monumental works and outstanding contributions towards our knowledge of science and art of healing. Mines of information about herbals, surgery, anatomy, and other allied subjects, contained in these two ancient books are extremely valuable and supply food for thought and problems for investigation to even the present-day medical men.

It is difficult to say if the science and art of herbals in its application as charm or in the treatment of diseases spread from India to Europe *via* Greece and other Mediterranean countries, or it spread from the Egyptian and Babylonian centres to India and Europe.

The Egyptian having faith in their numerous gods and evil spirits naturally believed in the mystical system of medicine. They were particularly fond of sweet-scented herbs which they must have used freely in embalming the bodies after death and naturally plants with aromatic properties are supposed to ward off evil vapours and spirits. Moreover, the Egyptian knew that there were many plants which were used for driving away evil spirits and curing human ailments.

About 2000 B.C., the Babylonians along with their achieving glorious intellectual advancement attained a high degree of skill in surgery and treatment of their diseases, but such treatment often used to be administered with spells of charms and thereby pleasing the presiding god of the particular disease. Toothache supposed to be caused by worms, even believed today, used to be treated with the application of a mixture of henbane and resin—a very effective remedy indeed and accepted as such even to this date, but at the same time, "the patient should call down the wrath of the presiding God Ea on the worm causing the pain". Arabs also attained considerable knowledge of herbalism and Greek and Roman works were translated into Arabic. Subsequently with the invention of printing the modern art and science of herbal developed to their present high degree of efficacy.

The herbal charms often do not fail to have sufficient influence over the mind of even highly cultured intellectuals of the present century. Sometimes herbals have action on one's body. One gentleman came to the Botanic Garden and asked for a piece of root of the white old sandal wood tree which is considered sacred and supposed to possess supernatural property. I gave him a bit of root and advised him that his daughter who was seriously ill might wear it as an amulet, or keep the root under her pillow. I forgot all about it, but when I met him later on, he said he was grateful to me as I was instrumental in curing his daughter. I was glad but wondered what might be the true cause of her cure—faith or the root of sandal wood tree! Another priest came on behalf of his client who was having a bad time. He stated if the root of this sandal wood tree possessed real charms, the root while being cut would exert a repelling force. Story goes that the man, as soon as he touched the root, was thrown over and hurt himself. The root worn as amulet was supposed to protect his client but the priest said that the amulet with the root would drop off and he would be in trouble. Later on, the amulet actually dropped off and although his client went out of Calcutta, he fell a victim to the inevitable trouble.

Similar stories and reports on herbal charms are plenty in the various European and Asian literature. Apart from the diverse effects of the herbal charms, the efficacy of the medicinal herbs depends much on the age of the plant and the method and time of collection of herbs as noted in our Ayurveda, part of *Atharva Veda,* and even in old Egyptian, Greek and European literature. There is, however, some scientific truth in such hear-say. The active principles

in plants vary at different stages of growth of a plant under different climatic and ecological conditions. Considerable diurnal variations are also observed in the production and composition of alkaloids and enzymes. Many legends and superstitions are also associated with various herbs. Theophrastus in his enquiry into plants mentions, "he who would obtain peony root was advised to dig it up at night because if he did the deed in daytime, and was observed by woodpecker he risked the loss of his eye-sight".

Similar superstition is associated with Mandrake, a species of which is common in Sikkim—*Mandragora caulescens* Clarke. The alkaloid contents of this vegetable drug are Hyoscyamine, Hyoscine, Mandragorine. Mandragora has aphrodisiac property and when taken with wine relieves pains. It is soporific like poppy—

"Not poppy nor mandragora
Nor all the drowsy syrups of this world
Shall ever medicine thee to that sweet sleep."

—(*Othello,* Shakespeare.)

"Mandrake root resembles with the human body and it is used as a charm. It is carried by women of Eastern Europe as a charm against sterility. Mountaineers in Alps often carry it as a protection against mishap."

—(T. J. Williams.)

The method of collection of the root is :

"One should draw three circles round Mandrake with a sword, and cut it with one's face towards the west; and at the cutting of the second piece one should dance.....round the plant.....One should also, it is said, draw a circle round the black hellebore.....and one should look out for an eagle both on the right and on the left; for that there is danger to those that cut, if your eagle should come near, that they may die within the year."

The flowers of Ketaki (*Pandarus*) found wild in the foot-hills of the Sikkim Himalaya is worn on the hair by the girls to win love of their lovers. Lord Siva after being defeated in the dice-play with mother Parvati felt ashamed and hiding himself in the Ketaki woods was absorbed in deep meditation. Mother Parvati took the form of a beautiful vil young girl and with Ketaki flowers in her braid approached Siva. The sweet scent of Ketaki attracted Siva's attention and thus disturbed Siva in his trance. Siva getting annoyed cursed the Ketaki plant.

Ketaki is aphrodisiac and induces sleep. The root of Ketaki taken with milk prevents abortion. The flowers remove headache and weakness. The seeds cure wound in the heart.

Many folk-lores are also current among the hill tribes about the miraculous cure by herbalists, medicine-men, Lepchas and Lamas living more or less a secluded life in remote monasteries and *gumphas* in the high mountains of Sikkim. Sir J. D. Hooker, the world-renowned explorer of the Sikkim Himalaya, however, seemed not to have laid much stress on the healing properties of the indigenous medicinal plants in his monumental work, namely, "Himalayan Journal : Or Notes on a Naturalist in Bengal, the Sikkim and Nepal Himalaya, the Khasia mountains, etc.", although he mentioned in glorious terms about the Lepchas' wonderful knowledge of the Sikkim plants. Before the advent of the Western medicines and their supply reached the hill people—the hill tribes for centuries mainly depended upon the indigenous plants for curing their diseases.

Recent introduction of European system of treatment of diseases and discovery of synthetic drugs and antibiotics and with the advancement of the Western medical science which are now reaching gradually even into the interior of these hill ranges, the primitive system of treatment of diseases practised in olden times by the medicine-men and herbalists of the different hill tribes in this and other areas of India is fast disappearing. Moreover, due to inherent secretive nature of these herbalists and medicine-men the knowledge and use of some of the really efficacious vegetable drugs are dying out with the old veterans and headmen of the villages—who are generally superstitious and cherish an inherent belief that if the secrets handed down to them from generation to generation about the wonderful uses of plants are given out to unauthorised persons the efficacy of the plants will not only be reduced but they might meet with some ill-fate on account of the wrath of the presiding deity of the medicinal plants in their forests falling on their heads. It becomes therefore extremely difficult to extract authentic information from the hill folk on the use of indigenous plants used in the treatment of various diseases by the hill men. I have tried for years but with little success. The only reliable source of my information is the old Ribu and his son Dawa and the expert Lepcha collector Tajib now working as a collector in the Drug Research Laboratory, Kashmir, under my esteemed friend Col. Sir R. N. Chopra and the present equally good Nepali collectors Ghaman and Narjit who are still working in the Lloyd Botanic Garden, Darjeeling.

Examination of all the sources from which information has been gathered, however, reveals that there does not exist any coherent account of uniform method of systematic treatment of different types of diseases properly recorded with correct diagnosis of the numerous medicinal plants of these mountains. Even if there exists, and I do believe there exists such a record in some of the works of the Lamas or ancient Tibetan literature stored in some of the monasteries scattered over this part of the land of the Lamas extending to the heart of the "forbidden land", I have, however, so far not come across any such book or medicine-men except Rai Sahib Bhim Bahadur Prodhan, the experienced Forest Officer of the Sikkim State, Rhenock Kazi and Sri S. D. Kathak, the Lepcha herbalist of Gangtok, who could give me a more or less correct information about the medicinal herbs, shrubs and trees and somewhat authentic account of their uses in the treatment of various kinds of diseases of men and animals. There is, however, not much difference in the value of the medicinal herbs and method of treatment used by the people from those mentioned in the Ayurvedic, the Unani, the Allopathic and the Homeopathic literature.

It is, however, admitted on all hands that there are medicinal plants in these mountains so rich in different types of sub-tropical, temperate and alpine plants whose medicinal value is not yet properly known to science and man. It may be realised that even if a single species of plant is discovered which is efficacious in curing some ailment of human being or animal then all our labour in such a venture will be fully rewarded. The discovery of Penicillin—a common fungus, Chloromycetin—a common actinomycetes, both belonging to the neglected lowest order of plant kingdom, has in modern times revolutionised the world and opened up new vista in the investigation of antibiotics. Discovery of the antibiotic property of *Polystictus sanguineus* by Dr. S. R. Bose has recently received the attention of the world. Renewed searches for tracing newer and less known plants of genuine medicinal value both among the higher and lower order of plant kingdom might yield results which might prove to be of greatest benefit to mankind. The successful cultivation in the Darjeeling district, and the Nilgiris of Cinchona—the quinine yielding plant of the Andes mountain—and Ipecacuanha—the Emetine yielding plant of Nicaragua and

Brazil, indicates that other drugs such as—Morphine, Cocaine, Strychnine, Digitaline, Ephydrine, Mandrogorine, Aconitine, Ergotine, Ergotometrine, Ergotoxin, Rauwolfine, Atropine, Cannabin, yielding plants and similar other plants which are well known for their medicinal value are possible of cultivation in these hills.

My searches in the mountains of the Sikkim Himalaya for more than a quarter of a century convinces me too that the indigenous and some of the introduced and acclimatised plants of these hills are full of potentialities. Some of the indigenous drugs need also proper investigation. The Ephedra—*E. gerardiana* var. sikkimensis [now called *E. saxatilis Royle* var. sikkimensis (Stapf.) Florin] is used profusely in these areas from time immemorial for the treatment of asthma. Chemical analysis of this drug has, however, shown rather poor ephidrene content due obviously to bad storage and old age of the plant. The juice of the leaves of *Plantago major* is supposed to cure Pneumonia in early stages. Juice of the leaves of *Drymaria cordata* is efficacious in hayfever, cold and throat trouble. The root of *Dichroa febrifuga*—as the name indicates as also Chirata is used for curing without any after-effect malaria and other fevers from very ancient times before quinine was introduced to India, and cultivated and made available in this part of the country. The use of *Elsholtzia blanda* and *Mahonia nepalensis* in eye trouble and eczema, the Rauvolfia—*R. serpentina* (root) in the treatment of high-blood pressure, insomnia and insanity, *Psorelea corylifolia, Mussaendra frondosa* and *Abutilon indicum* with some ingredients for treatment of leucoderma are some of the medicinal herbs of great value. The common nettle—*Urtica parviflora* (young inflorescence) is considered as a clearing and invigourating agent, and is profusely used in the hills by women after child birth. The mature powdery spores from the cones of Lycopodium is also used more or less for the same purpose. It is, therefore, high-time that the medicinal plants of the State of Sikkim should thoroughly be investigated.

In the study of the medicinal plants of the Eastern Himalaya—the first step is to collect all such plants and then gather from different sources all available information on the use of the various plants. Such information as stated above, may be correct, half correct, or incorrect. Nevertheless, each species may be studied botanically, pharmacognostically, chemically and lastly clinically. Collection work has already been done and some information has since been gathered but detailed scientific, chemical and clinical investigations need prolonged research on the subject by botanists and chemists. After such tests only an authentic pharmacopea of the Indian plants can gradually be prepared much to the benefit of our country and humanity at large.

As regards cultivation of suitable drugs the area favourable for growth of each of the medicinal plants will have to be demarcated and plotted out after thorough study of their habitat and distribution in various places under different ecological conditions, and then the chemical and other properties will have to be worked out in detail. Finally, the life history of each species will also have to be ascertained from the germination to the adult stage under different edaphic and climatic conditions as the active principle varies at different stages of the growth of the plant, such as pre-flowering or post-flowering stages under different environmental conditions. The alkaloids or the active principles confined to the cortical cells, bark, roots, stems, leaves, flowers, fruits or seeds will have to be correctly traced by anatomical, micro-chemical and chemical tests. The season and diurnal variations and the periodicity of the individual species will also have to be worked out in order to find when the active principle reaches its optimum and is most efficacious. This point is very important for cultivation of a particular medicinal plant in a suitable area at the proper season and harvesting

it in right time. The alkaloid content will also have to be increased by cross-breeding with a high yielding and disease resistant variety if such a variety is available, or by other physiological and horticultural methods so that the cost of cultivation is reduced to the minimum and the production of the active principle is increased to the maximum. All these various items of botanical researches on medicinal plants will have to be co-ordinated with the work of the chemists, the pharmacists and the medical practitioners in order to fully establish the efficacy of a particular plant in the treatment of a particular disease.

I have, therefore, in this booklet dealt with the most common plants of the Sikkim Himalaya in classified order and incorporated their various medicinal uses as are available from literature and can be gathered from local herbalists, medicine-men, Lamas, old folks and other sources. It is hoped that this treatise will serve as a working Materia Medica for Darjeeling and the Sikkim Himalayan plants. More detailed floristic work on the rich vegetation of the Sikkim Himalaya will form the subject of a separate treatise.

The schemes for the cultivation of medicinal plants other than Cinchona and the expansion of Ipecac plantation is under the Medicinal Plants Committee of the Government of West Bengal. This Committee was formed last year with Dr. B. C. Roy, the Chief Minister, West Bengal, as the Chairman and the writer as the member-Secretary. The Committee since then has set up a separate organisation with the author as the Director-in-charge and intends gradually to expand their activities and carry on researches on all the well-known indigenous and other medicinal plants introduced and acclimatised as also those possible of introduction and acclimatisation in the country in all the aspects, namely, botanical, chemical, pharmaceutical, pharmacognostical and clinical. It is hoped in near future India will not only be independent of some of the drugs but might be in a position to export some of the products, and thereby take her legitimate share in the drug market of the world.

I am grateful to Dr. B. C. Roy, M.D., D.SC., F.R.C.S. (Eng.), M.R.C.P. (Lond.), F.R.M.E., Chief Minister, Government of West Bengal, whose encouragement was a great stimulus to me in undertaking the present work. My thanks are due to Sri Jogendra Nath Naskar, Senior Herbarium Assistant, Indian Botanic Garden, Calcutta, for his valuable assistance in the preparation of this work. I am particularly thankful to Dr. N. Das, I.C.S., PH.D., for his appreciation and arranging publication of this book. I am also deeply indebted to Sir R. N. Chopra for his going through the manuscript and writing the foreword to this treatise on medicinal plants.

CHAPTER II

Important Works on Indian Medicinal Plants

THE ORIGIN of botanical science may be traced to the investigation of the medicinal properties of plants. Search for the healing properties of plants to mitigate the misery of human beings caused by various ailments led to the serious study of the plants around them. Thus developed the science of Ayurveda which forms an important part of Atharva Veda—the most ancient and celebrated treatise on Hindu medicine, although, the use of some plants is mentioned earlier in Rig Veda.

The works of Agnivesha, one of the six distinguished pupils of Ayurveda, resulted in the compilation of Charaka-Samhita by Charaka. Sushruta-Samhita then emanated from the pen of Sushruta, one of the brilliant disciples of Dhanvantari, the surgeon of heaven who took his birth in this country as Divadasa, King of Banaras, who was reputed for his extraordinary knowledge in surgery and medicine. Thus Charaka and Sushruta-Samhitas are the oldest treatises now extant and are of such great value to the Hindus that they are considered to be divine and beyond criticism. Among the contributions of this early period mention may be made of Bagbhatta's Astanga-hridaya-Samhita ; Chakradutta-Sangraha ; Sarangadhara-Sangraha ; Vab Misra's Vab Prokasa ; Madan Pal's Raj Nighanta and several other Nighantas and works on Drabya Gunas formed the basis of further studies on medicinal plants. Works of Makhzum-ul-Adwiya and other Hakims written in Persian and Urdu may be mentioned as valuable contributions to medical science in those olden days by Mohammedans.

Foreign influence on the study of plants either for purely theoretical interest or for information on their medicinal values, dates back to the sixteenth century when Portuguese and Dutch scientists came to India. They may be considered as the pioneer workers in this field. Thomas Rives, Odardo Verbosa, Christobal DaCosta are among those who took lively interest in the study of drugs. But along with these it will be necessary to include Garcia da Orta, whose *Coloquios dos simples e drogas he cousassmedicinai da India* was published at Goa in April 1563 and was in fact the third book printed in India. Van Rheedes' *Hortus Malabaricus* is the monumental work in twelve volumes on the study of Indian plants. This work was published in the 17th century between 1678 and 1703. During the 18th and 19th centuries, valuable contributions based on researches on modern lines, were made by a band of highly-trained workers which enabled the recent investigators to make sufficient headway in the study and investigation of medicinal plants of this country.

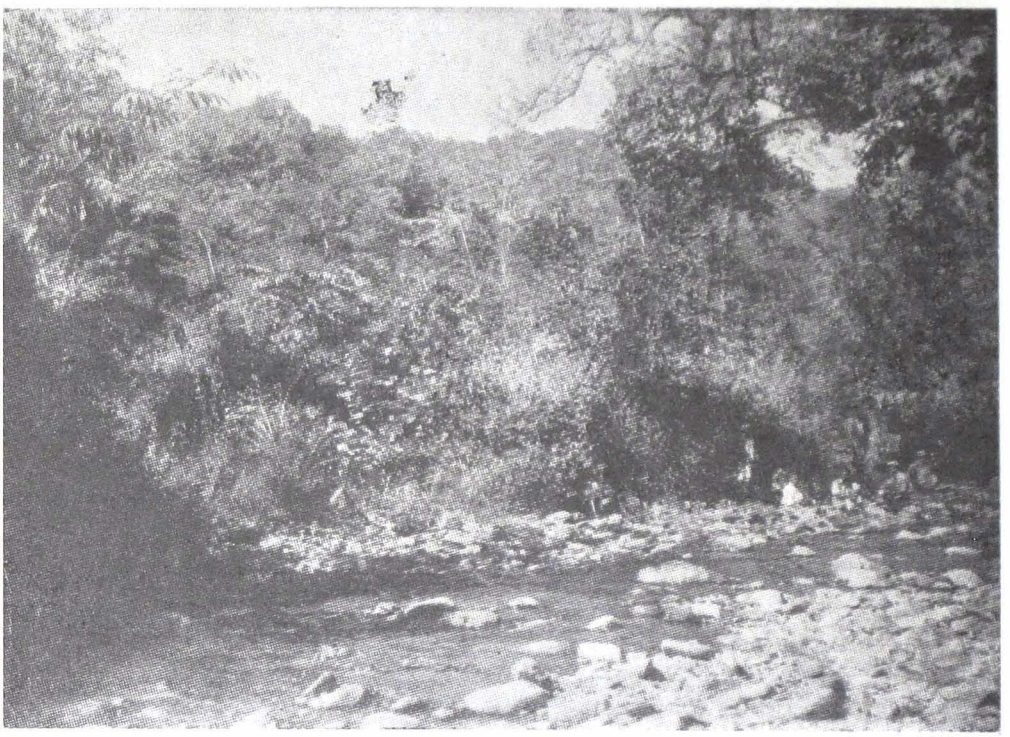
The earliest work of the 18th century of sufficient value is that of Georgens Everhardus Rumphius' *Het Amboinsch Kruid-Boek* (1750). It was actually written by Rumf in the 17th century and the manuscript was left unpublished in the archives of the Dutch East India Company until Burman received permission to publish it. The name of William Roxburgh, "the Father of Indian Botany", the first Superintendent (1793-1813—whose book on Indian plants was actually published in 1820-24 by Dr. Carey) of the then East India Company's garden—now the Indian Botanic Garden, Calcutta, has become a household word in this country in recognition of his inimitable Icones and his Flora Indica. His works form the keystone for subsequent works on Indian plants. To confine ourselves mainly to the study of Indian medicinal plants the names of the following workers may be mentioned: Dr. Fleming (1810), W. Ainslie, author of Materia Medica of the Hindus (1813) and its second edition of 2 octavo volumes on Materia Medica (1825); Playfair (1833), Talif Sheriff, Indian Materia Medica, published in Calcutta, 18th to 19th century; Forbes Royle, *Vegetable Resources of India* (1839); and Sir William

O'Shaughnessy of the Calcutta Medical College, who published in collaboration with Dr. Nathenial Wallich—next successor to Roxburgh as the Superintendent, the then Royal Botanic Garden, Calcutta—his much reputed work entitled *The Bengal Dispensatory and Pharmacopoeia* (1844). O'Shaughnessy's publication led to the recognition of the value of many of the Indian medicinal plants by foreigners. Next followed Dr. Edward Balfour's *Cyclopedia of India* (1855), a supplement to which was published in 1862. In the same year G. C. Birdwood wrote an account of Vegetable Products of Bombay. The *Useful Plants of India* by Heber Drury of Madras Army (1858-69) ; Dr. Stewart's *Punjab Plants* (1869) ; Atkinson's *Economic Products of North-Western Frontier Provinces;* Dr. George Bidie's *Cinchona Cultivation in India* (1878); U. C. Dutt's *Hindu Materia Medica* (1870) written with the valued assistance of George King, the then Superintendent of the then Royal Botanic Garden, Calcutta ; Kanny Lall Dey's *Indigenous Drugs of India* (1896) and the notable contribution of B. C. Gupta's *Vanaushadhi Darpan,* the second edition of which appeared in 1917 (1324 B.S.), was first published at the end of 19th century, are valuable contributions during the 18th and the 19th centuries. But this period cannot be passed without mentioning the publication of Dymock's *Vegetable Materia Medica of India* (1883) and particularly *Pharmacographia Indica* (1890-93) prepared in collaboration with Warden and Hooper; and Sir George Watt's *Dictionary of the Economic Products of India* in six volumes (1889-93), Index volume of which appeared in 1896—are the two outstanding works containing valuable information. These works embody the results of the labours of the two well-known investigators of the latter part of the 19th century. Their contributions will prove invaluable for research workers in their further investigations in this field. In 1918 the voluminous works on medicinal plants by Kirtikar and Basu were published, wherein the authors have made a praiseworthy attempt to compile a fully illustrated volume and a text containing detailed description of plants together with notes on their medicinal value. A revised edition of this work with considerable emendations and modifications has since been published by Rev. Fr. J. F. Caius. Apart from this work, *Indian Materia Medica* by K. M. Nadkarni, a revised edition of which appeared in 1926, deals exhaustively with the medicinal properties of plants. The botanical aspect of this book, however, requires to be corrected and improved upon. Col. R. N. Chopra in his book on *Indigeneous Drugs of India* (1933) has furnished further information mainly on the important medicinal properties of the plants. Col. R. N. Chopra, R. L. Bhadwar and S. Ghosh in their joint monograph entitled *Poisonous Plants of India* (1949) have dealt with the medicinal and specially poisonous properties in plants. *"Wealth of India"* which is now being published by the Council of Scientific and Industrial Research, New Delhi, has two sections—(i) Raw Materials and (ii) Industrial Products; the former contains useful up-to-date information on the medicinal properties of plants.

The illustrated *Bharatiya Banaushadhi* in three volumes written in Bengali by Dr. K. Biswas in collaboration with Sri Ekkori Ghosh, published by the Calcutta University (1950) deals exhaustively with past and present account of the medicinal properties of indigenous plants and also some foreign plants of medicinal value introduced and acclimatised in India. Full descriptions of plants and the illustrations accompanying the text are useful for specific determination of the plants.

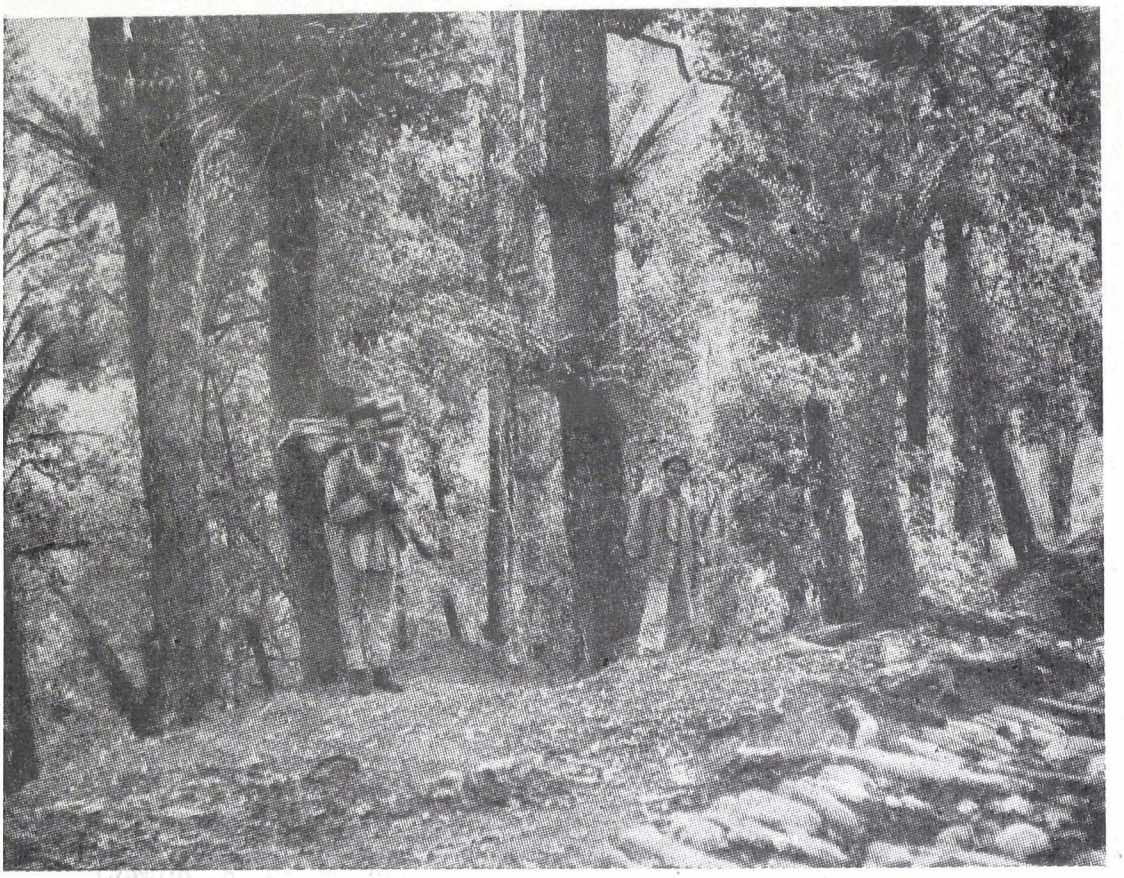
The Indian Pharmaceutical Code, Vol. I—Indigenous Drugs—by B. Mukherjee (1953) is a valuable and helpful publication dealing mainly with the pharmaceutical aspect of the medicinal plants in India. A Review of work on Indian Medicinal plants by Bt.-Col. R. N. Chopra and I. C. Chopra, 1955, is a valuable contribution to the literature on Indian Medicinal Plants.

PHOTO I



A typical Terai forest at the foot-hills of Darjeeling district showing the characteristic dense Tropical Vegetation of the Rain-forest type.
(*Photo by Dr. K. Biswas.*)

PHOTO II



A Middle-East Himalayan forest. In the foreground is seen *Schima Wallichii* with characteristic epiphytic fern *Polypodium quercifolium,* above the zone of *Shorea robusta* (Sal) in the Rongly Valley in Sikkim with a plant collector and Shri Sanjib Biswas. (*Photo by Dr. K. Biswas.*)

PHOTO III

Alpine scrubs composed of dwarf *Rhododendron, Gaultheria, Juniperus, Arenaria, Cassiope,* and other alpine plants above Kapup in East Sikkim at an elevation of about 14,000 feet. Patches of snow are still there in May in the foreground interspersed in between dwarf bushes of alpines with the author.

(*Photo by Mr. T. Prodhan.*)

PHOTO IV

A view of the Munsong Cinchona Plantation with different species of Cinchona grown at an elevation of about 4,000 feet under the shade of *Alnus nepalensis* (*utis.*) (*Photo by Dr. K. Biswas.*)

PHOTO V

A closer view of a full grown *Cinchona Ledgeriana,* the common quinine yielding tree in the Mungpoo Plantation of the Darjeeling district.
(*Photo by Dr. K. Biswas.*)

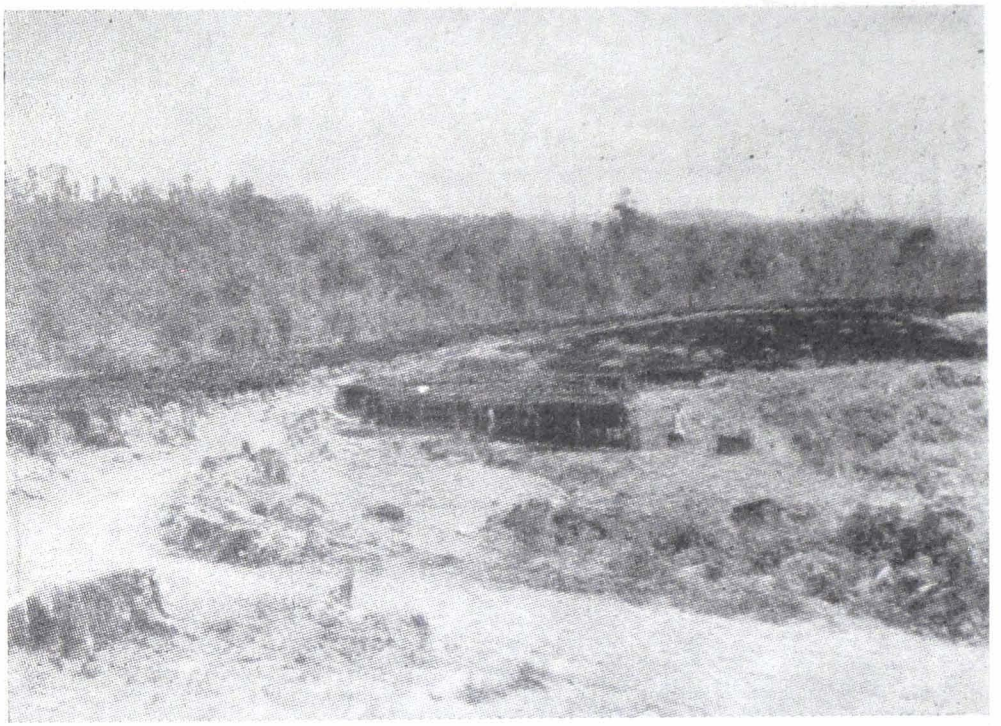
PHOTO VI

Tea Plantation in Matelli, North Bengal, with shade trees of *Albizzia stipulata,* in between the tea bushes pruned on the top at uniform level. (*Photo by Dr. K. Biswas.*)

PHOTO VII

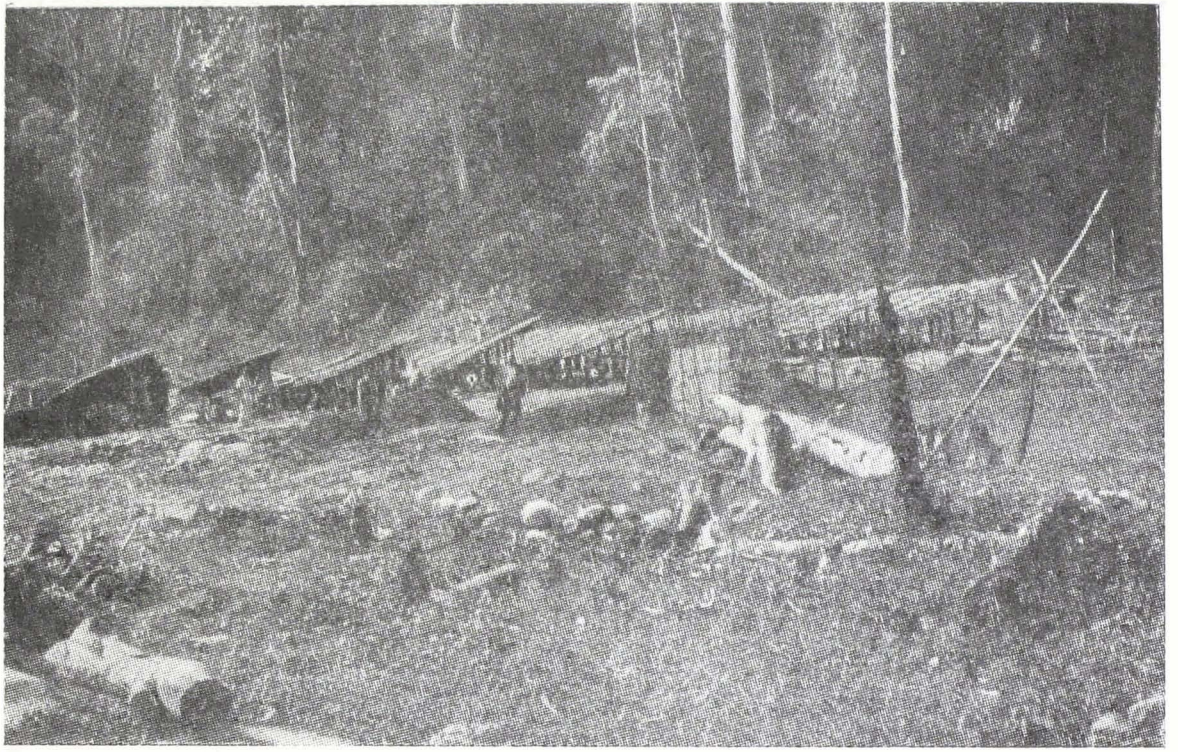
A closer view of a Tea Plantation. The hill girls are plucking tea leaves. (*Photo by Das Studio.*)

PHOTO VIII



A general view of the *Ipecac* Plantation in the lower hills of Rongo (Gairibas). Thousands of *kamras* (*Ipecac* nurseries) are seen in the foreground. The sub-Himalayan forest is seen in the background where Cinchona is also grown. (*Photo by Dr. K. Biswas.*)

PHOTO IX



Closer view of the extension of the *Ipecac kamras* in the foreground, with a porion of the Terai reserve forest at Kumani in the background. (*Photo by Dr. K. Biswas.*)

CHAPTER III

General features of the vegetation of the Darjeeling and Sikkim Himalayas

DARJEELING, Sikkim and Bhutan hill ranges lie in that part of Asia where the three great areas, China, India and Tibet, are very close together. Geographical factors seem to have resulted not so much in comparative isolation, but in lack of opportunities for interpenetration, since the huge mountainous range of the Himalayas separates India from Tibet and the sheer gorges of the Irrawady, Salween and Mekong rivers, with their wellnigh uncrossable divides, effectively bar communication for man at any rate between India and south-west China. Even so, these three areas have distinctive peoples, climates, plants and animals, but types appear in common and tend to intermingle occasionally where the boundaries of the areas merge together. The Sikkim Himalaya is roughly bounded by Nepal on its west flank, Tibet on the east and north, and Assam and Bengal on the south.

Part of the main Himalayan range, the Indo-Tibetan divide, forms the northern boundary of the country, and its big snow-covered groups of peaks reach their highest points at elevations of 20—25,000 feet. From this main range a series of ridges run southwards, decreasing in elevation until they reach the plains of India; but where they cross the line of 27°30′ N. lat. there is noticeable tendency for many of these ridges to throw up their crests in peaks varying from 14,000 feet to nearly 17,000 feet in altitude. Lateral spurs project with an easy slope into the valley, but sometimes the slopes make an abrupt descent to the bottom of the valleys from shoulders at elevation of 8—9,000 feet.

Eastwards from the line of 91°E. the configuration of the Himalayan chain alters. No longer do the secondary ranges trend southward from the main divide. This itself shows signs of disintegration, and secondary ranges begin to stretch from broken sections of it in other directions. The observable tendency is a swinging to the north-east and south-west, a changing of direction which culminates in the direct north and south trend of the divides of the big Assam and Burmese gorges.

The character of the vegetation is influenced by the strong, moisture-laden monsoon winds from the south. The ramifying outer spurs have a heavy rainfall and are densely clad by moist forest of tropical and sub-tropical genera. The central portions of the gorges and valleys have a lesser rainfall and tend to bear a drier type of forest. The moisture-laden breezes of the upper layers of the atmosphere pass unscathed over the outer spurs, only to be arrested by the summits of the ridges in the interior, where in consequence they deposit their moisture, and a moist temperate flora develops. This is made up of moss-clad and lichen-draped Rhododendrons, Maple, Poplars and Birches. Higher up between 10,000 and 11,000 feet Arundineria-Bambusa association is seen. Above 11,000 feet Abies Webbiana, Rhododendron, Berberis, Cotoneaster and Rosa association is common.

Trees range up the slopes to an upper limit of approximately 15,000 feet, with a dense undergrowth of shrubs and bushes, but there are many open glades containing low shrubby and herbaceous plants only. Above 11,000 feet—the altitudinal limit of Pines—Spruce and Juniper are also found, mainly on moist and dry slopes respectively and range up to the limit of tree-growth.

Above tree-level, where the slopes are moist, they bear a rich moisture-loving flora of biennial and perennial dwarfish herbaceous plants, such as low bushy Rhododendrons (*R.setosum, R.anthopogon, R.lepidotum*), *Gentiana, Arenarias, Juniperus pseudosabina, Meconopsis, Salix* and other Alpine plants. Those uplands, which are robbed of moisture by intervening peaks and ridges, are consequently drier and have a less profuse herbage, developing into Scree vegetation consisting of *Cassiope, Corydalis, Ranunculus hirtellus, Oxygraphis paniculata* and others, all forms showing adaptations to drought, and also response to the effects of freezing cold of the high altitudes. These areas are somewhat free from heavy snows only from April to September, and this short season, during which alone growth is possible, seems to generate a definite type of plant which produces flower spikes at the first awakening of growth, the leaves following immediately after. The climatic conditions of the drier upland valleys are coincident with those prevailing on the northside of the main chain (i.e., in Tibet), and plant forms range accordingly across the chain into that country.

The East Himalayan vegetation of the various plant communities at different elevations may be divided roughly into four well-marked mixed associations or consociations. Zones consisting of 1,000—3,000 feet—Tropical or sub-tropical belt or lower hill forests ; 3,000—5,000 feet—Sub-temperate or middle hill forests ; 6,000—11,000 feet—Temperate belt or upper hill forests ; 12-15—17,000 feet—Alpine belt. See photographs I, II and III. The lower and middle hill forests and also to a certain extent the upper hill forests are often interrupted by tea plantations and in certain areas Cinchona and other medicinal plants mostly in the Darjeeling hills (photo IV-VII). The different successions of the plant communities met with, as one proceeds from the lowest foot hills towards higher and higher altitudes from the plains, are as follows :—

(1) Dwarfed association of straggling cushions of Rhododendron and herbaceous ground vegetation of Rheum-Arenaria, Saussurea, Myricaria and others (15,000—17,000 feet).

(2) Juniperus-Rhododendron association and herbaceous Potentila, Primula, Anemone, Cassiope and other ground and Scree vegetation (12,000—14,000 feet).

(3) Abies-Rhododendron-Cotoneaster-Berberis-Gaultheria-Rosa association (11,000 feet).

(4) Abies Webbiana-Rhododendron-Rosa-Viburnum-Cotoneaster association (10,000 feet).

(5) Quercus - Betula - Tsuga - Picea - Cedrus - Rhododendron - Rosa - Bambusa-Arundinaria association (8,000—9,000 feet).

(6) Quercus-Betula-Bamboo-Magnolia association (7,000 feet).

(7) Englehardtia-Castanopsis-Schima-Saurauja association (6,000 feet).

(8) Machilus-Michelia-Castanopsis-Magnolia association (5,000 feet).

(9) Schima-Ostodes-Castanopsis association (4,000 feet).

(10) Duabanga-Castanopsis-Eugenia-Phoebe-Calicarpa-Erythrina association (3,000 feet).

(11) Shorea - Lagerstroemia - Steriospermum - Terminalia - Garuga - Albizzia-Erythrina association (2,000 feet).

(12) Phobe - Dellenia - Amoora - Eugenia - Bauhinia association (1,000 feet).

(13) Taller herbaceous—Savannah or Grassland association in sandy and moist Terai region, and Areca catechu, Dalbergia sisoo, D. latifolia, and Albizia association along the river bank of the Duars and Terai regions.

It is not intended to deal with the varied types of rich and luxuriant vegetation of this part of the Himalaya in this treatise which is mainly meant for the medicinal plants. But a brief outline as mentioned here would enable the reader to have a comprehensive idea of the plant communities in which the medicinal plants of this area are found to grow either wild or cultivated.

Mention may, however, be made of the general nature of the Eastern spurs of the Sikkim Himalaya. Here lies the Reche La over a stupendous mountain range with Paren and Rongo spurs separating Bhutan ranges intersected by torrents of roaring Jaldakka river. These hills are covered with a characteristic dense association of never-ending bamboos in the middle zone over-topped with tall trees. On the top near the pass weather beaten lightening struck group of tall and unusually stout specimens of *Rhododendron arboreum* forms a striking feature of the vegetation rarely seen elsewhere in these parts of the hills. The Rongo hill within the Darjeeling district is bounded by the Jaldakka river on the south. This river originating from the snows of the Roche La and other adjoining peaks in Bhutan, cuts through valleys and running south east finally disgorges into the great Brahmaputra river which flows over the plains of East Bengal now East Pakistan. The lower spurs of the Roche La dwindles into villages lying in the valleys, table lands and hill slopes lower down on either side of the Jaldakka river. Most of these villages are quite flourishing. Rice, Indian corns (*Zea mays*) and sometimes wheat, barley and Kodo (*Eleusine coracana* from which country liquor is manufactured) are widely cultivated in open terraces all along the hill sides. Vegetables, potaties, annaras, banaras, peaches, pears, plums, papayas, citrus and other fruit trees are also grown in abundance in the valleys and hill slopes. Scattered patches of hill forests and bamboo clumps here and there specially lower down meet the needs of daily life. The Rongo hill at its base has a belt of thick and rich Terai forest known as the Kumani forest with the characteristic association of somewhat tropical Rain forest. A patch of very old Iron wood tree, *Mesua ferrea* of abnormal size, some of which are now found dying down due obviously to the attack of some fungus or some virus is rather striking. Further down the table lands and the valleys subsiding into the plains are thickly covered with tea plantations miles and miles long (*Photos* VI and VII). This area of Rongo particularly lower down is notorious for malignant malaria. Any one visiting this place is advised to take proper precaution. Here the Ipecac plantation flourishes (*Photos* VII, IX). Medical plants suited to higher elevations are grown over Rongo hill top above 4,000 feet. Heavy rainfall about 250 to 300 inches per year, temperature varying from 86° maximum and 46° minimum and too much humidity are adverse climatic factors for the cultivation of Atropa, Datura, Digitalis, Lobelia, Hyoscyamus, Rye grown for the production of Ergot. Attempts to acclimatise and cultivate these plants in the open have met with partial success.

Cinchona

The febrifugal property of the bark of a kind of tree growing wild in the Andes mountains in South America was first discovered by the Spanish jesuits in Peru. The Peruvian name of the bark is "Qinaquina" that is a bark possessing medicinal properties. Sometime in 1740 the Conutess of Cinchon was attacked with fever and got cured by taking powdered "Qinaquina" bark. This bark since then is known as "Conutess bark", "Conutess powder" and "Jesuits bark". Carl Linnaeus in 1742 named the genus Chinchon in honour of Countess of Cinchon.

The quinine tree was introduced into India and Java towards the middle of the 19th century and experimental plantations were started in the Nilgiris and the Darjeeling district of the Eastern Himalayas in 1860 and 1861, respectively.

The plantations in Darjeeling gradually extended and at present different species of quinine yielding cinchona are cultivated in four plantations—at Mungpoo, Mungsong, Latpanchor and Rongo.

The methods of cultivation are more or less the same as followed in Java and the Nilgiris with necessary modifications according to local edaphic, climatic and other environmental factors prevalent in the East Himalaya.

The cinchona trees grow in their natural habitat between 2,500 and 9,000 feet altitude. In the Darjeeling district they do well between 3,000 feet and 5,000 feet. Several species are grown in the Darjeeling plantations. *C. succirubra* was the first to acclimatise, but for its poor alkaloid content it was subsequently abandoned. The yellow bark tree—*C. Ledgeriana* and *C. officinalis* —yield larger quantity of alkaloid and were preferred for cultivation to the other species. The hybrid between those seems to be still better from many aspects. *C. robusta* a recently introduced species is showing signs of success at higher elevation at about 5,000 feet and above at Munsong. There exists much scope for growing improved hybrids producing better quality and larger quantity of alkaloid by introduction of modern horticultural operation and application of up-to-date scientific methods in the cultivation of the cinchona species in these hills.

The Quinine Factory at Mungpoo was started in 1888. The factories in the Nilgiris in the Madras Presidency, and Mungpoo in West Bengal now manufacture quinine and other products on a large scale to meet the needs of the country. The total production of quinine hydrochloride, Q. bihydrochloride, Q. sulphate, and other products in West Bengal is 66,700 pounds per annum.

The introduction of synthetic products substitutes now more than 50 per cent. of the country's requirements of quinine. The psychology of the patients suffering from malaria is also favourable towards using synthetic drugs, such as, Plasmochin, Paludrin, Mepacrin, Atabrin, Nevaquin, Che-me-quin, etc., which seem to be more efficacious and do not lead to prolonged treatment without little after-effects. Moreover, the mass use of DDT and reclamation of unhealthy areas in the country and also the anti-malarial work launched on a countrywide, if not world-wide scale, seem to be controlling malaria to an appreciable degree.

It is, therefore, a problem how to balance the requirement of quinine in the light of India's, if not world's activities towards eradicating malaria. It is left with the politicians, medical men, and biologists to puzzle over if further extension of cinchona in the country would be advisable or not in future. Nevertheless, it is time to concentrate cultivation within a specified area and try our utmost to increase the yield of alkaloid by using scientific methods as it is done in Java, where it is said, private cultivation under certain conditions yielded good results.

The cultivation of cinchona trees and production of quinine in the country proved a great success during its evolution for a period of nearly a century. It played a great role in the last wars for the benefit of mankind. The growing of cinchona and development of manufacture of quinine in India particularly in West Bengal is a history by itself. The Government is to be congratulated for the noble efforts it had done and is still doing towards preservation of world health with regard to this drug. Its present attempt to grow on a scientific basis other drugs in the country in order to make India at least self-sufficient is indeed laudable.

CHAPTER IV

Classification and Nomenclature

IN THIS book the families have been arranged after the system of classification adopted in Bentham and Hooker's Genera Plantarum. This system has been followed in the Kew and the Calcutta Herbarium, the two famous Herberia of the world, obviously for the reason that this system proved to be of much practical value in the quick and easy determination of plants sent to these herberia for naming. This is done by comparison with the authentic herbarium sheets preserved and arranged in classified order in the herbarium and also with reference to the Icones and literature in the libraries attached to these herberia.

In dealing with medicinal plants, and, as a matter of fact any plant, it is of foremost importance that the plant in question must first of all be correctly determined. Inaccuracy in the determination of plant used for medicinal purposes would lead not only to useless result in the administration of a medicine derived from the plant in question for the treatment of a disease, but it may even cost the life of a patient by producing undesirable or poisonous effects in the human system. Much of our bootless efforts in the treatment of our various ailments are mainly due to administration of wrong plants. There are many lacunae in the method of diagnosis of the numerous medicinal plants mentioned in the old treatises. There is no doubt however that many indigenous plants possess amazing curative properties for various diseases prevalent in human beings and cattle. Although a detailed system of classification of the plants in olden days in India as well as other parts of the world was wanting, there existed undoubtedly some general method of classification in Rigveda, Brikhyurveda, Sukraniti and various other ancient works of great value. Some of the works, such as Charaka and Susruta, are unparalleled treatises in the medical world. Among other treatises may be mentioned Astanga Sanghita, Chakra Dutt Sanghita, Sarangadhar Sanghita, Bhaba Prakash, Madan Pal's Raja Nirghanta, Madhab Kar's Nidan and others. But no system of classification seemed to have attained a stage comparable to the present highly scientific natural system of classification. It may, however, be said that the modern classification of plants evolved from the Vedic period through the last sixth to seventh centuries to its present form and all the names of plants known up to date have been codified according to the International Code of botanical nomenclature based on the valuable works of the expert taxonomists and monographers of the different families, genera and species. The nomenclatural examination still goes on. It is a never-ending task for the systematic botanists and taxonomists. Nevertheless, all the present names are based on careful examination of the literature and the types and authentic herbarium specimens preserved as invaluable records in the well-known herbaria and library of the world.

The plant names are what is called binomial nomenclature. Each specific name of the plant consists of two epithets. The first is called the generic name and the second which is adjective to the first is the specific name. It signifies some special character of the plant. Then comes the name of the author who first discovered the plant and described it for the first time as new to Science. Such an original specimen is preserved as an irreplaceable record for all times to come for future reference. Such a specimen is called a *type* specimen. It is, therefore, fitting that the discoverer's name should be added to the plant name proper at the end so that the future workers may know who was the first discoverer of the plant and whether his discovery is genuine and the particular

plant is correctly named and properly described. As for example *Ficus religiosa* Linn., the name of our sacred fig tree. The generic name is Ficus which implies all fig plants characterised by a group of characters. The specific name "religiosa" indicates a further specified group of characters distinguishing this particular fig tree from other fig trees. The specific name "religiosa" is a qualifying adjective to the generic name. Linn., is the abbreviated name of the author, the world famous biologist, Carl Linnaeus who discovered the plant for the first time in 1753 and gave it the name *Ficus religiosa* with a description in his great work "Species Plantarum". Similarly William Roxburgh, the first Superintendent of the Indian Botanic Garden from 1793 to 1813, discovered and described for the first time the Pine tree with its long characteristic needle-shaped leaves, and named it as *Pinus longifolia* Roxb. Sometimes names are also given in honour of a botanist or belong to or pertaining to a botanist such as Putranjiva *Roxburghii* Wall. (Putranjiva of Roxburgh) named by Nathaniel Wallich, successor of Roxburgh. *Abies Webbiana* Lindl. (named in honour of Webb) is the well-known "Silver fir" of Darjeeling and Sikkim Himalaya occurring at an elevation of 8—12,000 feet.

The scientific world in order to avoid possible mistakes and misunderstanding in the correct determination of plants adopted the international latin names. The local names known to the people of the various countries and even in the different districts of a country often vary, and sometimes they are confusing. Thus *Ficus religiosa* Linn., in India is called Aswatha, Gajavaksha, Khirodrumma in Sanskrit, Asawatha and Asad in Bengali, Pipal in Hindi and Nepali, Nesak in Santhal, Ragi in Telegu, Arak in Tamil, Sacred Fig in English. Thus it can be realised to what extent confusion may arise in accepting local names of a tree which vary from State to State in India alone, not to speak of different local names given to the plants in other parts of the world. The scientific botanical latin names have therefore been given in this work in conformity with the international practice along with the Nepali and Lepcha and also Hindi, Sanskrit and Bengali names as far as available. Suitable new Bengali names have been coined in the cases of those plants which had no Bengali names hitherto.

The distribution in India of each species of plant has also been mentioned. Short description of each species of medicinal plants found either wild in Darjeeling and Sikkim Himalaya or introduced and acclimatised in the various parts of Darjeeling and Sikkim at different elevations has also been incorporated in this work.

Under the medicinal uses only the chief salient well-recognised medicinal values and properties of the respective species of plants have been recorded. No dosage and details of how to use them have been noted for the obvious reason that all diseases require first to be correctly diagnossed by an experienced physician before any medicine can be or should be administered. However, for more details of the uses of medicinal plants and their prescribed dosages, ingredients and relevant reference to literature the readers may consult the well-illustrated book in three volumes entitled "Bharatiya Banaushadhi" (written in Bengali) by Dr. Kalipada Biswas, M.A., D.SC. (Edin.), F.R.S.E., F.N.I., F.B.S., and Sri Ekkori Ghosh, published by the Calcutta University along with other literature on the subject.

CHAPTER V

Glossary of Botanical Terms

A

Abortion .. .. imperfect development or non-development of an organ.

Accrescent .. .. increasing in size with age ; usually said of parts of the calyx or corolla that persist and enlarge after flowering.

Achene .. .. a small dry indehiscent 1-celled 1-seeded fruit or a 1-seeded indehiscent carpel of an apocarpous fruit.

Acicular .. .. needle-shaped.

Actinomorphic .. divisible into similar halves by two or more planes.

Aculeate .. .. prickly ; beset with aculei.

Acuminate .. .. long pointed ; tapering to a point.

Acute .. .. evenly tapering and ending in a narrow angle, but without a prolongation.

Adherent .. .. touching closely or broadly.

Adnate .. .. said of dissimilar organs when congenitally united ; touching closely or broadly.

Adpressed .. .. lying close throughout the entire length against the surface.

Agglomerate .. } heaped or croweded into a dense cluster, but not cohering.

Aggregate .. .. }

Albumen .. .. the nutritive substance found within the seed coats of some seeds outside the embryo.

Amorphous .. .. without definite form.

Amplexicaul .. said of a sessile leaf, or the base of a petiole when clasping the stem.

Anatropous .. .. said of an (inverted) ovule, *i.e.*, one with the micropyle close to the hilum, and the calaza, at the opposite end, the axis of the ovule itself remaining straight.

Androspore .. .. a special kind of zoospore, produced in cells, which originate the dwarf males in Oedogonium.

Angular .. .. having corner.

Annual .. .. plant lasting a year.

Annular .. .. ring-shaped.

Annulate .. .. marked with rings.

Anther .. .. the part of a stamen that bears the pollen.

Antheridia .. .. certain producting organs supposed to be analogous to anthers or fecundative.

Apex .. .. top of a leaf or flowers.

Apical .. .. relating to the apex or tip.

Apiculate .. .. with a short pointed tip.

Appressed .. .. lying flat against or together for the whole length.

Arcuate .. .. bent like a bow.

Areola .. .. an angular space with an elevated margin.

Articulate .. .. composed of joints.

Aril, Arillus .. an accessory seed-covering or an appendage growing from or about the hilum of a seed.

Asexual .. .. without sex.

Axile .. .. relating to the axis.

Axillary .. .. growing in an axil (the angle between stem and leaf).

B

Beak .. .. a sharp tip like the bill of a bird.

Berry .. .. a simple fruit succulent throughout, without a stone, and generally with more than one seed.

Biconvex .. .. double convex.

Bicornate .. .. two horned.

Bifid .. .. divided into two segments with a narrow sinus ; two cleft.

Bilabiate .. .. having two lips, a term usually applied to gamosepalous calyces and gamopetalous corollas.

Bilobed .. .. divided into two lobes.

Binate .. .. in pairs.

Bipinnate .. .. twice pinnate.

Bisexual .. .. having both stamens and pistil in the same flower (hermaphrodite).

Bivalved .. .. two valved (flats or door).

Blade .. .. blade of a leaf ; the extended portion of a leaf or petal.

Bract .. .. a rudimentary or modified leaf subtending a flower or an inflorescence.

Bracteole .. .. a small bract.

Bulb .. .. a spout, usually underground stem, consisting of a short axis, bearing a bud or buds enclosed in fleshy scales or coats.

C

Caducous .. .. falling off very early.

Caespitose .. .. growing in tufts, with many stems from one root.

Calyx .. .. the outer whorl of floral leaves.

Campanulate .. bell-shaped deeper than cupshaped.

Capitate .. .. having a globose head.

Carpel .. .. one of the component parts of a syncarpous or apocarpous pistil.

Cauline .. .. pertaining to the stem.

Circinate .. .. curled round, coiled or spirally rolled up.

Clavate .. .. club-shaped.

Claw .. .. the narrowed base of certain petals.

Coma .. .. a tuft of soft hairs or cotton borne on seed.

Comose .. .. having a coma.

Compressed .. pressed together.

Concave .. .. hollow.

Connate .. .. organs or parts of the same organ when congenitally united.

Contorted .. .. twisted in one direction upon itself.

Cordate .. .. heart-shaped.

Coriaceous .. .. leathery, tough and thick.

Corolla .. .. the inner whorl of floral leaves.

Crenate .. .. with rounded teeth.

Cuneate .. .. wedge-shaped, acute angle at the base.

Cuspidate .. .. tapering gradually to a sharp stiff point.

Cyme .. .. an inflorescence of the definite or centrifugal type in which the main axis and all the lateral axis are each terminated by a flower so that the flowering proceeds from the centre outward.

Cylindrical .. elongated and with circular cross-section ; in the form of a cylinder.

Cypsela .. .. a dry inferior achene invested with the adnate calyx.

D

Deciduous .. .. trees or shrubs which are leafless for a part of the year.

Decumbent .. .. inclined downwards.

Decurrent .. .. produced down, as a sessile leaf when the blade is prolonged below the insertion along the stem forming a winged appendage.

Deflexed .. .. bent downwards.

Dehiscent .. .. the mode of opening of a capsule or of an anther.

Dentate .. .. with margins cut into triangular salient teeth directed outward.

Denticulate .. .. minutely toothed ; having denticulation or diminutive teeth.

Diadelphous.. .. stamens united by their filaments into two sets of bundles.

Dichotomous .. forked equally.

Dioecious .. .. when the male organs are borne on one plant and the female on another.

Didynamous .. flower with two long and two short stamens, and also of stamens when they are such.

Diffuse .. .. widely spreading.

Disciform .. .. depressed and circular, like a disc or point.

Disc or Disk .. an enlargement of the receptacle of a flower in the form of a cup or cushion, ring or glands.

Divaricate .. .. spreading widely apart.

Dorsal .. .. relating to or inserted on the back.

Drupe .. .. a stone fruit, *i.e.*, one with a fleshy or pulpy pericarp and bony or crustaceous endocarp.

E

Ellipsoid .. .. a solid with an elliptical outline.

Elliptic .. .. oblong with rounded end.

Elongate .. .. extended.

Emarginate .. .. with a notch at the apex.

Embryo .. .. the rudimentary plantlet formed in a seed.

Epigynous .. .. growing on the pistil, apparently above the ovary.

Epiphytic .. .. growing upon plants.

Exalbuminous .. without albumen.

Exerted .. .. projecting outwards as anthers beyond the corolla.

Exosporium .. the outer membrane on the coat of a spore.

Extipulate .. .. without stipulate.

Extrorse .. .. applied to anthers that dehisce outwards, *i.e.*, away from the axis of the flower.

F

Falcate .. .. scythe-shaped or sickle shaped.

Family .. .. a group of co-related genera.

Fascicled .. .. in dense clusters.

Fasciculate .. .. in little bundles from a common point.

Fastigiate .. .. said of branches when parallel, clustered and erect.

Ferrugineous .. coloured to immitate iron-rust.

Filament .. .. the stalk of an anther.

Filiform .. .. thread-like.

Fimbricate or fimbriate having a fringe or border of fine thread like process.

Flagelliform .. like a whip lash.

Foliaceous .. .. of the form or texture of a leaf.

Follicle .. .. a dry fruit, resulting from a single carpel opening by only one usually the inner structure.

Fulvous .. .. tawny ; orange yellow and gray mixed.

Furcate .. .. forked.

G

Gamosepalous .. having combined sepals.

Gelatinous .. .. jelly-like.

Genus .. .. group of closely related species indicated by the first name of a plant.

Geminate .. .. twin ; in pairs ; two side by side.

Geniculate .. .. bent abruptly ; like a knee.

Glabrescent .. .. becoming glabrous.

Glabrous .. .. without hair of any kind.

Glandular .. .. having glands or relating to glands.

Glaucous .. .. a bushy grey colour, often covered with a fine bloom.

Globose .. .. nearly spherical.

H

Hastate .. .. spear-shaped.

Herbaceous .. herb-like with succulent stem.

Hermaphrodite .. bisexual, having both stamen and pistil in the same flower.

Heterogamous .. flower heads when male, female, bisexual and neuter florets or any two or three of those, are borne on the same head.

Hilum .. .. the place of attachment of an ovule or seed to the placenta or funicle.

Hirsute .. .. thickly covered with long and coarse hair.

Homogeneous .. of the same kind, all of one nature or kind.

Host .. .. a plant which supports a parasite or an epiphyte.

Hyaline .. .. transparent or translucent and colourless.

Hypogynous.. .. inserted below the ovary.

I

Imbricate .. .. overlapping.

Incise .. .. cut sharply and regularly.

Indehiscent .. .. fruit—the pericarp of which does not open to discharge the seeds.

Inflorescence .. the mode in which the flowers are arranged on the stem.

Introrse .. .. anthers that are twined and open towards the axis of the flowers.

Involucre .. .. a circle of bracts subtending a flower cluster.

Involute .. .. rolled inward.

K

Keel .. .. the central dorsal ridge, like the prow of a boat, formed by the two anterior and innermost petals of a papilionaceous corolla.

Kernel .. .. the inner part of a seed containing the embryo.

L

Lacerate .. .. irregularly cleft as if torn or lacerated.

Lacuna .. .. a depression cavity or inter-cellular space.

Laevis .. .. smooth, not rough.

Lamellae .. .. thin plates or membranes parallel to each other.

Lamina .. .. the blade of a leaf.

Lanceolate .. .. shaped like a lance-head.

Legume .. .. a fruit of a single carpel usually opening by both sutures when ripe.

Lenticular .. .. lens-shaped.

Ligule .. .. anything shaped like a strap.

Ligulate .. .. strap-shaped, usually applied to the ray-florets of Compositae.

Linear .. .. narrower than lanceolate.

Lip .. .. one of the two divisions of a bilabiate calyx or corolla.

Lobe .. .. any division of an organ or specially a rounded division or projection.

Lobulate .. .. divided into small lobes.

Loculicidal .. .. a kind of dehiscence of a capsular fruit in which splitting takes place.

Lunate .. .. crescent-shaped.

M

Mammillate .. bearing Teat shaped processes.

Membranous .. thin, pliable like a membrane.

Monodelphous .. stamens united by their filaments, into one bundle forming a tube or column.

Moniliform .. necklace-shaped, contracted at regular intervals.

Monoecious .. unisexual with the male and female flowers on the same plant, with male and female organs on the same plant.

Mucronate .. abruptly terminating in a sharp point.

Multifid .. .. cleft into many lobes or segments.

N

Nerves .. .. the principal lateral ribs of a leaf.

Nut .. .. a hard indehiscent one-seeded fruit.

O

Obconical .. .. inversely conical.

Obcordate .. .. inversely cordate.

Oblique .. .. one half larger than the other, unequal.

Oblong .. .. much longer than broad.

Obovate .. .. inversely ovate.

Obovoid .. .. a solid which is inversely egg-shaped in outline.

Obtuse .. .. blunt at the apex.

Ochraceous .. ochre colour ; light yellow with a tint of brown.

Ochrea .. .. a membranous tabular stipule, forming a sheath round the stem.

Opposite .. .. set in pairs in opposite side of a stem.

Orbicular .. .. flat with the outline circular or nearly so.

Ovary .. .. that portion of the pistil which includes one or more cavities or cells containing one or more ovules.

Ovoid .. .. egg-shaped.

Ovate .. .. egg-shaped in outline with the broad end towards the base ; of the shape of the longitudinal section of hen's egg.

Ovule .. .. the embryonic seed in the ovary.

P

Panicle .. .. a compound inflorescence in which the main axis is racemose and the secondary and tertiary ramifications are racemose or not.

Papilionaceous .. butterfly-like.

Pappus .. .. the hairy tuft of the fruit on the Compositae and similar dry indehiscent fruit.

Parastic .. .. growing on or in and living upon another plant or animal.

Pectinate .. .. pinnatifid with narrow close segments, like the teeth of a comb.

Pedicel .. .. the ultimate stock supporting a single flower in an inflorescence.

Padicellate .. .. having a foot or stem.

Peduncle .. .. the stock supporting a solitary flower or fruit or a cluster of flowers or fruits.

Peltate .. .. shield-shaped.

Pentamerous .. having the members in each whorl of the flower in fives.

Perianth .. .. a floral envelop.

Pericarp .. .. the portion of the friut formed of the walls of the ovary and whatever adheres to it inclusive of and outside the seed.

Persistent .. .. remaining attached.

Petal .. .. one of the divisions of the corolla.

Petiole .. .. the stalk of a leaf.

Peliferous .. .. bearing hairs, hairy.

Pilose .. .. hairy.

Pinnae .. .. the primary division of a bipinnate or tripinnate leaf.

Pinnate .. .. a compound leaf is so called when the leaflets are arranged on either side of a common axis.

Pinnatifid .. .. deeply pinnately lobed to about half way down.

Pistil .. .. the female organ of a flower consisting normally of ovary, style and stigma.

Pistillode .. .. a rudimentary or barren pistil.

Placenta .. .. that portion of the interior of an ovary on which the ovules are borne.

Plumose .. .. feathered branched on either side like the plume or wages on the shaft of a feather.

Pod .. .. a dry dehiscent many-seeded fruit.

Pollen .. .. a minute powder-like grain contained in the anther cell.

Posterior .. .. that part of a flower which is nearest to the axis of inflorescence.

Pubescent .. .. covered with short, soft, straight hairs.

Pulvinate .. .. cushion-shaped.

Punctate .. .. dotted with small punctures or glands.

Pungent .. .. tapering gradually to a hard, sharp point.

Pyriform .. .. pear-shaped.

Q

Quadrangular .. four cornered.

Quadrate .. .. square.

Quinquefoliate .. with five leaflets.

R

Raceme .. .. an inflorescence of the indefinite kind in which the flowers are borne on pedicels or more or less the same length along a single undivided axis or rachis. Flowers growing towards the centre (centripetal).

Rachis .. .. the principal axis of a pinnate leaf or of an inflorescence.

Ramulus .. .. a small or secondary branch.

Radical .. .. the axis of an embryo below the cotyledons.

Ray .. .. one of the radiating branches of an umbel.

Receptacle .. .. the torus of a flower.

Recurved .. .. curved backward or downward.

Reflexed .. .. bent abruptly backward or downward.

Regular .. .. symmetrical, generally the petals or perianth segments alike in size and shape.

Reniform .. .. kidney-shaped.

Replicate .. .. folded back.

Reticulate .. .. having the veins connected together like the meshes of a net.

Rhizome .. .. an underground or prostrate stem of root-like appearance with an apical growing point which sends of roots at the nodes and bears like a true stem, buds, leaves or scales.

Rhomboid .. .. with four sides more or less and the lateral angles obtuse.

Rostrate .. .. terminating with a beak.

Rugose .. .. full of wrinkles.

S

Saccate .. .. sac-shaped ; baggy.

Sagittate .. .. shaped like an arrow head.

Scalariform .. .. barred or crossed like the rounds of a ladder.

Scabrous .. .. very rough to the touch owing to short-stiff hairs.

Scrobiculate .. marked with little pits or depressions.

Scape .. .. a leafless and generally unbranched flowering stem rising from the ground.

Scarious .. .. thin, dry membranous, somewhat stiff and not green.

Secund .. .. when parts or organs are all directed to one side.

Sepal .. .. one of the segments of the calyx, especially when not combined.

Septicidal .. .. a form of dehiscence of a ripe carpel when it opens through lines of junction of the carpels.

Septum .. .. Partition or division.

Seriate .. .. in rows traverse or lengthwise.

Serrate .. .. toothed like a saw.

Serrulate .. .. minutely serrate.

Sessile .. .. without a stalk.

Seta .. .. a bristle or bristle-shaped body.

Sheath .. .. a closely fitting tubular or enrolled case.

Shrub .. .. a woody plant of small size.

Simple .. .. undivided.

Sinuate .. .. with an irregular deeply wavy margin.

Spathulate .. .. shaped like a spathula ; spoon-shaped.

Spike .. .. a racemose inflorescence bearing sessile flowers on an undivided axis.

Spikelet .. .. a secondary spike.

Spinose .. .. furnished with spines or of a spiny character.

Stamen .. .. a male organ of a flower, consisting of a filament and an anther.

Staminode .. .. an abortive or antherless stamen.

Stellate .. .. star-shaped.

Sterile .. .. barren ; destitute of fruit or fruit-bearing cells.

Stigma .. .. that part of the pistil which is specially adopted for the reception of the pollen for the fertilization of the ovule.

Stipule .. .. an appendage of a leaf, usually one on either side of the petiole.

Stone .. .. the hard endocarp of a drupe.

Striate .. .. marked with longitudinal lines or minute furrows.

Style .. .. a stalk-like outgrowth from the summit of the ovary supporting the stigma.

Subulate .. .. shaped like a cobbler's awl, narrow, tapering and somewhat stiff ; awl-shaped.

Succulent .. .. with abundant cellular tissue full of juice.

Syngenesious .. stamens united by their anther as in Compositae.

T

Tap-root .. .. primary root resulting from the direct prolongation of the radicle.

Tegument .. .. a covering or membrane.

Tendril .. .. a slender process usually belonging to the axis as serving as a support in climbing.

Terete .. .. cylindrical, rounded in cross section.

Ternate .. .. arranged in threes in a cluster or whorl.

Testa .. .. the outermost coat of a seed ; the hard outer covering of a seed.

Thalamus .. .. that part of the axis of a flower which supports the floral whorls and the pistil.

Tomentose .. covered with short, soft, rather dense more or less tangled hairs.

Torulose .. .. almost synonymous with moniliform.

Torus .. .. same as thalamus.

Trichotomous .. dividing in threes.

Truncate .. .. as if cut off at the end.

Tuber .. .. a thickened modification of underground stem bearing buds or eyes.

Tuberculate .. .. covered with wart like projections or excrescence.

Turgid .. .. swollen and more or less firm.

U

Undulate .. .. wavy.

Unisexual .. .. one sex.

V

Vagina .. .. a sheath, sheathing.

Valvate .. .. with the margins of the members of a whorl only meeting without overlapping.

Variety .. .. a sort of modification subordinate to species.

Verrucose .. .. irregularly swollen at intervals.

Versicolar .. .. changing colour or of more than one tint or colour.

Ventral .. .. lower surface of flattened ribbon like thalli.

Verticillate .. .. arranged in whorls.

Vesicle .. .. a small bladder or air cavity.

Villose .. .. more or less thickly covered with long soft simple hairs.

W

Whorl .. .. a collective name for all similar members that are arranged in a circle round an axis.

Whorled .. .. disposed in whorls.

Wing .. .. any thin membranous appendages.

Z

Zygomorphic .. capable of being bisected into similar halves by a madian plane only.

CHAPTER VI

Systematic Enumeration of the Common Species of Medicinal Plants in the Darjeeling and Sikkim Himalayas

ANGIOSPERMAE—DICOTYLEDONES.

Family : RANUNCULACEAE.

Aconitum ferox Wall.

(Plate 1, page 99.)

(Beng.—*Katbis.*)

(Nep.—*Bikh.*)

Stem 3—6 ft., puberulous, leafy. Leaves 3—6 in., lobes cuneate-ovate, incised. Raceme erect, 6—12 in., simple or sparingly branched below, tomentose ; pedicels : 1—2 in. thickened at the top ; bracts pinnatifid ; bracteoles linear. Flowers large, pale dirty blue. Helmet about twice as long as high. Follicles 5, erect, usually densely villous, glabrous in some Garhwal specimens, seeds distributed by censor mechanism. Flowering in autumn and fruiting in cold weather.

Distribution : Temperate Sub-Alpine Himalaya from Sikkim to Garhwal, alt. 10—14,000 ft. Common in Thangu, Gnathong, Takung, Serethang, Tempung, Yokoni, Jangri between 12,000 and 14,000 ft. elevation.

Medicinal uses :

Parts used: Tuberous root.

The alkaloid extracted is Aconitine $C_{34}H_{47}NO_{11}$. Alkaloid content of plant grown in Singalila range, Darjeeling, is 1.134 per cent.

The root is antiperiodic, antidiabitic, antiphologistic, antipyretic, anodyne, diaphoratic and diuretic.

If taken frequently or in overdose it acts as a virulent poison. Aconitine mixed with blood and entering the tissue reduces frequency, force and tension of the pulse and increase the amount of urine.

Even one day's treatment with Aconitine the quantity of sugar in the diabetic treatment is reduced. Its ointment is useful in the treatment of rheumatism and skin diseases.

It is also used with good result in the treatment of mascular rheumatism and neuralgia.

Various poisonous properties are ascribed to this root. Supposed to have been commonly used in poisoning arrows in various manner.

Aconitum heterophyllum Wall.

(Beng.—*Atibis.*)

(Nep.—*Bikh.*)

Stem erect, leafy, 1—3 ft., simple or branched from the base, glabrous below, puberulous above. Leaves : 2—4 in., broad, ovate or orbicular, cordate, acute or obtuse; cauline sharply toothed, the lowest long—petioled

and not amplexicaul. Recemes often panicled, many-flowered. Bracts sharply toothed, upper 3-fid or entire. Flowers more than 1 in. long, bright blue, greenish blue, with purple veins. Helmet half as high as long, shortly beaked. Follicles 5, downy. Testa smooth. Flowering in autumn and fruiting in cold weather.

Distribution : Common in the Sub-Alpine and Alpine Zone of the Himalaya from the Indus to Kumaon.

Parts used : The root.

Medicinal uses : It is common more in the Western Himalaya, and more widely used for medicinal purposes by local Kaviraj with various ingredients.

The root is officinal in the Indian Pharmacopœia. Tonic and antiperiodic properties are attributed to it.

Aconitum napellus Linn.

(Beng.—*Nepalibis.*)

(Nep.—*Bikh.*)

Stem 6 in.—3 ft., often decumbent, glabrous or slightly pubescent. Leaves very variable in size, ultimate divisions linear. Racemes simple or sparingly compound ; bracts entire or 3-fid. Flowers ¾—1 in. long, bright or dull greenish-blue. Helmet three times as long as high. Follicles 3-5, in the Indian forms hairy. Flowering in autumn and fruiting in cold weather.

It appears from the monographic study of the genus that *A. nepellus* does not occur in India. But Hooker mentions of an Indian variety. It is, I think, likely that such an Indian variety exists in the Sub-Alpine Himalaya.

Distribution : Temperate Alpine Himalaya, from 10,000 ft. to the highest limit of vegetation. Cultivated in Great Britain.

Parts used : Root.

Medicinal uses :

Its febrifuge and tonic properties are mentioned in all works on Materia Medica.

Aconitum palmatum D. Don.

(Beng.—*Patabis.*)

(Nep.—*Bikh.*)

An erect herb, 2—5 ft. long with deeply 5-lobed reniform leaves with long petioles. Flowers large, greenish blue with long pedicel and arranged in panicles. Follicles 5, 1—1½ in. long, glabrous. Flowering in autumn and fruiting in cold weather.

Distribution : Temperate Himalaya from Sikkim to Garhwal, alt. 8—10,000 ft., common in Tonglu and Sandakphu.

Parts used :

Medicinal uses :

It is used in diarrhoea and rheumatism. Powder made from dry tuberous roots is used by the local people for fever, and also effectively applied in sharp cuts and wounds.

Family : DILLENIACEAE.

Dillenia indica Linn.

(Plate 2, page 100.)

(Beng.—*Chalda.*)
(Lep.—*Thapru.*)
(Nep.—*Phamsikol.*)

A middle-sized round headed tree. Leaves 8—10 by 2—4 in., fascicled at the ends of the branches, acute, veins close-set, glabrous above, pubescent especially on the nerves beneath, margin acutely dentate. Flowers 6 in. diam., subterminal. Sepals orbicular, thick and fleshy, persistent after flowering. Petals white, obovate falling off when flowers open. Inner stamens arching over the outer. Seeds compressed, margins hairy. Flowering in summer, fruits ripen in cold weather.

Distribution : Tropical forests in the Western Peninsula, Bihar and Ceylon. Abundant in the Terai forests of Darjeeling and Sikkim Himalaya, from Nepal to Assam. Eastern Peninsula from Sylhet to Singapore. A common tree in gardens and villages. Fruits sour, edible made into chatney.

Parts used : Bark, leaves and fruits.

Medicinal uses :

The juice of the fruit mixed with sugar and .water is used as a cooling beverage in fevers, and as a cough mixture. The bark and the leaves are astringent and are used medicinally. The fruit is slightly laxative, but is apt to induce diarrhoea if too freely indulged in. The leaves are used in the treatment of dysentery of the calves.

Family : MENISPERMACEAE.

Cissampelos pareira Linn.

(Plate 3, page 101.)

(Beng.—*Akaleja.*)
(Nep.—*Batulpati.*)

A lofty climber ; branchlets rarely glabrous. Leaves 1—4 in. diam., usually peltate, obtuse and mucronate, rarely acute, base truncate or more or less cordate ; petiole equalling the leaf or longer. Male cymes ½—1½ in. (sometimes replaced by a shoot with small leaves), axillary or nearly so, usually 2—3 superposed, decompound ; bracts minute, rarely foliaceous ; peduncle slender, pubescent tomentose or hirsute. Fem. racemes 1—2, axillary ; bracts lax or densely imbricate, usually hairy, sometimes petioled ; pedicles very short, petals yellowish. Ovaries rarely glabrate. Drupe, ovule ⅛ in. diam., scarlet when ripe. Flowering in the rains and autumn, fruiting in cold weather.

Distribution : Tropical and sub-tropical India, from Sind and the Punjab to Ceylon and Singapore. Common in Terai forest climbing profusely on trees.

Parts used : Roots, leaves and barks.

Medicinal uses :

It is used in dyspepsia, diarrhoea, dysentery, urinary diseases and also in dropsy and nephritis. Root is a remedy against wasp, bees and scorpion sting. Used in snake bite.

Stephania hernandifolia Walp.

(Plate 4, page 102.)

(Beng.—*Nimuka.*)

(Nep.—*Tambarki.*)

A climbing plant. Leaves 2—6 in. diam., somewhat triangular, base truncate or subcordate, glabrous or thinly pubescent below only or on both surfaces, pale or glaucous beneath ; petiole 1½—4 in. Flowers, greenish white, axillary, rays 8—12, with subulate bracts, sepals obovate, obtuse. Petals 3—4. Drupes red. Flowering in the rains and fruiting in autumn.

Distribution : From Nepal to Chittagong, Singapore and Ceylon. Abundant on trees and tall shrubs in the outskirts of Terai forests.

Parts used : Root, bark and leaves.

Medicinal uses :

The root is regarded as light, bitter, astringent and useful in fever, diarrhoea, urinary diseases, dyspepsia, etc. Leaves are used in opening up boils, and as depilatory.

Tinospora cordifolia Miers.

(Plate 5, page 103.)

(Beng.—*Gulancha.*)

(Sans.—*Guduchi.*)

A widely climbing plant characterised by threadlike hanging aerial roots, bark grey corky; with lanticels, shoots glabrous. Leaves 2—4 in. diam., cordate, acute or acuminate; petiole 1½—3 in. Racemes exceeding the leaves, axillary terminal or on the old wood; bracts subulate. Flowers yellow, males fascicled, females usually solitary, glabrous. Petals cuneate. Anthers oblong. Drupes ¾ in. diam. of the size of a pea or small cherry red. Flowering in summer and fruiting in cold weather.

Distribution : Throughout tropical India, from Kumaon to Assam and Burma, and from Bihar and Concan to Ceylon and the Carnatic. Common in the fringe of the Terai forest.

Medicinal uses :

Extracts from its roots are used for regaining lost vitality. It is an important medicinal plant profusely used with various other ingredients in Ayurvedic treatment. Extracts of the stem used freely as febrifuge and aphrodisiac, and taken with honey has soothing effect in gonorrhoea. When rubbed externally cures rheumatic pain.

Family : BERBERIDEAE.

Berberis aristata Dc.

(Plate 6, page 104.)

(Beng.—*Daru-haridra.*)

(Nep.—*Chitra.*)

An erect spinous straggling evergreen shrub, 3—10 ft. high; bark soft, yellow, rather corky. Leaves 1—3 in. long, evergreen or nearly so, obovate or oblong entire or margin with a few distant spinous teeth. Flowers 2 in. diam., in compound often corymbose racemes, petal pale yellow. Berries ½ broad, small subglobose, red. Flowering in spring and fruiting in summer.

Distribution : Temperate Himalaya, alt. 6—10,000 ft., from Bhutan to Kunawar. Nilgiri Mountain and Ceylon, alt. 6—7,000 ft. Between 9,000 and 12,000 feet they occur all over Sikkim in scattered condition at these elevations.

Parts used: Root, bark, branchlets and fruits.

Medicinal uses:

The root bark is used as tonic, stomachic, cholagogne, antiperiodic and alternative. It is reported to be diaphoratic and antipyretic in malarial fever. Used in the treatment of eye trouble. It is one of the best medicines for the treatment of eczema and skin diseases. Powdered root is used in stopping haemorrhage in piles. Mahonia nepalensis (*Berberis nepabuses*) possesses more or less same properties. This tree is very common in Darjeeling and Sikkim.

Family : PAPAVERACEAE.

Papaver somniferum Linn.

(Plate 7, page 105.)

(Beng.—*Aphin.*)

(Sans.—*Ahiphena.*)

Annual, 2—4 ft., tall, glaucous, simple, rarely branched, usually quite glabrous herb with latex. Leaves ovate, oblong or linear, variously lobed or sect oblong. Flower large, sepal 2, caudacious, petal 2 × 2, white purple or scarlet, or variously coloured in cultivation. Capsule 1 in. diam., stalked. Crowned by stellately rayed stigmas. Seeds reniform whitish yield oil. Seeds edible. Flowering in spring and fruiting in summer.

Distribution : Cultivated in temperate and warm regions of Europe, Asia and North Africa. Cultivated in the hills.

Medicinal uses :

The latex exuding from incision on unripe fruits of white poppy hardens into opium.

Treatment of poisoning by opium.—In early stage give emetics (Zinc Sulphate, Copper Sulphate or Mustard or 1/6th grain of Opomorphina Hydrochloride Hypodermically), stomach pump of syphon to wash out the stomach with a weak solution of Potassium Parmanganate (1 in 400) until the fluid returns with its purple colour unchanged ; repeat this every half hour for 12 hours ; prevent sleep by walking the patient about and giving strong coffee both by mouth and by rectum. Flick bare skin with towels, maintain warmth ; to combat failing respiration, apply artificial respiration, interrupted galvanic current, and inject subcutaneously Liquor Atropine Sulphate every ten minutes until the pupils dilate or the pulse is quickened, fredic battery, strychnine hypodermically in case of respiration becoming very slow ; Alcohol and Ammonia as stimulants internally.

The alkaloid in Morphine.—Highly poisonous ($C_{17}H_{19}NO_2$) used in suicide and poisoning cases. It is the most valuable hypnotic drug in Materia Medica, and profusely used also in relieving pain and also used in preventing abortion and pain after delivery and various other purposes.

Podophyllum emodi Wall.

(Plate 8, page 106.)

(Beng.—*Papra.*)

(Sans.—*Laghu Patra.*)

Stem or scape 6—12 in., erect, stout, herbaceous. Leaves 2, vernal, alternate, long petioled, plaited and deflexed in venation, 6—10 in. diam., orbicular, 3—5 lobed to the middle or base; lobes cuneate, acutely serrate. Peduncle terminal in bud, then apparently supra-axillary or inserted on the petiole of the upper leaf. Flowers 1—1½ in. diam., white or pink, sepals very deciduous. Petals 6—9, sometimes 4, obovate, oblong. Stamens 6. Berry 1—2 in., ellipsoid, red, edible. Flowering in rains and fruiting in autumn.

Distribution : Interior ranges of the Himalaya, alt. 9—14,000 ft., from Sikkim to Hazara, descending to 6,000 ft. in Kashmir. Between 10,000 and 11,000 Thangu, Yamthan, Dombong. It is worth cultivating in suitable areas in the Sikkim Himalaya.

Parts used: Whole plant, root and fruit.

Medicinal uses:

It is a sure purge in torpid liver, producing copious discharges. It is largely employed in bilious fevers. It is named "Vegetable Calomel" as its action somewhat corresponds to that of mercury. The rhizome itself is not employed in medicine. A pill containing ½ grain of *Podophyllum emodi* and 3 grains of *Extract Hyocyamus* is an efficient purgative causing four to six watery stools containing much bile.

Family: FUMARIACEAE.

Dicentra thalictrifolia Hf. & T.

(Plate 9, page 107.)

(Beng.—*Lata-gulfa.*)

(Lep.—*Creem, Thol.*)

Stem slender, reflexuous, angled. Leaves alternate, segments ¼—1 in., oval, oblong or orbicular. Flowers ¾—1 in. long, yellow or purple; peduncle 2—3 in., slender, often leafy; pedicels ½—1 in., bracts linear. Capsule is broader, ¾ in. long, thick fleshy, very tardily dehiscent, the style is stouter and the seeds granulate. Flowering in rains and fruiting in winter.

Distribution: Temperate Himalaya, alt. 4—8,000 ft., Nepal, Bhutan, Khasia Hills at the Kala Pani Bungalow, alt. 5,000 ft. Common in Sikkim.

Parts used : Roots.

Medicinal uses :

Extract from roots is used for stopping amenorrhoea.

Family: BIXINEAE.

Gynocardia odorata R. Br.

(Plate 10, page 108.)

(Beng.—*Chaulmoogra.*)

(Lep.—*Tulkung.*)

(Nep.—*Kadu.*)

A middle-sized tree, branches slender, flexuous somewhat pendulous. Leaves bifarious, more or less lanceolate, largest 6—10 by 3—4 in., smallest 4—6 by ½—2 in., coriaceous, strongly reticulate beneath; petiole ½—1 in. Flowers sweet scented, yellowish in very large fascicles on the trunk, solitary or few together in the leaf axils, very variable in size, ½—2 in. diam., the females largest; peduncles 1—3 in. bracts basal, minute, calyx coriaceous, cupshaped, petals 5, filaments woolly. Fruit 3—5 in. diam. Seeds 1 in. long. Flowering in summer and fruiting in autumn.

Distribution : Abundant in the middle and lower hill forests of Sikkim and the Khasia Hills, eastwards to Chittagong, Rangoon and Tenasserim.

Parts used : Seeds.

Medicinal uses:

The oil is in great repute in India as a remedy for leprosy; it has also been advantageously administered in scrofula, eczema and other skin diseases and chronic rheumatism; used in cold as a clearing agent. Gynocardic acid is prepared from its oil.

Family: POLYGALEAE.

Polygala arillata Buch.-Ham.

(Plate 11, page 109.)

(Beng.—*Nepali-kanti.*)

(Lep.—*Cleem-soom-creem.*)

An erect pubescent or nearly glabrous shrub, 4—8 ft. Leaves 4—6 by ¾—2½ in., lanceolate obovate—lanceolate or elliptic—oblong, acuminate; petiole ⅓—½ in. Flowers ½ in. long, in usually panicled racemes; bracts linear, deciduous. Sepals very unequal, caducous, upper very concave, 2 lower small, ovate; keel ampty-crusted, united to the lateral petals for half of their length. Capsule ½—⅔ in., broad—reniform, rather fleshy, rugose when dry. Seeds large, globose; cotyledons fleshy. Flowering in summer and fruiting in cold weather.

Distribution: Subtropical and temperate Himalaya, from Nepal eastward, alt. 2—6,000 ft. Khasia mountains., alt. 4—5,000 ft. Western Peninsula, Ava, Ceylon. Common at or below 4,000 ft.

Parts used : Root.

Medicinal uses :

Its root is used as purgative and febrifuge, and also used in headache. The Lepcha herbalist consider the root as one of the three ingredients for treatment of tuberculosis

Family: CARYOPHYLLEAE.

Drymaria cordata Willd.

(Plate 12, page 110.)

(Beng.—*Nasya-pati.*)

(Nep.—*Avijal, creem, thul.*)

A diffuse glabrous shrub, branched from the base; branches 1—3 ft., slender. Leaves ½ to 1 in. in diam., somewhat ovate-orbicular, 3—5 nerved from the base, mucronate; petioles variable; stipule of several bristles. Flowers ⅛—¼ in. diam., in axillary and terminal cymes; pedicels slender; bracts with membranous edge. Calyx obconic at the very base; sepals oblong, with 3 strong nerves, and membranous margins. Petals 2-lobed to below the middle, lobes narrow not exceeding the sepals. Stamens 3—5. Style short; ovules 3 or more. Capsule ovoid, 3-gonous, shortly pedicelled, 3-valved to the base; 1 seeded. Seeds orbicular, compressed muricate. Flowering and fruiting in rainy season, and almost throughout the year.

Distribution: Tropical and subtropical India and Ceylon, extending westwards to the Punjab, and ascending the Himalaya to 7,000 ft. abundant in Darjeeling and Sikkim. Tropical Asia, Africa and America.

Parts used : Leaves and wholeplant.

Medicinal uses:

Leaves and plants are smouldered over fire and inhaled through the nose in complaints of headache, when inhaled it gives a burning sensation. It is used as a medicine for dog-bites, and is also very useful as a throat paint in hay-fever, hay-asthma, diphtheria and pneumonia.

Family: HYPERICINEAE.

Hypericum patulum Linn.

(Plate 13, page 111.)

(Beng.—*Paharia Pitjhati.*)

(Nep.—*Urilo.*)

A glabrous shrub, 1—3 ft., with brownish bark and numerous red, stiffly patent branches. Leaves 1—2½ in., distichous, very shortly petioled, acute, black-delted and glaucescent or rusty beneath, pellucid—punctate and striate, margins reflexed. Cymes few-flowered, terminal; peduncles 2 bracteate; flowers 1 in. diam., sepals ¼ in.; petals yellow, orbicular, twice the length of the stamens, stamens many, filament free. Styles equalling the ovary. Capsule ½ in., obtusely conical. Flowering in autumn and fruiting in cold weather.

Distribution : Throughout the temperate Himalaya between alt. 3 and 7,000 ft., from Bhutan, to Simla, Dalhousie, and Chamba, Khasia mountains, alt. 5—6,000 ft., Yunan, Japan, Formosa.

Parts used: Seeds.

Medicinal uses:

The seeds are aromatic and stimulant.

Family: GUTTIFERAE.

Garcinia Zanthochymus Hook. f.

(Plate 14, page 112.)

(Beng.—*Tomal.*)

(Hind.—*Dampel.*)

A middle-sized evergreen tree; trunk straight; branches drooping angular. Leaves 9—18 by 2—4 in. diam., coreaceous, shining, veins ¼—½ in. apart, reticulated; petiole 1 in., rugose. Male flowers ¾ in. diam., in 4—8 flowered fascicles, from the axils of fallen leaves, white; pedicels thickened, 1—1½ in; sepals ⅙ in., orbicular, concave fleshy, unequal. Petals ⅓ in., orbicular, spreading, thin. Stamens in 5 broad bundles of 3—5, alternating with 5 fleshy glands, anthers 2-celled. Hermaphrodita flower like the male. Ovary ovoid, pointed, usually 5-celled; stigmatic lobes 5, oblong, spreading, entire. Fruit the size of an apple; subglobose, pointed, dark yellow. Seeds 1—4 oblong. Flowering in spring and fruiting in summer. Fruits sweet and sour.

Distribution: Eastern Bengal and the Eastern Himalaya, from Sikkim to the Khasia mountains and Burma; Eastern Peninsula, Penang and the Andaman Islands, Western Peninsula, the Circas, and the Bombay Ghats southward.

Parts used: Bark, fruits and seeds.

Medicinal uses:

The seeds yield a concrete oil known as Dampel oil or Dampel butter. This oil or butter is a specific remedy in dysentery and mucous diarrhoea, administered in doses of one tola in a quarter seer of milk three times a day until complete recovery; it is also useful in phthisis, pulmonalis and some scorbutic diseases. Its soft twigs soaked in water and made into a paste when applied over boils, cure boils.

Mesua ferrea Linn.

(Plate 15, page 113.)

(Beng.—*Nag-kesar.*)

(Sans.—*Nagakesara.*)

A tall or middle-sized evergreen glabrous tree; trunk erect, straight; twigs slender, sub-4-angled, timber hard—known as Iron wood. Leaves 3—6 by 7½ to 1¾ in., lanceolate base acute or rounded, dark green and shinning above, covered more or less with fine waxy meal beneath; veins very fine, close set, and equally inconspicuous on both surfaces. Petiole ¼—⅓ in. Flowers ¾—3 in. diam., usually terminal and solitary or in pairs. Sepals orbicular, thick with membranous margins, inner pair largest. Petals 4, spreading, cuneate-obovate, pure white. Anthers crowded, large, oblong, golden yellow. Fruit ovoid, conical-pointed, size variable, often of a large chestnut; base surrounded by the persistent sepals, 1—4 seeded. Seeds dark brown, testa smooth.

A very variable plant, the absence of the pruinose under surface of the leaves is by no means confined to the small-flowered states from South India, to which the name of coromandeliana has been applied; the latter is a small and distinct looking form. Flowering in spring and fruiting in and after the rains.

Distribution: Mountains of Eastern Bengal, the Eastern Himalaya and the Eastern and Western Peninsulas, and the Andaman Islands; cultivated in the Botanic and other gardens in India. This much admired tree found abundant in Terai forest is now getting scarce.

Parts used: The flowers, kernel, bark and leaves.

Medicinal uses:

The flowers are considered by the Hindu physicians to have astringent and stomachic properties. A paste made of the flowers with butter and sugar is used in bleeding piles and burning of the feet. The flowers and leaves are used in Bengal as antidote to snake poison. The bark is mildly astringent and aromatic; the seeds are used as an embrocation in rheumatism in North Canara and found useful in the treatment of itch. The flower is said to yield a high quality of scented oil used in perfumery.

Family: THEACEAE.

Schima wallichii Choisy.

(Plate 16, page 114.)

(Beng.—*Cheloni.*)
(Nep.—*Chilaune* or
Aule Chilaune.)

A tree 40—100 ft., with rough or smooth, pale or brown bark. Leaves 6—7 by 2—3 in., elliptic-oblong, tapering or rounded below, acute or slightly acuminate, glabrous and reddish-veined above, reticulate and more or less pubescent beneath; petiole ½ in., pubescent. Peduncles rather slender; bracts ¼ in., alternate, narrow oblong, retuse. Flowers 1½—2 in. diam., white fragrant. Sepals ⅙ in., long, with pubescent ciliate margins, glabrous, or slightly pubescent outside. Petals pubescent outside at the base. Stamens yellow. Fruits about ¾ in. diam. Flowering in spring and fruiting in cold weather.

Distribution: Eastern Himalaya, from Nepal, Sikkim, alt. 2—5,000 ft., Bhutan, Assam, Chittagong and the Khasia Mountains, alt. 2—4,000 ft., Burma, Sumatra, abundant in the East Himalaya, all over Darjeeling district and Sikkim middle hill forest.

Parts used: Bark.

Medicinal uses:

The bark is a mechanical irritant and vermicide, and is used for curing gonorrhoea by the local people.

Family: DIPTEROCARPEAE.

Shorea robusta Gaertn.

(Beng.—*Shal.*)
(Lep.—*Salwa.*)
(Nep.—*Tatural.*)

A very large diciduous highly valued timber tree, but often occurring in a stunted form in the plains and low hilly districts. Leaves 6—10 by 4—6 in.; petiole ¾—1 in; stipules ⅓ in., falcate pubescent. Panicles 5—9 in. long, clothed as well as the flowers with pale velvety pubescence, branches unilateral,

racemose. Flowers subsessile. Petals about ½ in., long, pale yellow, tapering upwards, 12—13 nerved. Anthers with a bearded appendage. Ovary pubescent, stigma 3-denticulate. Fruiting—calyx with the segments sometimes sub-equal, bases ⅓ in., ovate, pubescent; wings 2½ in., linear obtuse, 10-nerved. Flowering in spring and fruiting in summer.

Distribution : Tropical Himalaya, and all along its base from Assam to Sutlej. Eastern districts of Central India, West Bengal Sub-Himalayan Tracts, abundant in Darjeeling and Sikkim Terai region.

Parts used: Resin and leaves.

Medicinal uses:

The resin and leaves are much used for packing and other useful purposes. The resin is regarded as astringent and detergent, and is used in dysentery, and for fumigations, plaster, etc. The resin thrown over the fire gives out thick volumes of fragrant smoke, and is much used for fumigating rooms occupied by the sick. The resin is also burnt as incense to drive out mosquitoes.

Family: MALVACEAE.

Abutilon indicum G. Don.

(*the Leucoderma plant.*)

(Plate 17, page 115.)

(Beng.—*Petari, Jhampi.*)

(Hind.—*Kungani, Kahia.*)

(Sans.—*Atibala Karkatura.*)

Minutely hoary tomentose rather spreading shrub. Leaves up to 3½ by 2 in. cordate, ovate, acuminate, toothed, rarely subtrilobate; petioles 1½—3 in. long; stipules ⅓ in. long, linear, acute, deflexed. Pedicels often 1—2 in. long, axillary, solitary, jointed very near the top. Calyx ½—⅔ in. long, divided to the middle; lobes ovate, apiculate. Corolla 1 in. in diam., yellow, opening in the evening. Staminal tube hairy at the base; filaments long. Carpels usually 15—20, longer than the calyx, with a distinct small acute point, hairy. Seeds brown-black densely and minutely scorbiculate. Flowering in autumn and fruiting in winter.

Distribution: Occurs wild in the tropical parts of Africa, Asia and northern Australia. In India it is found in all the provinces in the plains and up to an elevation of 4,000 ft. in the hills of Darjeeling and Sikkim.

Part used : Root, leaves and flowers.

Medicinal uses:

Efficacious in the treatment of *Leucoderma.*

Equal part of the root of this plant, say one ounce root, one ounce fresh honey, one ounce chaulmugra oil and one ounce of white sandal wood fresh paste should be made into an ointment or emulsion. This emulsion should be applied to the affected part at least twice daily for about a month or more according to the nature of the disease. According to some, vegetarian diet and drinking of sufficient water during the treatment is supposed to expedite cure. (Author's prescription.) Oil of the seeds of *Psoralea corylifolia* is also efficacious in leucoderma.

Infusion of the leaves and roots is used as a cooling agent in fevers. Decoction of the leaves are good as a mouth wash and in cases of tender gums and is also used in gonorrhoea and inflammation of the bladder. The flowers and leaves are applied to boils and ulcers. It is distinctly useful in gonorrhoea, gleet and chronic cystitis. The bark, and root are good diuretics. Root infusion is also used in relieving strangury and haematura. It is also useful in leprosy.

Family : BOMBACEAE.

Salmalia malabarica Schott et Endl.

(Syn.—*Bombax malabaricum Dc.*)

(Beng.—*Simul.*)

(Lep.—*Simal.*)

(Eng.—*Silk cotton tree.*)

(Nep.—*Sunglu-king.*)

A large deciduous tree, covered with stout hard conical prickles; branches spreading. Leaflets 6—12 in., glabrous; petiole longer than the leaflets, secondary petioles 1 in. Stipules small, caducous. Flowers numerous, fascicled at or near the ends of the branches. Calyx 1 in., cup-shaped, smooth externally, silky within, margin slightly lobed, ultimately irregularly cleft, deciduous with the corolla and stamens. Corolla 6—7 in., red or white. Petals 5, oblong, recurved, fleshy, twice the length of the stamens. Stamens tube short, filaments numerous, pluriseriate, 5 innermost forked at the top, each with an another, 10 intermediate shorter, outer very numerous, filaments about 70; the numerous outer ones united in 5 clusters. Anthers long, afterwards twisted. Style longer than the stamens. Capsule 6—7 in., oblong, hard woody, downy, 5-valved. Valves silky within. Seeds glabrous, embedded in silky wool. Flowering in early spring and fruiting in early summer.

Distribution : Tropical Eastern Himalaya, abundant in Terai and foot-hills, and throughout the hotter forest regions of India, Ceylon, Burma, Sumatra.

Parts used: Bark, root, fruits and seeds.

Medicinal uses:

Its gum-like juice is used in dysentery. The dry flowers with poppy seeds, goats milk, and sugar are boiled and inspissated, and of this conserve two drachms are given three times a day in haemorrhoids. The resin is aphrodisiac. Young roots are used in gonorrhoea.

Family: GERANIACEAE.

Oxalis corniculata Linn.

(Beng.—*Amrul-sak.*)
(Eng.—*Indian sorrel.*)
(Sans.—*Amlalonika, Changeri.*)

A very variable soft delicate, herbaceous trailing weed. Leaves long, peticled; leaflets obcordate. Bracts setaceous. Flowers subumbellate. Sepals obtuse. Petals yellow, obcordate. Fruiting pedicels depressed. Capsule tomentose, subcylindric, cells many-seeded. Seeds transversely ribbed. Flowering and fruiting in autumn and throughout year.

Distribution: Throughout the warmer parts of India and Ceylon, ascending the Himalaya to 7,000 ft. Abundant in plains, hillsides and shady wasteland and cultivated place; ascending in Darjeeling and Sikkim up to 6000 ft. mixed with other oxalis species.

Parts used: Leaves and whole plants.

Medicinal uses:

The leaves are considered by the Sanskrit writers as cooling, refrigerant and stomachic. The fresh juice expressed from them is said to relieve intoxication from Datura; and said to be useful in dysentery and prolapsis of the rectum. The juice is also febrifuge, used in the treatment of boils.

The fresh leaves made into a curry are said to improve the appetite and digestion of dyspeptic patients.

Family: RUTACEAE.

Citrus reticulata Blanco.

(Beng.—*Kamla Nebu.*)
(Nep.—*Soontala.*)

An arboreous, rarely shrubby, small, slender tree; young shoots glabrous. greenish-white. Leaves glabrous, 3—6 in., elliptic or ovate, acuminate; petioles naked or winged; wings often obovate, as large as the blade or nearly so. Flowers pure white, scented more or less; bisexual. Stamens 15—30. Fruit globose, often depressed 2 in. diam., generally oblate, not mammillate. This is the orange of the East Himalaya. Flowering in spring, fruits ripen in early cold weather.

Distribution : Hot valleys along the foot of the Himalaya, and from Garwhal eastwards to Sikkim and in the Khasia Mountains; Manipur; mountain forests in the Peninsula. Much cultivated in the lower and middle-east Himalaya, all over Bhutan, Darjeeling and Sikkim.

Tons of oranges sent to the plains from Bhutan border, Darjeeling and Sikkim during cold weather.

Parts used: Skin, flowers and inner succulent juicy cells.

Medicinal uses:

The dried outer portion of the rind of the fruit possesses stomachic and tonic properties. It is useful in dyspepsia and general debility. The water distilled from orange flowers is employed, in one or two fluid ounces, as an antispasmodic and sedative in nervous and hysterical cases.

Citrus medica Linn. var. *typica.*

(Beng.—*Buno Gorah Nebu.*)

(Sans.—*Matulunga.*)

A thorny spreading shrub or small tree, flowering and fruiting at most seasons. Leaflet 3—6 in., elliptic-ovate or ovate lanceolate; petiole naked or winged. Flowers pink, in long, 5—10 in a raceme, small or middle-sized. Stamens 20—40 with an oblong leaflet 4 in. long, narrowly ellipsoid. Fruit rough 7 in. long, of which the upper 2 in. are contracted into a long conical mamilla, the rind is very thick, and pulp pale yellow. Flowering in early spring and fruits ripen in autumn.

Distribution: Valleys along the foot of the Himalaya from Garhwal to Sikkim ascending to 4,000 ft., the Khasia mountains; the Garro mountains, Chittagong and the Western Ghats and Satpura range in Central India. Abundant in the Terai forests (growing wild and bearing profusely all along the foot hills of Darjeeling—Lal-Tung forests).

Parts used: Fruits and rind.

Medicinal uses:

Fruits used in typhoid and they help in digestion. The rind is made into a marmalade and is an antiscorbutic. It is made into a preserve and is used for dysentery. The juice is sour but makes excellent syrup and a refreshing drink in hot weather.

Evodia fraxinifolia Hook. f.

(Beng.—*Shah kanak.*)

(Nep.—*Khanakpa.*)

A small much branched densely leafy tree, smelling strongly of caraway when bruised. Branchlets thick, terete. Leaves 8—12 in., spreading, bright green; petiole cylindric; leaflets 4—9 in., shortly petioled, oblong or oblong-lanceolate, acuminate, straight or falcate, quite entire or crenulate, base rounded often oblique, nerves spreading slender terminal leaflet often long-petioled. Cymes on short stout compressed peduncles, axillary and terminal, clothed with fine close set pubescent; bract minute. Flowers shortly pedicelled, white, male flower nearly ½ in. diam. Sepals small, obtuse. Petals imbricate, pubescent within. Stamens exceeding the petals, filaments somewhat hairy; anthers broad. Ovary glabrous; style short, stigma capitate. Fruit ½ in. diam., red; carpels not separating to the base, very coriaceous. Seed broadly elliptic, slightly compressed; testa dark brown, shining. Flowering in summer and fruiting in cold weather.

Distribution :. Sub-tropical Himalaya from Nepal to Sikkim alt. 4—7,000 ft., Khasia mountains, alt. 3—5,000 ft.

Parts used: Fruits.

Medicinal uses:

Fruits are used in the treatment of typhoid and they help in digestion also.

Evodia roxburghiana Benth.

(Beng.—*Pit-kanak.*)

A small tree with soft wood; branches opposite. Leaves usually large, spreading; petiole 2—5 in long, leaflets 2—5 in., very shortly petioled, obovate, oblong or obolanceolate, tip rounded or acuminate or apiculate, nerves almost horizontal very slender not at all prominent, costa perfectly glabrous on both surfaces. Cymes very variable, length and breadth of peduncle, more or less finely pubescent; branches opposite and alternate, bracts minute. Flowers usually densely crowded, $\frac{1}{10}$—$\frac{1}{8}$ in. diam., yellow green, very shortly pedicelled. Calyx minute. Petals slightly imbricate. Capsules usually 2, about the size of a pepper-corn, coriaceous, rugose. Seed splendent, blue-black. Flowering in summer and fruiting in cold weather.

Distribution: Khasia mountains, throughout the mountains of the Western Peninsula; in the Eastern Peninsula, from Tenasserim of Malaya and Penang. Ceylon. Abundant in Darjeeling and Sikkim, ripe fruits are sold in the local bazar and *hat*.

Parts used: Root, bark and leaves.

Medicinal uses:

Root bark boiled in oil are given to improve complexion. The juice of leaves is given in fever. Fruits are stomachic.

Glycosmis pentaphylla Correa.

(Beng.—*Ashseora.*)

(Nep.—*Girgitti, Ban nimbu.*)

Unarmed shrub. The leaves, which are evergreen, vary from 1—5 foliolate, the leaflets from 1—9 inches long; and are broad or narrow, obtuse, acute or acuminate, oblong elliptic or obovate or lanceolate, quite entire or crenulate, rather membranous, pale and raticulately veined. Flowers small, white, in pubescent panicles that are very variable in size and composition. Berry white, globose, usually the size of a large pea. Flowering in early cold weather and fruiting in spring.

Distribution : Throughout tropical and sub-tropical Himalaya, ascending to 7,000 ft. in Sikkim from the Sutlej river in the north-west, southwards to upper Assam, Travancore, Malacca and Ceylon.

Parts used : Whole plants, leaves and fruits.

Medicinal uses :

The wood is used in snake-bite, used in treatment of throat trouble. The leaf juice with cow's ghee when smeared in a piece of paper and smoked cures swelling in the throat due to diphtheria. Stem and branches are used as good toothbrush.

Micromelum pubescens Bl.

(Beng.—*Gandha-soom.*)

(Lep.—*Creem, Soom.*)

A small umbrageous tree. Leaves 6—18 in.; leaflets subopposite and alternate, short petioled, waved, often caudate-acuminate, base often cordate, pubescent beneath, rarely above. Cymes terminal, decompound, tomentose; peduncle long or short; pedicels 1/12—$\frac{1}{8}$ in.; bracts minute. Flowers variable in size, $\frac{1}{3}$—$\frac{1}{2}$ in. dia., heavy-scented. Petals narrow-oblong, subacute, finely pubescent. Stamens alternately longer; anthers didymous. Ovary usually

hairy; 2—7 but usually 5-celled. Berry ovoid or oblong, as large as a large pea, yellow. Seed nearly as long. Flowering in cold weather and fruiting in summer.

Distribution : Central and Eastern tropical Himalaya; Nepal, Sikkim, Assam, Khasia Mountains, Chittagong and from Burma southward to Malacca, Ceylon. Found to grow in Darjeeling and Sikkim below 4,000 ft.

Parts used : Roots, bark and stem.

Medicinal uses :

The bark of roots, stems and branches is used for treatment of T.B. cases.

Murraya koenigii Spreng.

(Beng.—*Barsanga.*)
(Eng.—*Curry leaf.*)
(Sans.—*Surabhi-nimba.*)

A small strong-smelling umbrageous tree, pubescent or tomentose, rarely glabrous, deciduous. Leaves often 1 foot long, narrow; petiole slender, terete; leaflets petioled, 1—1½ in.; variable usually obliquely ovate, obtusely acuminate, tip notched, crenulate, sometimes suborbicular or lanceolate. Corymbs peduncled, many-flowered. Flowers white, ⅓ in. long, subcompanulate, ebracteate. Sepals acute. Petals linear-oblong, obtuse, dotted. Stamens 10, alternately longer, filaments dilated below. Ovary 2-celled; style cylindric, stigma capitate grooved; ovules solitary in each cell, or 2-superposed. Fruit ovoid or subglobose, 1—3 in. diam., black, rugose. Seeds imbedded in mucilage. Flowering in the late rains and fruiting in cold weather.

Distribution : Along the foot of the Himalayas, from Garhwal to Sikkim, ascending to 5,000 ft.; Bengal, Pegu, and southward to Travancore and Ceylon; often cultivated.

Parts used : Whole plants.

Medicinal uses :

The bark and root are used as stimulants by the native physicians. Externally, they are used to cure eruptions and the bites of poisonous animals. The green leaves are described to be eaten raw for the cure of dysentery; they are also bruised and applied externally to cure eruptions. An infusion of the toasted leaves is used to stop vomitting. The root is slightly purgative. It is also used in rheumatism, cold and hysteria. Leaves are much eaten in curries and is commonly known in the south as the curry leaf.

Skimmia laureola Hook. f.

(Beng.—*Sudhi-gulma.*)
(Nep.—*Chumloni.*)

A glabrous shrub branched from the base, 3—5 ft. high, evergreen, strongly aromatic; branches and foliage very bright green. Leaves exceedingly variable in size and shape, 3—7 in., softly coreaceous, quite entire, nerves indistinct; petiole short, stout. Panicles, terminal short, dense-flowered, branched; females smaller; bracts and 2 bracteoles deciduous. Flowers about ½ in. diam., yellowish-white, inodorous, shortly pedicelled. Sepals small. Petals oblong, obtuse. Filaments stout, subulate. Ovary ovoid, minute, conic and 4-cleft in the male flowers. Fruit ½—¾ in. long, ellipsoid, red, fleshy. Seeds 1—3; embryo green. Flowering in summer and fruiting in cold weather.

Distribution : Throughout the temperate Himalaya from Marri to Mishmi, alt. 6—10,000 ft., Khasia Mountains, alt. 5—6,000 ft.

Parts used : Leaves.

Medicinal uses :

Its leaves are brunt or smouldered in houses affected with infectious diseases like smallpox, chicken-pox, etc.

Zanthoxylum alatum Roxb.

(Beng.—*Nepali-dhanae.*)
(Lep.—*Sungrukung.*)
(Nep.—*Tejbal, Tumru.*)

A shrub or small tree, with dense foliage and pungent aromatic taste and smell; prickles often vertically flattened on the trunk and branches, the older with a corky base. Leaves 1½—9 in. Petiole glabrous, narrowly winged, with 2 stipular prickles at the base; leaflets ¾—4 in., narrow, usually elliptic-lanceolate, rarely ovate, obtusely acuminate. Panicles loose, sparingly branched. Flowers ⅛—⅙ in. diam. Calyx 6—8 lobed, lobes sub-acute, Stamens 6—8. Ripe carpels ⅛—⅕ in. diam., usually solitary, broadly ovoid, pale red, tubercled. Flowering in late rains and fruiting in cold weather.

Distribution : Hot valleys of the subtropical Himalaya, ascending to 6,000 ft. from Jammu to Bhutan; Khasia Mountains, alt. 2—3,000 ft.

Parts used : Bark, fruit and seed.

Medicinal uses :

Fruits are used as anti-typhoid medicine. Seeds and the bark are used as an aromatic tonic in fever, dyspepsia, and cholera; the fruit as well as the branches and thorns are used as a remedy for toothache, also deemed stomachic and carminative and employed to intoxicate fish.

Family : SIMARUBEAE.

Balanites roxburghii Planch.

(Beng.—*Hingan, Jiyasuta.*)
(Sans.—*Ingudi-Vrikshaka.*)

A small tree, 20 ft. high, with glabrous or pubescent, branches ending in very strong sharp ascending spines. Leaves of two elliptical or obovate puberulous entire, rounded, coriaceous leaflets. Cymes 4—10 flowered. Flowers white or greenish, fragrant. Sepals and petals ovate, valevety, pubescent. Filaments filiform subulate. Fruit large woody, angular, more than an inch long. Flowering in early spring and fruiting in rains to autumn.

Distribution : Drier parts of India from Cawnpore to Sikkim, Bihar, Goojrat, Kandish, and the Deccan; Burma.

Parts used : The seeds, bark, leaves and fruit.

Medicinal uses :

The seeds are given in cold and coughs. The bark is used in sores, unripe fruit and leaves are pungent, bitter and purgative, and are considered to have anthelmintic properties. The African Arabs use the pulp of the fruit as a detergent and the bark to poison fish. Oil extracted from the seeds is used in burns and wounds.

Family : MELIACEAE.

Cedrela toona Roxb.

(Plate 18, page 116.)

(Beng.—*Toon gach.*)

(Lep.—*Poma, henduri poma.*)

(Nep.—*Toon.*)

A tall valuable deciduous timber tree. Leaves 1—3 ft., leaflets 2—7 by ¾—3 in., sometimes glaucescent beneath. Flowers fragrant, ⅛—¼ in. long. Petals ciliate. Stamens 5 at the centre. Capsule about ¾—1 in. long, oblong. Seeds winged at the upper end only. Flowering in cold weather and fruiting in summer.

Distribution : Tropical Himalaya, from the Indus eastwards ascending to 3,000 ft.; and throughout the hilly districts of central and southern India and Burma. Abundant in lower hill forest in the Darjeeling and Sikkim Himalaya, cultivated by the forest department.

Parts used : The bark and the flowers.

Medicinal uses :

The bark of this tree is a powerful astringent, used in chronic dysentery and may be resorted to when other remedies of the same class are not available. The powder of the bark was found to be of great service as a local astringent application in various forms of ulceration. The flowers, called *gul-ter* in Bombay, are considered emmenagogue.

Azadirachta indica Juss.

(Beng.—*Nim.*)

(Sans.—*Nimba.*)

A large tree of 40—50 ft., with a straight trunk. Leaves 8—15 in., crowded near the ends of the branches; leaflets 1—3 by ½—1½ in. Flowers white, honey-scented, ⅕—⅙ in. long. Drupe oblong ½—¾ in. long. Flowering in early spring and fruiting in rains.

Distribution : A common tree throughout the greater part of India, often planted, as elsewhere, in hot climates and also in Terai forests.

Parts used : Roots, bark, leaves, flowers, fruits, seeds and gum juice.

Medicinal uses :

A valuable medicine as an antiseptic, used in the treatment of smallpox. Small twigs are used as tooth brushes and as a prophylactic for mouth and teeth complaints. Extract from the leaves are useful for sores, eczema, and skin diseases. Boiled and smashed leaves serve as excellent antiseptic. Decoction of leaves are used for purifying blood by drinking it. Used as febrifuge.

Another Nim, *Melia azadarach* Linn. Ghora nim or Pahari nim is used for driving worms, curing skin diseases and hysteria.

Family : CELASTRACEAE.

Celastrus paniculata Willd.

(Plate 19, page 117.)

(Beng.—*Malkangni.*)

(Lep.—*Ruglim.*)

A seandent shrub with terete branches, the young shoots and branches pendulous, foliage very variable. Leaves 2½—5 by 1¼—2½ in., oval oblong or ovate or obovate, acuminate, serrate, membranous. Flowers yellowish-green, in terminal pendulous panicles. Petals $\frac{1}{12}$ in., oval or oblong. Seed ⅓ in., yellow covered with red—outer cover. Flowering in early summar and fruiting in early cold weather.

Distribution : Tropical and sub-tropical Himalaya, alt. 1—4,000 ft.; Punjab and throughout the hilly districts of India, ascending to 3,000 ft.; Ceylon, ascending to 2,000 ft. Malaya, Archipelago, and Phillipine Island.

Parts used : Seeds and leaf-juice.

Medicinal uses :

Seeds are used in rheumatism, paralysis and leprosy. Four tolas of the leaf-juice are given as an antidote in overdoses of opium. Seeds made into a paste with cow's urine are applied to cure scabies. Oil extracted from the seeds is a valuable medicine for beri-beri. 10—15 drops of the oil to be taken internally twice a day. In chronic rheumatism and lumbago seeds taken one each day and increasing up to 15 on the fifteenth day, and then reducing to one for one month, supposed to give marvelous result as personally known to the author from a European patient residing in Darjeeling who was an expert chemist and pharmaceutist of a well-known firm in Calcutta, and actually used the seeds for treatment of chronic lumbago.

Family : RHAMNACEAE.

Govania leptostachya DC.

(Beng.—*Batwasi.*)

(Sikkim—*Tung-cheougmourik.*)

Branches glabrous. Leaves 3—4 by 1¾—2 in., ovate, acuminate, subcordate at the base, serrulate. Racemes slightly puberulous; bracteales conspicuous, subulate. Calyx glabrous or with a very few scattered hairs on the outside. Petals hooded. Styles ¼ the length of the calyx-segments. Fruit glabrous. Flowering in early cold weather and fruiting in cold weather.

Distribution : Tropical Himalaya, from Kumaon to Assam and the Khasia mountains; ascending to 4,000 ft.; Banda, Burma, Tenasserim, and the Malaya Peninsula.

Part used : Leaves.

Medicinal uses :

Leaves are used to make poultices for sores.

Family : AMPELIDACEAE.

Leea macrophylla Roxb.

(Beng.—*Dholsomudra.*)
(Nep.—*Bulyettra.*)

1—3 ft. tall shrub, stems erect, flexuose. Leaves 9 in.—2 ft., broadly ovate, subcordate at the base, coarsely serrate or dentate or sublobed, repand, glabrous and dark-green above, nearly white beneath, and pubescent with minute branching hairs. Cymes puberulous, 1 ft. or more, freely branching. Flowers small, white. Anthers connected. Fruit the size of a small cherry, smooth, black, succulent. Flowering in summer and fruiting in early cold weather.

Distribution : Throughout the hotter parts of India, from the tropical Himalaya, as far west as Kumaon to Bengal, Assam, Tenasserim, and the Western Peninsula. Abundant in Darjeeling and Sikkim Terai forests with *Clerodendron infortunatum.*

Parts used : Roots, leaves and seeds.

Medicinal uses :

Its tuber is used for ring-worm and guinea-worm. Powdered roots cures sores. The Paharias use the seeds for hanging them round children's necks as a kind of charm to drive away pains in the stomach. Leaves made into a paste when applied on a cut or wound stops bleeding.

Leea robusta Roxb.

(Beng.—*Paksomudra.*)
(Lep.—*Pantom.*)
(Nep.—*Gabui.*)

A large robust shrub, 5—6 ft. stems stout, the older parts glabrous, the younger covered with a harsh coarse short pubescence. Leaves 1—3 ft. long, often broader. Bracts ½—1 in., lanceolate. Flowers larger than in the other species. Anthers connate. Fruit black, succulent, the size of a small cherry. Flowering in summer and fruiting in cold weather.

Distribution : Sikkim Himalaya and Khasia mountains, alt. 1—5,000 ft., Martaban. Western Peninsula, in the Northern Circas.

Part used : Leaves.

Medicinal uses :

Externally as anodyne, internally in diarrhoea.

Leea sambucina Willd.

(Beng.—*Kukurjib.*)
(Goa—*Gino.*)
(Nep.—*Gubui.*)

10 ft. tall shrub, stems shrubby, with straight branches. Leaves pinnate or tripinnate, often 3½—4 ft.; leaflets stalked, very variable in size and shape, nerves arcuate. Flowers greenish white. Anthers connate. Fruit the size of a small cherry, dry. Flowering in summer and fruiting in cold weather.

Distribution : Common throughout the hotter parts of India, from the Himalaya as far west as Kumaon to Burma, and southwards to Ceylon and Malacca.

Parts used : Root, stem and leaves.

Medicinal uses :

Used in colic, diarrhoea, chronic dysentery, vertigo as subdorific.

Family : ANACARDIACEAE.

Rhus insignis Hook. f.

(Plate 20, page 118.)

(Beng.—*Momphulai.*)
(Lep.—*Serh.*)
(Nep.—*Kagphulai.*)

A small beautiful tree. Leaves 12—18 in.; petiole terete; leaflets 6—9 by 3—4½ in., coriaceous, quite entire, elliptic or oblong, abruptly acuminate, glabrous and shinning above, rusty, softly tomentose beneath; nerves very numerous. Flowers 1 in. across. Fruiting panicles axillary, stout, 10 in. long-peduncled. Drupes scattered on the panicle, globose ⅓ in. diam.; epicarp thin, dry, bursting irregularly and enclosing a globose white mass of wax containing a very small flattened crustaceous stone. Flowering in early spring and fruiting in early summer and rains.

Distribution : Sikkim Himalaya, interior valleys, alt. 3—6,000 ft. Khasia mountains at Nurtiung, alt. 4,000 ft.

Medicinal uses : Vesicant, given in colic.

Rhus succedanea Linn.

(Beng.—Kankrasringhi.)
(Nep.—*Raniwalai.*)

A tree about 25—30 ft. high, everywhere glabrous, except the panicle in some varieties. Leaves crowded at the ends of the branches, 6—18 in., petiole terete, slender leaflets 2—5 by 1½—2½ in., petiolulate, elliptic-oblong or oblong or ovate-lanceolate, tip very slender, base rounded or acute, straight or oblique; nerves numerous, slightly arched, slender. Panicles axillary, half the length of the leaves, slender, lax, with a very few scattered hairs, or glabrous. Flowers $\frac{1}{12}$th in. diam., yellow-green; pedicel 1 slender. Sepals broadly ovate, obtuse. Petals 5, much larger, oblong or obtuse. Stamens 5, disk 5 lobed. Drupes ¼ in. diam., in drooping panicles, gibbous, compressed, epicarp very thin, bursting irregularly, stone compressed bony surrounded with wax. Flowering in spring and fruiting in summer.

Distribution : Temperate Himalaya, from Kashmir, alt. 3—6,000 ft. to Sikkim, at 5—8,000 ft. and Bhutan; Khasia mountains, alt. 2—6,000 ft.

Parts used : Leaves and flowers.

Medicinal uses :

The juice of the leaves is said to blister the skin, used in curing indigestion and vomitting in children. The fruit is considered officinal and is used in Kashmir in the treatment of phthysis.

Semecarpus anacardium Linn. f.

(Beng.—*Bhela.*)

(Lep.—*Konghi.*)

A moderate size, 25—30 ft. high, dioecious deciduous tree, exuding a dark juice; young parts petioles leaves beneath and panicle clothed with a fine pale pubescence. Leaves 9—30 by 5—12 in., very coriaceous, flat, margin cartilaginous, rarely linear-oblong, usually contracted below the middle; nerves 16—25 pairs, stout, slightly arched; petiole 1—2 in., rounded, not winged. Panicle winged equalling or shorter than the leaves, stout branches spreading; bracts lanceolate. Flowers ¼—1 diam., subsessale, fascicled. Petals greenish-white, much longer than the calyx. Fruits 1 in. long, oblong, smooth, shining, black. Flowering in rains and fruiting in cold weather.

Distribution : Tropical outer Himalaya, from Sirmore to Sikkim ascending to 3,500 ft., and throughout the hotter parts of India, as far east as Assam (absent in the eastern Peninsula and Ceylon).

Parts used : Root, bark and fruit.

Medicinal uses :

In Hindu medicine the ripe fruits are regarded as acrid, heating, stimulant, digestive, nervine and escharotic, and are used in dyspepsia, piles, skin diseases, leprosy, nervous debility. Seed paste and oil is poisonous and should be used cautiously.

Mahomedan writers consider the juice of the pericarp to be hot and dry, useful in all kinds of skin diseases, paralysis, epilepsy and other affections of the nervous system. Externally, it is applied to cold swellings, such as piles. Fruits soaked in curd water (Ghol) when taken relieves asthmatic trouble, oil extracted from the seeds or paste affresh when applied into the vagina causes abortion. The oil is used in rheumatism. It is used as Dhobi's mark on clothes. It is used in the treatment of all kinds of complaints in beri-beri.

Family : LEGUMINOSAE.

Bauhinia vahlii W & A.

(Beng.—*Chehur.*)

(Nep.—*Borla.*)

A gigantic climber, stem more than 100 ft., long with very large leaves, ¼—1½ ft. long, deeply cordate, apex incised bilobed, downy beneath. Flowers bright white in long peduncled dense terminal racemes. Calyx tube slender, limb about ½ in. long; petals obovate, 1 in. long. Pod rusty downy, ¾—1 ft. by 2 in., 8—12 seeded. Flowering in spring and fruiting in cold weather.

Distribution : Foot of Central and Eastern Himalayas ascending up to 3,000 ft., very common in the Tista Valley, climbing over tall trees as a liane.

Parts used : Seeds.

Medicinal uses :

The seeds are used as tonic and aphrodisiac and the leaves are used for mucilage and demulcent.

Bauhinia variegata Linn.

(Plate 21, page 119.)

(Beng.—*Raktakanchan.*)

(Nep.—*Taki.*)

A middle sized tree, 20—30 ft. high, with deeply cordate, apex bilobed, rigidly sub-coriaceous leaves. Flowers in corymbs. Calyx tube about 1 in. long. Petals 1½—2 in. by 1 in. white, with purple patch on the standard petal. Stamens 3—5. Pod, 6—12 by 1 in., glabrous, hard, flat, 10—15 seeded, dehiscent. Flowering in early summer and fruiting in rains.

Distribution : Foot of West Himalayas and Sikkim, ascending up to 4,000 ft. common in the lower hill forests up to 2,000 ft. in Darjeeling district. Common from Bamunpukri westwards.

Parts used : Bark, leaves, roots and flower-bud and flowers.

Medicinal uses :

The bark is alternative, tonic, astringent and is useful in scrofula, ulcers, skin diseases and diarrhoea. Dried buds are used for cough, bleeding piles, haematuria, diarrhoea and dysentery. The decoction of the root is used in dyspepsia and flatulence. The flowers are used as mild laxative.

Desmodium pulchellum Benth.

(Beng.—*Bara Salpani.*)

(Nep.—*Sarkinu.*)

A small shrub 3—6 ft. high; leaflets coriaceous, glabrous above and finely downy beneath. Flowers pale blue, small in ¼—1 ft. long umbellate racemes. Joints of pods ½ in. long. Flowering and fruiting in cold weather.

Distribution : Eastern Himalayas, common in the Terai, and ascending up to 2,000 ft. Ceylon and Burma. Common as gregorious shrubby weeds in rather open places in the forests.

Parts used : Bark and flowers.

Medicinal uses :

Decoction of the bark is used in haemorrhage, diarrhoea, poisoning and eye-diseases. Flowers are used in biliousness.

Entada scandens Benth.

(Beng.—*Gilagach.*)

(Nep.—*Taktokhajim.*)

An immense climber, with slender terete woody branches. Leaves long-petioled, the rachis usually ending in a tendril; pinnae stalked, mostly 4; leaflets oblong or obovate, obtuse or acute, 1—2 in. long, rigidly coriaceous. Spikes peduncled, ½ ft. long or more, usually panicled from the nodes of old leafless branches, sometimes simple from the axils of the leaves. Flowers ½—⅛ in. long, sessile or on short pedicles. Pod 1—2 ft. or more by 3—4 in., curved, constricted between the seeds. Seeds 2 in. broad. Flowering in early summer and fruiting in the rains.

Distribution : Central and Eastern Himalayas, Nepal, ascending to 4,000 ft. in Sikkim, Western Peninsula, Ceylon, Malacca. Common densely entangled tall climber (liane) over forest trees in the middle hill forests.

Parts used : Seeds and wood-bark.

Medicinal uses :

Powdered kernel, mixed with some few spices, is commonly taken by native women for some days immediately after delivery for allaying the bodily pains and warding off cold. Juice of the bark and wood used for skin diseases. Lepchas, Nepalis and other hill men use the seeds for washing hairs and kernel of the seeds are fried and eaten.

Flemingia congesta Roxb.

(Plate 22, page 120.)

(Beng.—*Batesi.*)

(Lep.—*Nipitmuk.*)

(Nep.—*Batwasi.*)

A shrubby weed, 5—10 ft. high. Leaflets oblong acuminate, 4—6 in. long, grey silky beneath. Racemes dense, oblong; bracts lanceolate, silky on the back. Calyx covered with shining silky hairs. Pod oblong with 2 black seeds. Flowering in spring and fruiting in autumn.

Distribution : Central Himalayas to Ceylon and Malacca. Very common in the hills and Sal Forests of Darjeeling district up to 4,000 feet.

Parts used : Leaves and bark.

Medicinal uses :

The paste prepared from this plant is used for external application to ulcers and swellings. It is also a good substitute for Kamola (*Mallotus philippinensis* Muell. & Arg.) and contains "flemingine" which is analogous to "Kamola" drug.

Glycine soja Sieb & Zucc.

(Beng.—*Garikalai.*)

(Hindi—*Bhat, Bhatwan.*)

Stems suberect or climbing upwards on trees and shrubs, annual, densely clothed with fine ferruginous hairs. Leaves long-petioled; leaflets membranous, ovate acute, rarely obtuse, 2—4 in. long. Calyx $\frac{1}{4}$ in., densely hairy. Corolla reddish, little exserted. Pods usually only 2—3 developed in the axil or each leaf, linear-oblong, recurved, densely pubescent, $1\frac{1}{2}$—2 in. by $\frac{1}{3}$—$\frac{3}{8}$ in., 3—4 seeded, subtorulose. Flowering in early cold weather and fruiting in cold weather.

Distribution : Himalayas, tropical region; Kumaon to Sikkim, Khasia and Ava, often cultivated.

Parts used : Root.

Medicinal uses :

A decoction of the root is said to possess astringent properties.

Uraria picta Desv. (H. Dabra)

(Beng.—*Sankar jata.*)

(Hind.—*Dabra.*)

An erect little branched suffruticose perennial, 3—6 ft. high. Stems robust, finely downy. Petioles 1—2 in.; leaflets 4—6, rarely 9, rigidly subcoriaceous, glabrous above, reticulato-venulose, minutely pubescent below, 4—8 in. long, ¼—1 in. broad; lowest simple, round or oblong. Flowers in dense cylindrical racemes, ½—1 ft. long, ⅝—¾ in. broad; bracts brown, scariose, deciduous, not distinctly ciliated; upper lanceolate, lower ovate acuminate; pedicels ¼—⅜ in.; abruptly recurved at the tip after flowering. Corolla purple, slightly exserted. Joints 3—6, glabrescent, polished, often whitish. Flowering in the late rains and autumn and fruiting in cold weather.

Distribution : Himalaya to Ceylon, ascending to 6,000 ft. in the North-West. Abundant as undershrub in the Terai forests of Darjeeling and Sikkim.

Parts used : Whole plant and fruit.

Medicinal uses :

In Bombay the plant is supposed to be an antidote to the poison of the Phursa snake (*Echis carinata*).

The fruit is applied to the sore mouths of children.

Family : ROSACEAE.

Potentilla fulgens Wall.

(Beng.—*Bhuitara.*)

(Nep.—*Chiriya phal.*)

An erect-branched perennial herb, ½—2½ ft. high. Spreading hairs on the petiole and stem, and with the brilliant silvery clothing of the under surface of the leaves and inflorescence sometimes extending to the upper surface. Root stock very stout. Stems 6—24 in.; stout, ascending or erect, leafy. Leaves 2—6 in.; larger leaflets ½—1½ in.; crowded or not, sometimes with deeply impressed nerves above, at others quite flat, teeth very numerous and acute; petiole rather stout; stipules usually membranous. Flowers yellow in raceme. Petals obovate orbicular. Achenes on an elevated hairy receptacle. Flowering in Spring and fruiting in Autumn.

Distribution : Temperate Himalaya; from Kunawar, alt. 6—7,000 ft., Darjeeling and Sikkim abundant between alt. 7—13,000 ft., Khasia Mountains, alt. 4—5,000 ft.

Parts used : Root.

Medicinal uses :

Roots are used in diarrhoea.

Prunus puddum Roxb.

(Plate 23, page 121.)

(Beng.—*Padmak.*)

(Eng.—*Bird Cherry.*)

(Lep.—*Kongki.*)

A large tree, of brilliant appearance in flower, glabrous except the puberlous young shoots. Leaves 3—5 in., variable in length and breadth, often doubly serrate, glabrous; petiole slender ½—⅔ in.; stipules long, subulate, laciniate. Flowers rose, red or white, from lateral buds clothed with concave rounded glabrous scales; peduncles ½—1 in., often subcymose, connate at the base or almost umbellate. Calyx tube ½—1 in., glabrous; lobes ovate, acute, quite entire. Drupe oblong or ellipsoid, obtuse at both ends; fleshy scanty yellow or reddish, acid; stone bonny rugose and furrowed. Flowering in autumn and cold weather and fruiting in Spring and summer.

Distribution : Temperate Himalaya; from Garhwal, alt. 3—6,000 ft. Abundant in Darjeeling, Sikkim and Bhutan, between alt. 5—8,000 ft. and Burma, East of Bhamo.

Parts used : Bark, wood and kernel of seed.

Medicinal uses :

The kernel is used in stone and gravel. The bark contains amygdalin, and the smaller branches are sold in the bazars as substitute for hydrocyanic acid in native practice. Smaller branches crushed and soaked in water taken internally stops abortion.

Rubus ellipticus Sm.

(Beng.—*Gachstrawberry.*)

(Nep.—*Asayloo.*)

A large sarmentose shrub with branches 15 ft. long, long-hirsute with spreading red sub-setose hairs and with a silky-tomentose under-layer. Leaves pinnately 3-foliolate, petiole and rachis hairy like the twigs. Leaflets usually elliptic 2—4 in. long, with an appressed hoary tomentum between the hairy nerves beneath and often small prickles along the mid rib. Panicles ·3—·5 in. diam., with obovate petals exceeding the calyx. Fruit a yellow raspberry ·6 in. diam., very sweet. Flowering in early cold weather and fruiting in spring and summer.

Distribution : Temperate and subtropical Himalayas, from Sirmur, alt. 2—7,000 ft. Abundant in Darjeeling, Sikkim and Bhutan, alt. 4—7,000 ft., Khasia mountains, alt. 4—7,000 ft.

Parts used : Root.

Medicinal uses :

Roots and young shoots are used in colic pains. Fruits are eaten by hill-men.

Family : SAXIFRAGACEAE.

Astilbe rivularis Ham.

(Beng.—*Jharnaphul.*)

Stem and leaves with long fulvous hairs, especially about base of the petioles. Leaflets 1—4 in., ovate acuminate, often cordate at the base, generally scabrous on the nerves on both surfaces. Rachis of panicle wooly-pubescent, and brown-villose; pedicels short with a small bract at the base. Sepals green, subglabrous, oblong, obtuse, erect $\frac{1}{8}$ in. Young carpels but slightly united. Ripe carpels $\frac{1}{3}$ in. long. Seeds numerous. Flowering in early spring and fruiting in autumn.

Distribution : Temperate Himalaya, from Kashmir to Bhotan, alt. 5—9,000 ft., abundant. Khasia mountains, alt. 4—6,000 ft., very common.

Parts used : Roots.

Medicinal uses :

Roots used for prolapsus of uterus and haemorrhage. Also used in diarrhoea and dysentery. Root juice decoction and powder with honey is used after delivery and stopping overbleeding in menses. Stimulant after exhaustion.

Dichroa febrifuga Lour.

(Plate 24, page 122.)

(Beng.—*Paharivasak.*)

(Lep.—*Gebokanak.*)

(Nep.—*Basak.*)

Stems 5—9 ft. high, somewhat virgate. Leaves 3—8 in., tapering into the petiole, pubescent or puberulous on the nerves, otherwise glabrous, usually narrow, sometimes obovate-lanceolate. Petals $\frac{3}{16}$ in. long. Berry finally an intense blue. Flowering in spring and fruiting in rains.

Distribution : Temperate Himalayas, from Bhutan to Nepal at an alt. 5—8,000 ft. Khasia mountains, alt. 4—6,000 ft. Exceedingly common in Sikkim and Darjeeling districts at an alt. of 6,000 ft.

Parts used : Roots and leaves.

Medicinal uses :

The root is emetic and febrifuge. The decoction of root is given in fevers. Young shoots and bark of the roots are made into decoction and used as febrifuge by the local people. Experiments so far carried out indicate promising result in the treatment of malaria and other fevers without any after effect.

Saxifraga ligulata Wall.

(Plate 25, page 123.)

(Beng.—*Palrabedi.*)

(Hind.—*Pakhan-bed.*)

A low herb. Leaves a foot in diam., glabrous on both surfaces, dotted on the lower flowers on exact tall raceme. Petals $\frac{1}{3}$—1 in. long, white or rose or purplish, orbicular with a claw of variable length. Fruit subglobose. Styles very long. Carpels sometimes 3. Flowering in early summer and fruiting in summer.

Distribution : Temperate Himalaya, from Bhutan to Kashmir, alt. 7—10,000 ft., common. Khasia mountains.

Parts used: Root.

Medicinal uses :

The root is used as a tonic in fevers, diarrhoea and cough, and also as an antiscorbutic. It is bruised and applied to boils and also in ophthalmia. It is also considered absorbent and given in dysentery. The root is rubbed down and given with honey to children when teething.

Family : CRASSULACEAE.

Kalanchoe spathulata. Dc.

(Beng.—*Patharkoni.*)

(Nep.—*Haths kane.*)

An erect, succulent, perennial herb. Stems 4 ft. high. Leaves glabrous, spathulate-oblong, crenate, upper distant and becoming very narrow, sometimes 3-foliate, with the petiole often 3—4 by $\frac{1}{2}$ in., frequently sessile; lower commonly 3—4, sometimes 10 in., long, besides the petiole. Lowest bracts linear, narrow, trifoliate, upper few, scattered, linear, $\frac{1}{4}$—$\frac{1}{2}$ in. Corymb flattish or more rarely elongate. Flowers clear, yellow; the corolla-tube glabrous. Calyx in fruit often as much as $\frac{3}{8}$ in. wide, 4-partite, elongate. Corolla, with a flask-shaped tube and spreading 4 fid limb, much exceeding the calyx, persistent. Stamens 8, in two series, adnate to the corolla-tube, hypogynous scales 4, linear. Carpels 4, adnate to the base of the corolla-tube, attenuated into long styles; ovules very many. Follicles 4, seeds very many, oblong, ellipsoid, with 8-15 longitudinal ribs. Flowering in early cold weather and fruiting in cold weather.

Distribution : Tropical Himalaya, from Bhutan to Kashmir.

Parts used : Leaves.

Medicinal uses :

Leaves used in cholera and in curing wounds.

Family : MELASTOMACEAE.

Melastoma malabathricum Linn.

(Plate 26, page 124.)

(Beng.—*Lalatasi.*)
(Nep.—*Tulasi.*)

An evergreen spreading shrub. Leaves 3—4 in. long, broad lanceolate with adpressed hairs above and hairy along the diverging prominent nerves beneath without midrib. Flowers mauvepurple with long calyx teeth. Fruit pulpy within. Flowering in spring or almost throughout the season and fruiting in autumn.

Distribution : Throughout India up to an altitude of 6,000 ft. It is a very common shrub in the waste places of Terai, lower and middle Hill—forests of Darjeeling district and Sikkim.

Parts used : Leaves, flowers and roots.

Medicinal uses :

The juice of leaves and roots are used in indigestion. The flowers act as a nervous sedative and are used in piles and haemorrhage.

Family : LYTHRACEAE.

Woodfordia floribunda Salisb.

(Beng.—*Dhaiphul.*)
(Nep.—*Daheri.*)

A spreading shrub of the hill sides. Leaves 2—4 in. long, opposite, lanceolate, rounded or sub-cordate at the base. Upper surface hairy, greenish, under surface pubescent margin. Flowers 5—15 in small pedicel, bright brick red. Capsule ellipsoid, included in the persistent red calyx-tube. Seeds many, brown, smooth. Flowering in autumn and fruiting in early cold weather.

Distribution : Throughout India, common; ascending to 5,000 ft. Abundant in hot Teesta valley and open Terai Forest.

Parts used : Flowers.

Medicinal uses :

Flowers are dried and used for dysentery and sold in Darjeeling market. Powdered flower applied on sores and boil. Dried flowers used in piles and liver complaints.

Family : PASSIFLORACEAE.

Carica papaya Linn.

(Beng.—*Papae.*)
(Hind.—*Papita.*)
(Nep.—*Mewa.*)

A well-known small tree with very large palmately lobed leaves, the lobes again variously lobed. Sepals and petals in alternating whorls. Flowers greenish-white, females large subsolitary or in very short cymes, males panicled.

The different 2-sexual forms referred to above all occur in this species in India, always on a male inflorescence. Fruit 1-celled. Flowering and fruiting throughout the year.

Distribution : Throughout India. It is cultivated in hot valleys by villagers all over Terai.

Parts used : Milky latex.

Medicinal uses :

The digestive ferment papain is extracted from the milky sap. It is believed if pregnant woman takes latex it may cause abortion.

Family : BEGONIACEAE.

Begonia laciniata. Roxb.

(Beng.—*Hooirjo.*)

Root-stock long, creeping, neither woody nor tuberous. Stem 6—24 in., succulent, more or less brown tomentose. Leaves 4—6 in. diam., always more or less lobed, acutely laciniate. Petiole 1½ in.; stipules ¾ in., persistent, lanceolate, mucronate, pubescent. Peduncle 3—6 in., usually from one or two uppermost axils, tomentose; bracts large, oblong, tomentose. Flowers medium, not very many, always more or less glandular pubescent on the back, from nearly white to deep rose. Male sepals 2, long-elliptic; petals 2, narrowly obovate; stamens many, filaments short nearly free, about 50, anthers obovoid, connective little produced, obtuse. Female : perianth segments 5-4 linear gradually smaller; ovary with pubescent glandular roughness; styles 2, divided from near the base into 2 much contorted branches. Capsule ½ by 1 in. including the wings, often recurved in fruit, with a descending wing; dehiscing by 4 lines adjacent to, and one on each side of, the two narrow wings. Seeds ellipsoid, somewhat obovoid. Flowering in summer and fruiting in rains.

Distribution : Nepal to Burma; ascending in Sikkim to 7,000 ft., very common in Khasia and Chittagong.

Parts used : Succulent stalks.

Medicinal uses :

Extracts from stalks are used for venereal diseases.

Family : UMBELLIFERAE.

Haracleum nepalense D. Don.

(Beng.—*Banmouri.*)

(Nep.—*Selowni.*)

Stem 2—5 ft., sparingly pubescent. Pinnae often 6 by 4 in., deeply lobed or pinnatifid, serrate. Bracts 3—5, ½ in., linear, sometimes nil; rays 8—20, 1½—3 in.; bracteoles 0—6, ⅙ in., linear; pedicels 8—20, ¼—½ in. Calyx-teeth linear, small. Outer flowers of the umbel radiant or not. Dorsal and intermediate ridges hardly excurrent; wing broad, with a prominent small marginal vitta; dorsal vittae ⅔ the length of the fruit, commissural 4—⅔ the length. Flowering in rains and fruiting in early cold weather.

Distribution : From Nepal to Bhotan, 5,000—12,000 ft.; frequent.

Parts used : Fruits.

Medicinal uses :

Fruits serve as an anti-typhoid.

Hydrocotyle asiatica Linn.

(Beng.—*Thankuni.*)

(Hind.—*Brahmi.*)

(Nep.—*Kalhenyok.*)

Prostrate, perennial herbs. Stems long trailing, given off from leaf-axils of a short vertical rootstock, cord like, glabrous, with very long internodes. Leaves ½—2½ in. long, several from the rootstock, 1—2 from each node of the runners, petiole 3—6 in., erect glabrous, furrowed above; stipules short, adnate to petiole, but forming a sheathing base. Blade orbicular, reniform, entire, crenate or lobulate, horizontal, more or less cupped, 1½—2 in. The rounded basal-lobes often overlapping, glabrous and shining on both sides. Flowers nearly sessile, white, pale or dark pink, usually 3 together, at the end of short erect pubescent peduncles, 1—3 from the nodes, opposite the leaves; bracts 2, close beneath umbel, ovate, obtuse; calyx-segments nil; petals minute, ovate acute, obtuse imbricate. Ovary very much compressed, slightly hairy, styles very short, erect. Fruit about ⅛ in., ovoid hard; pericarp thickened, mericarps with the primary and secondary ribs, very obscure or vein-like. Flowering in early cold weather and fruiting in cold weather.

Distribution : Throughout India, alt. 0—2,000 ft., from the Himalaya to Ceylon and Malacca frequent. Common in the Terai of Sikkim trailing over the ground.

Parts used : Leaves.

Medicinal uses :

The leaves are officinal in the Indian Pharmacopoeia and described as alternative, tonic and local stimulant, more especially useful in syphilitic skin diseases, both externally and internally.

It is a valuable medicine for stomach troubles. The leaves are used in skin diseases and internal sores. Powdered leaves with milk are taken to increase brain power and it is invigourating. The leaves are also used in dropsy. The leaves pasted when applied externally in leprosy gives relief within a short time. The leaves are also useful in controlling irregularity in women and relieve pain in skin diseases due to murcuric poisoning.

Hydrocotyle javanica Thunb. var. *podantha.*

(Beng.—*Pahari-Thankuni.*)

(Hind.—*Brahma manduki.*)

Creeping herbs, rooting at the nodes. Leaves 1—3 in. diam., pubescent or glabrous. Peduncles ¼—2 in., lower solitary, leaf-opposed. Umbels many-flowered; bracts minute lanceolate scales among the pedicels; pedicels nil in., glabrous. Fruit $\frac{1}{10}$ in., orbicular or subquadrate, reticulate-rugose or smooth (sometimes deframed, enlarged, obovoid, corky); lateral primary ridges, commissural, intermediate faint or nil; pericarp hard, thin. Fruit exceedingly uniform even in minute characters. Flowering in early cold weather and fruiting in early spring.

Distribution : Himalaya from Kashmir to Bhutan, alt. 2—8,000 ft. Common in Khasia mountains, mountains of Malabar and Ceylon. Burma—Pegu and Tenasserim.

Parts used : Leaves.

Medicinal uses :

Extract from leaves is used for throat pain, diphtheria and pneumonia.

Family : RUBIACEAE.

Hedyotis scandens Roxb.

(Beng.—*Jhaolanlata.*)
(Nep.—*Bakrelara.*)

A much-branched climber. Leaves 3—5 in., green when dry, sometimes cudate-acuminate, smooth, flat; stipules membranous, ciliolate. Cymes spreading, leafy, flat or round-topped, sometimes puberulous. Flowers subumbellate, pedicels $\frac{1}{10}$—$\frac{1}{6}$ in. Calyx obconic; teeth ovate, acute or obtuse. Corolla-tube short, glabrous, lobes long beared within. Capsule broadly obovoid, crown very prominent, loculicidially gaping, many-seeded. Flowering in cold weather and fruiting in summer.

Distribution: Tropical and subtropical Himalaya from Nepal to Sikkim, Khasia mountains and Sylhet and Chittagong.

Parts used : Roots.

Medicinal uses :

Root used in colic pains.

Hymenodictyon excelsum Wall.

(Beng. and Hind.—*Kukurkot.*)
(Nep.—*Latikaram* or *Latijhora.*)

A large or middle-sized tree, bark bitter but tasteless when dry. Leaves at the ends of the branches ovate to broadly elliptic 4—10 in. by 3—6 in. Flowers greenish, crowded on the abbreviated branches of thrysoid sub-erect or drooping tomentose panicles 3—6 in., long, which are subtended by long-petioled leaf-like bracts which become dry in fruit. Capsules 7—75 in., long ovoid or ellipsoid, finally reflexed or on reflexed rhachis. Flowering in early cold weather and fruiting in cold weather.

Distribution: In all the hill districts and also in Purneah; usually in dry rocky situations, especially near rocky nalas.

Parts used : Bark.

Medicinal uses :

It is astringent, toxic and contains an alkaloid—*Hymenodictine.* It acts as cinchona in high fever. It is really a good medicine in the treatment of fevers.

Its bark when fresh is bitter, but when dry tasteless.

Mussaenda frondosa Linn.

(Beng.—*Nagballi.*)
(Sans.—*Sribasti.*)
(Lep.—*Tumbarh.*)
(Nep.—*Asari.*)

A more or less scandent shrub with much more broadly elliptic cuspidate leaves. Flowers orange coloured or yellowish with narrowly lanceolate, acute

sepals as compared with the oblanceolate obtuse bracts one sepal is large leafy, white and in some species brightly red coloured; calyx lobes elongate-lanceolate much longer than the ovary; corolla pubescent silky or hirsute, lobes broadly ovate acute or acuminate. Berris obovoid glabrous. Flowering in rains and fruiting in cold weather.

Distribution : Tropical Himalaya from Nepal eastward, Assam, Khasia Mountains, Andaman Islands, Western Peninsula from the Concan southwards.

Parts used : Root, leaves and flowers.

Medicinal uses :

The root in 80 grains doses is given with cow's urine as a remedy for jaundice (*pandu-roga*), or two tolas (360 grains) of the white leaves may be given in milk. The juice of the leaves and fruit, which is very mucilaginous, is used as an eyewash. The root in decoction expels phlegm, externally applied it is cooling, boiled in oil it cures aphthac. The flowers are attenuant and diuretic, and are used in cough, asthma, agne, and flatulence; externally applied they clean foul ulcers, and cure skin eruptions. Half tola juice extracts of root mixed with cow's urine when applied externally cures leucoderma. Compare Abutilon indicum P. 37.

Paederia foetida Linn.

(Beng.—*Gandhavadulia, Ghandalpata.*)
(Hind.—*Gandhali.*)
(Nep.—*Berilahara.*)

A bad smelling climbing plant. Branches long in distant pairs. Leaves 2—6 by ¾—2½ in.; petiole ½—1 in. Panicle 2—6 in. long, puberulous; cymose at the extremity; bracts minute, ovate or subulate, celiolate flowers sessile and pedicelled. Calyx small, tube campanulate. Corolla ½—⅔ in., tomentose. Fruit ¼—⅓ in., polished, crowned by the conical disk and minute calyx-teeth. Flowering in autumn and fruiting in cold weather.

Distribution : From the Central and Eastern Himalaya, ascending to 5,000 ft., southward to Malacca and westward to Calcutta.

Parts used : Leaves, roots and fruits.

Medicinal uses :

The decoction prepared of the leaves is considered wholesome and nutritive for the sick and convalescent. The whole plant is regarded as specific for rheumatic affections, in which it is administered both internally and externally. The roots are used by the Hindus as an emetic. The juice of the leaves is considered astringent and given to children when suffering from diarrhoea; dose 1 drachm. The fruit is used to blacken the teeth by Lepchas and Paharias; this, they say, is a specific against toothache.

Pavetta indica Linn.

(Beng.—*Kukurchura.*)
(Sans.—*Papat.*)
(Hind.—*Kankra.*)

A profusely flowering large shrub or small bushy tree with elliptic or obovate glabrous, pubescent or tomentose leaves. Leaves 3—9 in. long, and large trichotomous corymbose panicles of slender white flowers 5—75 in. long with very slender styles exerted 7—1 in. beyond the mouth of the corolla. Fruit globose

smooth, black, ¼— in. diam., with usually 1 seeded only. Flowering in the rains and fruiting in the early cold weather.

Distribution : Throughout the whole area, plains, valleys and shady slopes of the hills in the damper forests ascending to 5,000 ft. Often cultivated in gardens. Common in the lower hill-forest of Terai in Darjeeling and Sikkim.

Parts used : Root and leaves.

Medicinal uses :

The root is bitter, possessing aperient qualities, and is commonly prescribed by native doctors in visceral obstructions; given in powder to children, the dose is about a drachm or more. Boiled in water, a fomentation is made from the leaves for haemorrhoidal pains. The root is pulverised and mixed with ginger and rice water, and given in dropsy.

Cephaelis ipecacuanha A. Rich.

(Syn.—*Psychotria ipecacuanha* Hook.)

(Plate 27, page 125.)

(Beng.—*Ipecac.*)

(Nep.—*Ipecac.*)

A small low rather straggling evergreen decumbent herb, root much branched annulated or moniliform or breaded 4 in. to 1 ft. long, grey or brown, when dried dark-brown. Stem 6 in. to 2 ft. high. Leaves opposite 2—4 in. long and 1—2 in. broad, elliptic, margin entire. Flowers in cyme, white. Fruit round or oval; black when ripe containing two flat whitish seeds. Flowering in very early spring and fruiting in rains or flowering and fruiting throughout the year in adult plants.

Distribution : South America, Brazil. Cultivated in Darjeeling district—Kumani in Rongo and Mungpoo.

This is the genuine emetine yielding plant. It was first introduced into India by the late Sir George King, one of the Superintendents of the Royal Botanic Garden, Calcutta (now the Indian Botanic Garden), in 1886. It was since tried to grow in the Cinchona plantation and after much experiment in different places it was acclimatised in Mungpoo (Labda). Subsequently it was grown on a large scale in Tennasserim, Mergui, South Burma in the Cinchona plantations there. The plant is found to grow well in the lower hills of the Darjeeling-Himalaya, and is at present cultivated on a large scale under the auspices of Government of West Bengal in the Rongo lower hill ranges along the border of Bhutan, at an elevation of about 600 to 1,500 ft. The plants are grown in Kamras (a shed 6 ft. × 6 ft.). Each Kamra after 3 years yield about 2 lbs. of dry radix. Harvesting is done in early summer. Present products is 3000 lbs. per year to be increased to 18,000—20,000 lbs. in seven or eight years. The dry roots are sold at the rate of Rs. 30 to 40 per lb. Attempt to grow the plant in the open has been made but not with much success yet. The two important alkaloids emetine and cephaeline are rich in the root of Indian *Ipecac* which is preferred in some quarters to the Brazalian root, a stouter variety of *Ipecac*.

Parts used : Root. Total alkaloid varies from 2 to 3 per cent. according to edaphic and climatic conditions at Mungpoo and Gairibash and Kumani in the Rongo hills.

Medicinal uses :

The root is emetic. It is a specific remedy in dysentery and is used in piles and gonnorrhoea. It is also used in cold and cough and asthma. In small doses (¼ gr.) it is a gastric stimulant. It is also diaphoretic and combined with opium (Dovers' powder) used as sedative expectorant in colds, sore throat and mild rheumatic attacks. The drug is also used as a direct chologogue.

Cinchona officinalis Linn.

(Plate 28, page 126.)

(Nep. and Beng.—*Cinchona, quinine.*)

A tree reaching more than 10—15 meter that is about 35 ft. in height. Leaves 70—150 mm. long, 24—10 mm. broad, glabrous, lanceolate or ovate-lanceolate, base sub-attenuate, acute or shortly acuminate, at the apex, in the inflorescence smaller. Flowers red, in short cymbiform, compound cymes, terminal and axillary, 100—180 mm. long. Calyx tube, 5 toothed obconical subtomentose, sub-campanulate, acute, triangular, dentate, hairy. Corolla tube, 5 lobed, densely silky with white adpressed hairs, slightly pentagonal, 1.3—1.7 cm. long. Stamens 5; style round, stigma submersed. Capsule ovoid-oblong, 1.7—2 cm. long. 6—9 mm. broad. Seeds elliptic, winged margin octraceous, crimlate-dentate. Flowering in summer and rains and fruiting in autumn.

Cinchona succirubra Pav.

A small tree, as grown in the plantation in India, but if allowed to grow to its full height it reaches 25 m. (70 ft.) in height. Leaves opposite, decessate, soft pubescent or tomentose, often red beneath, generally ovate-elliptic, abruptly acute at the apices, sometimes rounded; blade 1—2.5 cm. (3—6 inches) or more, petiole 2.5—3.8 cm. long, secondary nerves 8—10 pairs, hairy pits in the axils of secondary nerves. Flowers rose-coloured, cymes compact in a large pyramidal thyrsus, corolla, subturbinate, rounded, curved with pressed hairs; corolla longer than calyx-tube, 1.3—2 cm. long. Tube clavate, truncate, obconival. Capsule oblong, narrowed towards the apex, 2.5—3.2 cm. long. Seeds winged, small, suboval, lanceolate, asymetrical, margin lacirate, fimbriate, ciliate, dispersed by wind. Flowering and fruiting as above.

Cinchona ledgeriana Moens.

A tree, maximum height about 6 m. Leaves large, 70—285 mm. long 20—30 mm. broad, glabrous, lanceolate or elliptic-oblong; blade 7.5—15 mm., petiole 6—8 mm. long, those of coppiced shoots much larger. Flowers in panicles, strongly scented, yellowish-white on pedicles 4 mm. long. Calyx tube 3—4 mm. long, obpyramedal, 5 dentate; corolla 8—13 mm. long, somewhat clavate, obconical, subinfundibuliform; tube pentagonous, lobes same colour as tube, fringed with very long white hairs. Stamens inserted in the tubes. Capsule ovoid-lanceolate, smooth, reddish, 5 nerved, 8—13 mm. long, on pedicels, 5—8 mm. long. Seeds small, 4—5 mm. long, 1—3 mm. wide, winged, elliptic-oblong, subpulverulous, wings ochre colour, ciliate-dentate. About 17,000 seeds weighs one ounce. Flowering from May to August and fruiting in autumn.

All the three species are cultivated in the Darjeeling plantations between an elevation of 1,000 and 5,000 feet.

Rubia cordifolia Linn.

(Beng.—*Manjista.*)

(Hind.—*Manjit, Majith.*)

A herb scrambling over bushes by means of its scabrid or minutely aculeate stems, petioles and whorled leaves. Leaves 2—4 in. long, ovate-cordate acuminate or, in some forms, usually ovate-lanceolate with rounded or cordate

base, with 5—7 principal nerves, arbed above, hairy beneath. Petiole 1—3 in. aculeate with small hooked prickles. Flowers yellowish-white, 7 in. diam., umbellate on the branches of 3-chotomous cymes 1—3 in. long. Corolla hispid with 5—6 recurved petals. Anthers didynamous, fruit globose fleshy 12—17 in. diam. The plant is very variable and only the local form is described above. Flowering and fruiting in cold weather.

Distribution : Throughout the hilly districts of India, from the North-West Himalaya eastwards, ascending to 8,000 ft., and southwards to Ceylon and Malacca.

Parts used : Root and fruits.

Medicinal uses :

The root gives a dye (*madder*) and is also used in Indian medicine. Its root made into paste is used as an ointment in skin diseases. It also used in irregular monthly courses and other troubles of the women. Root juice is a good cleansing agent after delivery. Taken in over doses it brings in madness. It is also used in curing boil and sores and also in dropsy paralysis. The juice when taken internally gives red colour to the urine. The root is purchased in large quantity by the Tibetans who use it mainly for colouring wool, blanket and carpet.

Family : VALERIANEAE.

Nardostachys jatamansi DC.

(Plate 29, page 127.)

(Beng.—*Jatamansi.*)

(Sans.—*Jatamansi.*)

Root-stocks woody, long, stout, covered with fibres from the petioles of withered leaves. Stem 4—24 in., more or less pubescent upwards, glabrate below, sub-scapose. Radical leaves 6—8 by 1 in., longitudinally nerved, glabrous or slightly pubescent, narrowed in to petiole; cauline 1 or 2 pairs, 1—3 in. long, sessile, oblong or subovate. Flower-heads usually 1, with pale pink or blue flowers, 3 or 5; bracts ¼ in., oblong, usually pubescent. Corolla tube ¼ in. long somewhat hairy within, as are the filaments below. Fruit $\frac{1}{6}$ in. long covered with ascending white hairs, crowned by the ovate, acute, often dentate calyx teeth. Flowering in the rains and fruiting in autumn.

Distribution : Alpine Himalaya, alt. 11-15,000 ft.; from Kumaon to Sikkim ascending to 17,000 ft. in Sikkim.

Parts used : Whole plants and root-stock.

Medicinal uses :

It is mentioned by Susruta in a prescription for epillepsy, and is prescribed by Hindu physicians as a nervine tonic, diuretic, expectorant and carminative and aromatic adjunct in the preparation of medicinal oils and *ghritas* (butters). In the Nighantas it is described as cold and a remedy for leprosy, morbid heat and erysipelas. It is a good medicine for palpitation and hysteria. The oil has the property of increasing growth of hairs on the head and turning the hair black. It is supposed to be beneficial in low blood-pressure.

Valeriana hardwickii Wall.

(Beng.—*Saru Tagor.*)

(Nep. and Lep.—*Chammaha.*)

Perennial herbs. Root-stock hardly thickened, descending, fibrous. Stem 1—5 ft., erect, usually simple or corymbose only upwards, above often glabrous, nodes little pilose or sometimes densely white-barbate. Radical leaves long-petioled, ovate, acute; lower rarely undivided, cauline several, leaflets often 3, rarely more than 5, upper small. Corymb in fruit often 1 foot, repeatedly dichotomous, ultimate branchlets very short; upper bracteolets much shorter than the hairy fruit. Flowering in the autumn and fruiting later.

Distribution : Temperate Himalaya; from Kashmir to Bhutan, Khasia mountains. Common in Darjeeling and Sikkim temperate hill-forests.

Parts used : Root.

Medicinal uses :

It is described in the Nighantas as sweet, emollient, pungent, hot and light; a remedy for suppression of urine, epilepsy, swoons and headaches. It has more or less the same properties as those of *Jatamansi.*

Family : COMPOSITAE.

Artemisia vulgaris Linn.

(Plate 30, page 128.)

(Beng.—*Nagdamani.*)

(Nep.—*Titapat.*)

A tall herb of shruby nature. Leaves alternate pinnatisect. 5-7 lobes, deeply incised, smooth above and white tomentose beneath. Heads one-eighth to one-sixth in. long, clustered in greenish panicled racemes; corolla whitish yellow, glabrous. It has several varieties. Flowering in rains and fruiting in autumn.

Distribution : Kashmir, Nepal, Sikkim, Bhutan, Assam, Manipur and all mountainous districts of India. Abundant all over the Darjeeling and Sikkim Himalaya in the middle and upper open hill forests.

Parts used : Whole plant and leaves.

Medicinal uses :

The true santonin-yielding plant of commerce is *Artemisia meritima,* and its varieties particularly var. *bravifolia,* found growing wild in the extreme North-West Frontier Provinces of West Pakistan. The East Himalayan plants do not contain any trace of santonin. But it is used for various medicinal purposes. The herb steeped in hot vinegar is bound round a sprain or bruise; and also the expressed juice of the herb is applied to the head to prevent convulsions. The former is also used as fomentation to the head in Cephalalgia, to the joints in gout or rheumatism. Absinthium is a better stomachic tonic. It increases appetite and promotes digestion; it is given in dyspepsia. It is also given in hysteria, spasmodic affections as epilepsy, in nervous irritability and nervous depression; also in mental exhaustion. As an enema its infusion is used as an anthelmentic. A strong decoction of the herb is given as a vermifuge, and a weak one to children in measles. Externally it is used as a fomentation in skin diseases, and foul ulcers. The dose of the herb is 10 to 60 grains.

Sonchus arvensis Linn.

(Beng.—*Banpalang.*)
(Hind.—*Sahadevi bari.*)

A tall crisply-succulent hollow-stemmed herb 3—4 ft. high, nearly glabrous or with copious gland tipped hairs above and always white flocculent under the flower heads. Latex milky, leaves glaucous beneath lanceolate from an amplexicaul base with rounded auricles, attaining 10—16 in. in length and irregularly runcinately pinnatifid and spinulosely denticulate, uppermost linear. Heads (in fresh flower) ·5—·6 in. long and ·7—·8 diam., contracted in the middle, umbellate or umbelliform corymbs, ultimately long-peduncled. Cypselas pale brown subterete or somewhat compressed with 4(6) strong ribs and 1—2 weaker ones between, ribs all rugulose. Flowering in autumn and fruiting in cold weather.

Distribution : Throughout India; wild and in cultivated places, scarce in the plains, common in the Khasia and Himalaya, ascending to 8,000 ft. All temperate and many tropical countries, wild or introduced.

Parts used : Whole plant.

Medicinal uses :

Cattle are found of every part of the plant. On being wounded, milky juice discharged from the cut or damaged part of the plant thickens into a substance like fresh soft opium. Among the Santals the root is given in jaundice.

Sphaeranthus indicus Linn.

(Beng.—*Murhmuria.*)
(Sans.—*Mundi, Mundilika.*)

Low about 1 ft. high annuals with spreading branches, tomentose or villous, branches ascending with toothed wings. Leaves 1—2 in. long, obovate-oblong toothed or serrate, base narrowed and decurrent. Clusters of heads on winged peduncles globose or shortly oblong, bracts short slender acuminate. Flowers violet, fruits smooth. Flowering in cold weather and fruiting in summer.

Distribution : Tropical Himalaya, ascending to 5,000 ft., from Kumaon to Sikkim, Assam, Sylhet, and southwards to Ceylon and Singapore. Common in rice fields.

Parts used : Root, bark, flowers, and seeds.

Medicinal uses :

It is described in the *Nighantas* as pungent, bitter, and stomachic; sweet, light and stimulant, a remedy for glandular swellings in the neck, smell of the plant prevents urethral discharges and it is used in jaundice.

Taraxacum officinale Wigg.

(Beng.—*Pitachumki.*)
(Hind.—*Dudal, Baran, Kanphul.*)

Scapigerous milky herbs. Glabrous or crown and scape wooly, root vertical. Leaves sessile oblanceolate or linear entire toothed pinnatifid or runcinate, lobes acute more or less denticulate. Heads solitary, inner invol. bracts linear often thickened or clawed at the tip, outer ovate or linear, appressed or the outer

reflexed, achenes flowers bright yellow, narrowly obovoid ribbed, ribs muricate or cchinate above the middle sudently contracted into a very slender beak equalling or exceeding the body. Flowering in rains and fruiting in autumn.

Distribution : Throughout the Himalaya and Western Tibet from 1—18,000 ft. Mishmi mountains. Temperate and cold regions of the North and South hemisphere.

Parts used : Root.

Medicinal uses :

The root is officinal, being alternative, tonic and cholagogue. It is useful in dyspepsia, chronic hepatic affections, especially in torpor and congestion of the liver, and in jaundice and chronic cutaneous diseases. It is tonic, aperient and diuretic, and is said to have an almost specific action on the liver, by modifying and increasing its secretion. The dried root, when powdered, is frequently used, mixed with coffee. When roasted and powdered, it has been used as a substitute for coffee.

Family : CAMPANULACEAE.

Pratia begonifolia Lindl.

Leaves ¼—½ in. diam., denticulate. Peduncles ½—1·½ in., distant, none from the upper axils. Calyx-teeth linear. Corolla green with pink marks. Anthers 5, nearly black; 2 surmounted by 1 bristle each 3 puberulous. Berry ⅛ in., shortly ellipsoid, finally smooth, black. Seeds compressed, ellipsoid, smooth. Flowering in cold weather and fruiting in rains.

Distribution : Nepal, Sikkim, Bhotan, Assam, Khasia mountains, and Pegu, alt. 2—7,000 ft., frequent.

Parts used : Root and whole plant.

Medicinal uses :

Roots and plants are used for dysentery and asthma. Recently been introduced and acclimatised in the Lloyd Botanic Garden, Darjeeling.

Family : ERICACEAE.

Rhododendron arboreum Sm.

(Beng.—*Baras.*)
(Lep.—*Etok.*)
(Nep.—*Guras.*)

A tree 20—60 ft. high. Leaves 4—6 in. long. oblong, lanceolate, silvery or brownish tomentose beneath. Heads many-flowered, dense. Corolla 1—1½ in. by ¾—1 in., 5-lobed, crimson, rarely pink or white. Capsule 1 by ⅓ in. cylindrical, curved with ellipsoid seeds. Flowering in spring and fruiting in autumn.

Distribution : Temperate Himalaya, alt. 5—10,000 ft., from Kashmir to Simla, Bhotan, very common. Khasia mountains, alt. 4—6,000 ft. common in

Burma. It is abundant in Tonglu, Senchal, Ghumpahar, Dumsong, whole of Darjeeling and Sikkim Himalayas and other temperate and upper hill forests.

Parts used : Flowers and petals.

Medicinal uses :

Its scarlet petals, fresh or dried, are effectively used in dysentery and hill-diarrhoea. The flowers of the Simla hills and other neighbouring areas of the Western Himalaya are considered to be more efficacious.

Rhododendron campanulatum D. Don.

(Plate 31, page 129.)

(Beng.—*Ghentaboras.*)
(Nep.—*Nilochimal.*)

A large shrub or small tree, 6—10 ft. high. Leaves glabrous, elliptic, subobtuse at both ends, tomentose beneath. Corolla 1—1½ by ¾—1 in., campanulate, 5-lobed, red, purple, or pale pink or white. Capsule glabrous, cylindrical, slightly curved with compressed linear-oblong seeds. Flowering in late spring and fruiting in autumn.

Distribution : Alpine Himalaya, alt. 8—14,000 ft. from Kashmir to Bhutan. It is the commonest species on Sandakphu (Darjeeling District) and East and North Sikkim.

Parts used : Leaves and wood.

Medicinal uses :

The leaves are useful in colds, hemicrania, chronic rheumatism, syphilis and sciatica. The dried twigs and wood are used in Nepal as a medicine in phthysis and chronic fevers.

Family : STYRACEAE.

Symplocos racemosa Roxb.

(Beng.—*Lodh.*)
(Nep.—*Chumlane.*)

A small tree. Leaves 1·¾—5 in., oblong, coriaceous. Flowers small in racemes, yellow, sweet scented. Fruit smooth, sub-cylindric. Flowering in early cold weather, and fruiting in spring.

Distribution : Throughout North-East India, alt. up to 2,500 ft.; common from the Terai of Kumaon, Darjeeling and Sikkim to Assam.

Parts used : Bark and leaves.

Medicinal uses :

The bark is astringent and used in bowl complaints, dye-diseases, dysentery, dropsy and ulcers. Used in stopping haemorrhage from teeth or prolonged bleeding of women, cures wounds in vagina, and prevents chance of abortion in right months when taken by pregnant women with juice of the bark with pepul, honey and cow's milk. It cures leuchorrhoea when juice of bark is taken with the extract of the bark of Banyan tree.

Family : OLEACEAE.

Fraxinus floribunda Wall.

(Beng.—*Paharijui.*)
(Nep.—*Kangsu, Tuhasi.*)

A large tree. Leaflets 3—4 pairs, 4 by 1¼ in., acutely acuminate, serratures close shallow glabrous, when young pilose on the nerves beneath; petiolules ¼ in. Pedicels ⅛ in.; in tufts on the branches of the panicle. Calyx ⅛—1/24 in.; teeth acutely triangular in the typical Kumaon plant, hardly any in the East Himalayan. Corolla-lobes ⅛—⅙ in.; linear-oblong. Filaments 1/12 in. style short; stigma long, deciduous. Samara in. wide upwards, narrowed to the width of the seed at base. Flowering in summer and fruiting in rains.

Distribution : Temperate and Sub-Alpine Himalaya, from Kashmir, Darjeeling, Sikkim to Bhutan, Khasia mountains.

Parts used : Bark and leaves.

Medicinal uses :

Bark is chiefly used in fractures and dislocation both of men and animals. The leaves are purgative.

Family : APOCYNACEAE.

Alstonia scholaris Br.

(Beng.—*Chatim.*)
(Lep.—*Purbo.*)
(Nep.—*Chatiwan.*)

A large usually straight handsome evergreen tree with the branches and leaves whorled, leaves 3—7 usually 6 in a whorl, 4—8 in. long, whitish beneath. Flowers greenish, highly scented, white in umbellately branched cymose panicles. Fruit of two slender pendulous follicles 1—2 ft. long. Flowering in cold weather and fruiting in rainy season. Evergreen.

Distribution : Drier forests of India; in the Terai region of the Western Himalaya from the Jumna eastwards to Assam, and southwards to Ceylon, Singapore and Penang. Common in the Terai and Duars of Darjeeling and Sikkim.

Parts used : Bark, latex and flowers.

Medicinal uses :

The bark is described as tonic, alternative and useful in fever and skin diseases, also used in rheumatism. Juice of the root when taken with milk cures leprosy. It is anthelmentic, vermifuge and stimulant after childbirth.

Holarrhena antidysenterica Wall.

(Plate 32, page 130.)

(Beng.—*Kurchi.*)
(Sans.—*Indrayava.*)

A small deciduous tree, bark pale. Leaves 6—12 in. by 1·5—5 in., strongly nerved beneath and terminal corymbose cymes 3—6 in. wide of sweet scented white flowers. ·75—1-5 in. diam. Follicles slender divaricate 6—9 in. long by about ·16 in. broad. Seeds linear-oblong, ·5 in. long, with a long brown coma. Flowering before rains and fruiting in cold weather. It flowers on the new shoots.

Distribution : Tropical Himalaya, Chenab westwards, and throughout the drier forests of India to Travancore and Malacca. Abundant in the lower hill-forests of Darjeeling Terai and Sikkim hills. It is found here and there along the lower valleys (1,000—3,000 ft.).

Parts used : Bark.

Medicinal uses :

The bark is medicinally used as a tonic and febrifuge; it is one of the most valuable indigenous medicine; but it is chiefly esteemed for its anti-dysenteric properties. That it is always a sure remedy for dysenteric affections, has been borne out by the statements of many medical practitioners, both Indian and European.

A well-known physician says that he treated a child, 15 months old suffering from dysentery, with the decoction of the bark and met with success, after every other medicine had been tried. It is expectorant, digestive and it cures piles, trouble of biles and leprosy. Its seeds are used as an antidote against poisons and relieves pain and swelling in snake-bites.

Rauvolfia serpentina Benth.

(Plate 33, page 131.)

(Beng.—*Chandra, Chotachand.*)

(Sans.—*Sarpagandha, Chandrika.*)

A small shrub 6—18 in., rarely 2—3 ft. high, bark white, rarely lenticillate. Leaves 3—7 by 1½—2½ in., green, smooth, when dry very pale beneath, narrowed into a short petiole, entire, rather acuminate. Cymes 1—2 in. diam., many-flowered; peduncle 2—5 in., stout, branches and pedicels red; bracts obsolete; pedicels ¼—⅓ in. Flowers white or pinkish, nearly 1 in. long. Calyx small, bright red. Corolla-tube often curved; lobes not one-quarter the length of the tube, margins undulate; throat hairy. Drupes black when ripe, endocarp slightly rugose. Flowering in spring and fruiting later, sometimes seen flowering and fruiting throughout the year.

Distribution : Tropical Himalaya and plains near the foot of the hills from Sirkind and Moradabad. Abundunt in Darjeeling and Sikkim Terai. It extends to the Khasia mountains, Assam, the Deccan Peninsula along the Ghats to Travancore-Cochin and Ceylon. The alkaloid varies in the roots of the plants found growing under different climatic and edaphic conditions. The plant is now under cultivation at Rongo Hills in the border of Bhutan under the auspices of the Medicinal Plants Committee of the Government of West Bengal and Indian Council of Agricultural Research.

Parts used : Root with the Alkaloid *Rauvolfin* which varies from 1·2 to 1;6 per cent.

Medicinal uses :

The root is a bitter tonic, and narcotic. It is long known as an antidote to the bites of poisonous reptiles and stings of insects. It seems to act also as febrifuge. The decoction of the root is employed to increase uterine contraction. The juice of leaves is instilled into eyes as a remedy for the opacities of the cornea. The root is a valuable remedy in painful affections of the bowels, insomnia, nervous breakdown, violent insanity and an effective medicine in blood-pressure for which this plant is receiving the attention of the world and subjected to careful investigation.

R. conescens Linn. (plate 34, page 124) is another species found abundant in the plains and grows well in the hills. The leaves possess somewhat similar property to that of the root of *R. serpentina*.

Wrightia tomentosa Roem & Schult.

(Beng.—*Dhudh-karabi.*)
(Nep.—*Karinghi.*)
(Hind.—*Kala indrayan.*)

A small usually crooked deciduous tree, bark corky. Leaves 3—6 by 1½—2½ in., often tomentose on both surfaces, dark brown when dry, nerves 10—14 pairs; petiole ¼ in. Cymes peduncled, corymbose, manyfid.; flowers 1 in. diam., yellowish with orange coronal scales. Sepals half as long as the corolla-tube, rounded. Corolla-lobes linear or ovate-oblong, coronal scales very variable. Anthers white. Folicles 6—12 by ½ in. connate into a cylinder, with a deep groove on each side till maturity, rough with tubercles. Seeds slender, ½—⅝ in., coma pure white. Flowering in early winter and fruiting later.

Distribution : Tropical India; from the Indus eastwards and southwards to Ceylon, Burma and Penang, ascending to 2,000 ft. in the Himalaya, and to 4,000 in the Nilgherries. Common in Darjeeling and Sikkim Terai.

Parts used : Root and leaves.

Medicinal uses :

A thick, red coloured medicinal oil is said to be obtained from the seeds. A preparation from the bark is given in menstrual and renal complaints.

The bark and root-bark are believed to be useful in snake-bite and scorpion stings. It is an efficacious medicine for the treatment of the male sexual organ. Its white latex is used for stopping haemorrhage.

Family : ASCLEPIADACEAE.

Marsdenia roylei Wight.

(Beng.—*Raimukula.*)
(Nep.—*Bahuni Lahara.*)
(Hind—*Murkula.*)

Large-climbing shrub; leaves 3—6 by 2—4 in., ovate-cordate acuminate often velvety beneath; petiole 1½—2 in. Cymes 1—1½ in. diam. corymbose. Corolla ¼—⅛ in. diam. Stigma dome-shaped. Follicles turgid, 3 in. long, 1—1½ in. diam., straight, beaked, pericarp thick transversely rugose puberulous. Seeds ½ in. long. Flowering in May, fruiting in September.

Distribution : Eastern and Western Himalaya; from Simla to Kumaon, ascending to 5,000 ft. in Sikkim and Darjeeling hills. Common in lower hill forest.

Parts used : Roots and leaves.

Medicinal uses :

It has a cooling and alternative effect in gonorrhoea. Roots eaten by Lepchas.

Family : GENTIANACEAE.

Swertia chirata Ham.

(Plate 35, page 133.)

(Beng.—*Chirata.*)
(Nep.—*Chiretta.*)

Annual or perennial erect herbs. Stem 2—5 feet, 4-laneolate or subterete. Leaves 2 by $\frac{3}{4}$ in., the lower often much larger, nerves prominent sometimes petioled. Panicles large, leafy, many-fid.; pedicels nil—$\frac{3}{4}$ in.; foscicled mostly short. Calyx lobes $\frac{1}{8}$ in., lanceolate. Corolla-lobes $\frac{1}{4}$ in., ovate accuminate more or less purple-nerved; the glandular depressions are green, shallow, often sub-marginal, rarely close together or subconfluent, with a fringe of long white or pink hairs at the summit. Filaments linear, free, anthers oblong. Style cylindric; stigmas oblong. Capsule $\frac{1}{4}$ in. and upwards, ovate, acute. Seeds $\frac{1}{50}$ in., poly-hedral, smooth; testa close, not reticulated. Flowering in early cold weather and fruiting later.

Distribution : Temperate Himalaya, alt. 4—10,000 ft. from Kashmir to Bhotan, Khasia mountains, alt. 4—5,000 ft.; frequent. Common in the Darjeeling and Sikkim upper hill forests.

Parts used : Root, branches, and leaves and whole plant. Darjeeling grown S. chirita yields 1.072 per cent. bitter principles.

Medicinal uses :

It is a favourite remedy in intermittent fevers, acidity and in bilious dyspepsia accompanied by fever; combined with acid it is said to be specially serviceable in the dyspepsia of gouty persons and in functional inactivity of the liver. It is bitter and tonic, laxative and when taken with sandle-wood paste it stops internal haemorrhage of the stomach and it is useful medicine for skin disease.

Family : SOLANACEAE.

Datura fastuosa Linn.

(Beng.—*Dhutura.*)
(Hind.—*Kala dhutura.*)

A coarse annual herb or a low shrub 2—6 ft. high with ovate, toothed, glabrous leaves. Flowers large; calyx 3 in. long; corolla 7 in. long; limb shortly 5—6 toothed. Capsule $1\frac{1}{2}$ in. in diam., sub-globose, spinous all over. Flowering in the rains generally and fruiting later.

Distribution : Throughout India. Very common in waste places throughout Darjeeling district, up to 7,000 ft.

Parts used : Roots, leaves and seeds.

Medicinal uses :

The Datura leaves are useful for neuralgia, rheumatic swelling, sciatica, lumbago, etc. It has got the properties analogous to those of Belladona "The alkaloid content of *D. fastuosa* is undoubtedly low but it grows so abundantly that would be worthwhile using it in medicine". The local people use the leaves for inflamation complaints and fruits for dog-bites. Seeds are poisonous and often used in drugging people by mixing the seeds with drink and food. When it is taken in overdose it might cause death. It is used as a strong intoxicating agent in country liquor. The leaves used as a smoke or the smoke inhaled from the leaves reduces asthmatic fits.

Attempts are being made to acclimatise and cultivate in Rongo *D. stramonium* which yields *"stramonii folia"*.

Hyoscyamus niger Linn.

(Plate 36, page 134.)

(Beng.—*Khorasanijowan.*)
(Eng.—*Henbane.*)
(Hind.—*Bazrul, Kurasaniajowan.*)

An erect pubescent herb more or less hairy. Leaves 5 by 2 in. Lower pedicels in fruit scarcely $\frac{1}{8}$ in. Calyx in flower $\frac{2}{3}$ in., teeth short, triangular; in fruit 1 by $\frac{1}{2}$ in., subcontracted in the middle, teeth somewhat rigid. Corolla purple in the base, limb lurid green purple-veined. Capsule $\frac{1}{2}$ in. diam. Seeds $\frac{1}{24}$ in. diam. Flowering in early autumn and fruiting in early cold weather.

Distribution : Temperate Western Himalaya, alt. 8—11,000 ft. from Kashmir to Garhwal; frequent. Cultivated in the Rongo hills along with other medicinal plants.

Parts used : Whole plant and fruits. Yield *Hyoscyami folia.*

Medicinal uses :

A poultice of the juice with barley flower is applied to relieve pain of inflammatory swellings.

A mixture of the powdered seeds with pitch is used for stuffing the hollows of painful teeth; it is used also as a pessary in painful affections of the uterus. It is used in nervous diseases and insomnia and a good medicine in asthma. It is a valuable medicine for eye trouble.

Family : SCROPHULARINEAE.

Picrorhiza kurrooa Benth.

(Plate 37, page 135.)

(Beng.—*Kataki.*)
(Eng.—*Hellebore.*)
(Hind.—*Katuka.*)
(Sans.—*Katurohini.*)

A low herb like the radish. Rootstock as thick as the little finger, 6—10 in. long, clothed with withered leaf-bases. Leaves 2—4 in., rather coriaceous, tip-rounded, base narrowed into a winged sheathing petiole. Flowering stems or scapes ascending, stout, longer than the leaves, naked or with a few bracts below the inflorescence. Spikes 2—4 in. long, subcylindric, obtuse, many-flowered, subhirsute; bracts oblong or lanceolate as long as the calyx. Sepals $\frac{1}{4}$ in. long, viliate. Corolla of short stemmed from $\frac{1}{4}$—$\frac{1}{3}$ in. long, with longer filaments $\frac{1}{3}$ in. long. Capsule $\frac{1}{2}$ in. long. Flowering in the rains and fruiting in early autumn.

Distribution : Alpine Himalaya; from Kashmir to Sikkim, alt. 9—15,000 ft. common. *Digitalis purpurea* and *D. lanata* are being cultivated at Rongo hills at an elevation of 4—5,000 ft. The alkaloid *Digitalin* is a valuable medicine for heart diseases.

Parts used : Root, root-stock and stem. Yields *picrorhiza.*

Medicinal uses :

It is described as digestive, bitter, pungent, dry aperient light and cold; and is recommended as a remedy for worms, asthma, bite, phlegm, and fever.

Kutaki is a favourite remedy in bilious dyspepsia accompanied by fever, and is given daily in decoction, with liquorice, raisins, and *Neem* bark, half a tola (90 grains) of each, water 32 tolas, boiled down to one-fourth. In dyspepsia and dysentery it is combined with aromatics and is given in dose of ten to twenty grains. It is considered to be specially indicated in those cases in which the secretions are scanty and the bowels costive, and is often prescribed for children suffering from worms, jaundice and dropsy. Its febrifugal property is a little less than quinine and it is a tonic.

Digitalis purpurea and *D. lanata* are being cultivated in the Rongo hills. Analysis and bio-assay experiment indicate satisfactory results. Leaves contain the alkaloid *digitalis,* a well-known medicine for heart trouble.

Family : ACANTHACEAE.

Adhatoda vasica Nees.

(Plate 38, page 136.)

(Beng.—*Basak.*)

(Nep.—*Asuru, Bhekkar.*)

A bushy shrub 3—10 ft. high, with large minutely pubescent elliptic or elliptic-lanceolate acuminate leaves 5—8 in. long with a foetid smell, and large white flowers 1;3 in. long. Spikes 1—3 in. often several together at the ends of the branchlets with ovate elliptic or obovate bracts ·75 in. long and bracteoles ·5 in. Calyx ·3—·5 in. with equal lanceolate lobes. Corolla-tube with a short basal inflated portion; throat transversely barred with rose or yellow lips about ·75 in. long. Filaments hairy at base only. Capsule ·75 in., pubescent. Flowering in early cold weather and also at the end of the rains, fruiting later.

Distribution : India; from the Punjab and Assam to Ceylon and Singapore. Common, frequently cultivated. Abundant on the Terai and Duars in the lower hill forests of the Darjeeling and Sikkim hills.

Parts used : Roots, bark, leaves and flowers.

Medicinal uses :

Said to be a good insecticide. Leaves and root expectorant and antispasmodic, and considered serviceable in pthisis. In the *Nighantas* it is described as removing phelgm, bile and impurities of the blood, a remedy for asthma, cough, fever, vomiting, gonorrhoea, leprosy, and pthisis. The leaves are valuable antiseptic, flowers used in gonorrhoea.

Family : VERBENACEAE.

Callicarpa macrophylla Vahl.

(Beng.—*Baramala.*)

(Nep.—*Patharman, Sumali, Denthar, Daya.*)

A shrub 3—6 ft. high. Leaves 4—7 in. long, ovate, lanceolate, glabrous above and stellate tomentose beneath. Flowers small in shortly peduncled globose cymes. Berry white. Flowering in late summer and fruiting in late autumn.

Distribution : From Kashmir to Assam and Pegu. Common in Darjeeling Terai.

Parts used : Bark.

Medicinal uses :

Bark is used in rheumatism, and also as medicine for gonorrhoea by the local people.

Clerodendron infortunatum Gaertn.

(Beng.—*Ghetu.*)

(Nep.—*Kambaldum L. chitu.*)

A gregorious shrub, 3—10 ft. high, covered with white or yellowish hairs. Leaves 4—12 in. long, 3—8 in. broad, cordate, tapering at the end; petiole 1—4 in. long. Inflorescence 6—15 in. long, much branched, upper bracts red, calyx 1—3 to ½ in. long, incised, corolla white pinkish with soft hairs. Fruit ½ in. wide, compressed black when ripe. Flowering in early spring and fruiting in summer.

Distribution : Common all over plains of India in waste land. It is one of the most common gregorious shrub seen all along the Terai generally abundant in open areas and fringe of the forest and forest clearing.

Parts used : Bark and leaves.

Medicinal uses :

Leaves are anthelmentic, emetic. The juice of the leaves is sprayed inside the annus to kill small worms. Fresh juice of the leaves is tonic and febrifuge.

Clerodendron siphonanthus R. Br.

(Beng.—*Bamanhati.*)

(Nep.—*Angiya.*)

Shrubby, or herbaceous with tall annual strict hollow stems 3—6 ft. high. Leaves 3—5-nately whorled, rarely opposite, narrowly lanceolate or linear, rarely elliptic or oblanceolate, 5—10 in. long by usually 1—1½ in. broad, glabrous, entire or sinuate, rarely sparsely coarsely toothed above. Flowers pretty, white or cream in axillary cymes and forming a large terminal panicle easily distinguished by the very long slender tube of the corolla, which is 3—4·5 in. in length. Drupe blue of 1—4 connate drupelet, each about .35 in. long and ·25 in. diam., seated on the large red accrescent calyx. Flowering during the rainy season and fruiting in autumn.

Distribution : From Sikkim and Assam, mountains of South Deccan Peninsula. Kumaon.

Parts used : Roots and leaves.

Medicinal uses :

The roots are used in asthma, cough and swelling of the throat. The juice of the twigs mixed with pure ghee is used in skin diseases.

Its roots made into a paste with ginger and eaten with hot water cures asthma. It is one of the best medicines for heat-burn. Root bark mixed with honey and cow's milk relieves asthmatic spasm.

Family : LABIATAE.

Anisomeles ovata R. Br.

(Beng.—*Gobra.*)

(Sans.—*Alamoola.*)

Erect branching coarse herbs. Strong smelling softly pubescent herb 3—6 ft. high with ovate coarsely crenate acuminate leaves, 1—3 in. long and purplish

flowers in axillary dense-flowered whorls and terminal spikes, or whorls laxy cymose elongate. Flowering in early cold weather and fruiting later.

Distribution : Tropical and subtropical India, from the Indus to Assam, ascending the Himalaya to 5,000 ft. Abundant in the lower and middle hill forests.

Parts used : Whole plant and oil.

Medicinal uses :

A distilled oil is prepared from it and found useful in uterine affections. It has also carminative, astringent and tonic properties.

Ocimum kilimendscharicum Gurke.

(The Camphor yielding Tulsi.)

(Beng.—*Karpur Tulsi.*)

Ocimum kilimendscharicum Gurke is a recently introduced plant into this country from Africa. The plant in its morphological appearance looks almost similar to that of our sacred Tulsi—*Ocimum sanctum.* Its habit and growth are also somewhat similar. In the plains of West Bengal it does not do very well, but in the lower hills of Darjeeling Himalaya it thrives luxuriously and is now grown abundantly both from seeds and cuttings. It is cultivated in the Rongo hills.

Its leaves yield camphor. In the older ripe leaves especially those which fall on the ground the camphor content is richer than the younger leaves. The smell of thymol can easily be eliminated in the finished products. By distillation a very good cottage industry can be developed in the hills for the benefit of the hill people. Analysis of the leaves shows total volatile oil in fresh leaves=8.33 per cent. v/w, dry weight basis, dry leaves 7.64 per cent. v/w, and the camphor content of the volatile oil (calculated from the total katonic value) is about 58.53 per cent. w/w.

Elsholtzia blanda Benth.

(Beng.—*Pahari-tulsi.*)

A tall bushy herb, 2—5 ft. high, branches slender, obtusely 4-angled. Leaves 1—4 in., petiole short. Spikes 2—5 in., flowering ¼ in. diam., fruiting broader, whorls lax or dense; bracts subulate-lanceolate. Corolla white, sparingly pubescent. Fruiting calyx short, mouth contracted. Nutlets broadly ellipsoid. Flowering in autumn and fruiting in cold weather.

Distribution : Central and Eastern Himalaya; Nepal, Sikkim, Khasia mountains. Abundant as low gregorious herb in open hill sides of the middle hill forest between 3 and 6,000 ft. elevation.

Parts used : Whole plant and leaves.

Medicinal uses :

Extract of leaves of young shoots are used for stomach trouble and vomiting tendencies. It also cures old sores and eczema on the face. Decoction of the leaves are said to be used by the Chinese in cases of cholera.

Mentha viridis Linn.

(Plate 39, page 137.)

(Beng.—*Pudina.*)
(Nep.—*Pudina.*)

Aromatic perennial herb, rootstock creeping. Stem thick or slender, 2—3 ft. hoary-tomentose. Leaves 1—3 by —2 in., base rounded or cordate, dentate. Spikes 1—3 in., ⅓—½ in. diam., bracts lanceolate; pedicals hairy. Corolla lilac, about ⅛ in. diam. Nutlets usually pale, smooth, sometimes brown and conspicuously delicately reticulate. Flowering and fruiting in cold weather.

Distribution : Temperate Western Himalaya and Western Tibet; from Kashmir to Garhwal, alt. 4—12,000 ft. Cultivated in the plains in cold weather on moist soil.

Parts used : Leaves and flowering spikes.

Medicinal uses :

Leaves given in fever and bronchitis. Decoction used as lotion for aphthae. The oil is distilled from fresh flowering spearment. Dried plants are made into a chutney is used for treatment of flatulence, and good for kidney. It is a flavouring agent and carminative. The oil is used in the treatment of muscular rheumatism. It is the source of spearmint oil of commerce.

M. piperita Linn.

(Beng., Nep. and Eng.—*Piperment.*)

This is the true peppermint. It is used more or less for same purpose as *M. viridis, M. arvense.*

It is being successfully cultivated in Rongo hills along with M. arvense. It yields volatile oil 1.7 to 2.04 higher than B.P.C. standard. There is a great demand for this oil and menthol. Calcutta alone deals in Rs. 1.2 lakh worth of the oil. Total India's requirement is about one million rupees.

Family : AMARANTACEAE.

Achyranthes aspera Linn.

(Plate 40, page 138.)

(Beng.—*Apang.*)
(Sans.—*Apamarga.*)
(Hind.—*Chir-cheta.*)

Stem 1—3 ft., simple or branched. Leaves 1—5 in., extremely variable, generally thick, pubescent tomentose or velvety, rarely glabrate; petiole short. Spikes usually with a robust rachis that rapidly lengthens, sometimes to a foot long. Flowers ⅙—¼ in., longer than the bracteoles. Staminodes fimbriate from the margin or from an appendage below the margin behind. Flowering in cold weather and fruiting in spring.

Distribution : Throughout hotter India and Ceylon in damp places, ascending the Himalaya to 4,000 ft. Common in Terai and in the lower hill forest.

Parts used : Root, leaves and seeds.

Medicinal uses :

It is described in the *Nighantas* as purgative, pungents, digestive; a remedy for phlegm, wind, inflammation of the internal organs, piles, itch, abdominal enlargements, and enlarged cervical glands. European physicians agree as to its value in dropsical affections; one ounce of the plant may be boiled in ten ounces of water for 15 minutes, and from 1 to 2 ounces of the decoction be given 3 times a day. Used in snake-bite cases and hydrophobia, and also in hysteria and nervous disorder. Root paste with water cures cholera and the ash is used in asthma. ¼ in. root with one pepper if taken once is supposed to cure prolonged bleeding in women. The plant in flowering state if applied to the bodies of snake and centipeds they get paralysed and cannot move.

Family : POLYGONACEAE.

Rheum emodi Wall.

(Plate 41, page 139.)

(Beng. and Hind.—*Rebondachini.*)
(Nep.—*Padam chal.; Rhubarb.*)

Root very stout; stem very stout, 5—6 feet high, streaked green and brown. Radical leaves often 2 ft. diam., papillose beneath, sub-caberulous above; petiole 12—18 in., very stout, scaberulous. Panicle 2—3 ft., with erect strict branches. Flowers 1—8 in. diam., petals 5. Fruit ½ in. long, purple, wings narrower than the disk. Flowering in the rains and fruiting in autumn.

Distribution : Subalpine and Alpine Himalaya; Nepal, Sikkim. Common above 11,000 ft.

Parts used : Root.

Medicinal uses :

Rubarb is stomachic, tonic and cathartic so that its secondary effect is to confine the bowels; hence it is efficacious in simple diarrhoea, but not in constipation or any affection in which a continuous aperient action is necessary; it is not suitable for inflammatory or febrile cases, although it seldom acts as an irritant. It is stimulating combined with its aperient properties render it valuable in atonic dyspepsia.

Rumex nepalensis Spring.

(Beng.—*Pahari-palang.*)

Root with tuberous fibres. Stem 2—4 ft., stout, erect. Lower leaves often 6—14 by 3—5 in., undulate or not; petiole very slender; upper petioled or sessile. Flowering in rains and fruiting in autumn.

Distribution : Temperate Himalaya; from Bhutan to Kashmir, alt. 4—9,000 ft. (12,000 on the Chenab) to the Nilghiris. Abundant in Darjeeling, Sikkim and all along the 6—7,000 ft. belt.

Parts used : Root and leaves.

Medicinal uses :

The tuberous roots are said to be sold in the bazars of Bengal under the name of *Rewand Chini* as a substitute for rhubarb. They are given in constipation, in dose of 10 grains to 120 grains. It is supposed to cure burning sensation due to stinging nettles.

Family : PIPERACEAE.

Piper longum Linn.

(Plate 42, page 140.)

(Beng.—*Pipul.*)
(Sans.—*Pippule, Kawnamool.*)

A creeping and rambling aromatic herb with distant alternate lower long-petioled, deeply cordate, usually ovate or orbicular, upper more oblong and sessile or amplexicaul leaves. Dioecious. Bracts of both sexes stalked peltate with free margins all round. Bracts ·05 in. diam. Bracteoles O Male spikes slender, yellow, 1·5—3·5 in. long. Stamens 2—3. Fem. spikes ·5—·75 in. in flower, up to 1·2 in. long in fruit, bracts similar to male, but more distant and less stipitate; ovary sunk in and more or less confluent with the thick rhachis; stigmas 3—4 lanceolate spreading papillose. Berries distinct, ·1 in. diam. Flowering in rains and fruiting in early cold weather.

Distribution : Hotter provinces of India, from East Nepal to Assam, the Khasia Mountains, and Bengal, westward to Bombay, and southward to Travancore, Ceylon and Malacca, wild or cultivated.

Parts used : Root and fruits.

Medicinal uses :

It is considered to be digestive, sweet, cold, bitter, emollient and light; useful in rheumatism, asthma, cough, abdominal enlargements, fever, leprosy, gonorrhoea, piles and spleen. Old long pepper is to be preferred to fresh. A mixture of long pepper, long pepper root, black pepper and ginger in equal parts, is prescribed by several writers as a useful combination for catarrh and hoarseness. As an alternative tonic, long pepper is recommended for use in a peculiar manner. An infusion of three long peppers is to be taken with honey on the first day, then for ten successive days the dose is to be increased by three peppers every day, so that on the tenth day the patient will take thirty at one dose. Then the dose is to be gradually reduced by three daily, and finally the medicine is to be omitted. The powdered root with pepper taken with milk is good for women for development of breasts. Powdered *pipul* taken with *gur* induces sound sleep.

Family : LAURANEAE.

Cinnamomum tamala Fr.

(Beng.—*Tejpata.*)
(Hind.—*Talispat.*)
(Lep.—*Napsor.*)
(Nep.—*Chota sinkoli.*)

A moderate-sized tree. Leaves usually 4—5 in. long, very variable in breadth, rarely alternate, shining above, rarely elliptical and obtuse, venules below very obscure, young leaves pink. Flowers ¼—⅛ in. white, long. Peduncle and calyx small, ½ in. long, the latter usually ¼ in. diam. with truncate lobes. Stamens 9, 6 outer and 3 inner. Fruit ½ in. long, black when ripe. Flowering in spring and fruiting later in summer.

Distribution : Tropical and sub-tropical Himalaya; from near the Indus to Bhotan. Alt. 3—5,000 ft. Sylhet and Khasia Mountains, common in Sikkim, ascending to 7,800 ft.

Parts used : Bark and leaves.

Medicinal uses :

The leaves are stimulant, used in rheumatism; used also in colic and diarrhoea. The bark is given in gonorrhoea. Given in decoction or powder in suppression of lochia after child-birth with much benefit.

Lindera neesiana Benth.

(Beng.—*Gandha-daru.*)
(Nep.—*Seltimur.*)

A small aromatic tree; shoots terete, smooth, usually quite black when dry, often very stout. Leaves 1½—4½ in. diam., smooth and reticulated above when dry, more or less glaucous beneath with 4—6 pairs of longitudinal nerves besides the basal which do not reach the middle of the leaf, and slender distant reticulated ones. Umbels unopened, globose, ⅓ in. diam., on slender pedicels ⅓—½ in.; outer bracts hemispheric, inner narrower; flowers on tomentose pedicels ¼ in. diam., green. Sepals orbicular, nearly glabrous, very membranous. Stamens 9, filaments short, glabrous, 2 inner, glandular. Fruit ⅙ in. diam., seated on the unaltered perianth with fragments of the sepals. Flowering in autumn and fruiting in early cold weather.

Distribution : Temperate Himalaya; Nepal, Sikkim.

Parts used : Bark and fruits.

Medicinal uses :

It is aromatic, carminative and yields very good sassafras.

Litsaea citrata Bl.

(Beng.—*Nebuchite.*)
(Nep.—*Siltimur.*)

A small tree with strongly lemon-scented, elliptic, lanceolate, acuminate leaves. Terminal bud naked. Flowers small in solitary or corymbose umbels. Fruit small, globose. Flowering in rains and fruiting in early cold weather.

Distribution : Eastern Himalaya, from Sikkim to Mishmi, alt. 5—6,000 ft. It is common in the Darjeeling district up to 7,000 ft.

Parts used : Fruit.

Medicinal uses :

It contains an alkaloid called *Laurotetanine,* having a toxic effect.

Litsaea sebifera Pers.

(Beng.—*Kukurchite.*)
(Hind.—*Gabbigaon.*)
(Nep.—*Kawala.*)

An evergreen tree, 20—50 ft. high. Leaves subterminal on the branches, pale when dry; petiole ½—1 in. Umbels few or many, ⅓—⅔ in. diam.; pedicels

clustered on a stout or slender common peduncle ¼—3 in. long. Bracts 4, more or less tomentose. Stamens 9—20 or more, filaments more or less villous. Fruit the size of a pea, pedicel sometimes thickened. Flowering in cold weather and fruiting in spring.

Distribution : Throughout the hotter parts of India, from the Punjab and lower Himalaya at Garhwal, eastwards to Sikkim, Assam and the Khasia Mountains, the Gangetic Plain in Bengal, and southwards to Malacca. Throughout the Deccan Peninsula, Ceylon, ascending to 3,000 ft. Common in lower hill forests.

Parts used : Bark and fruits.

Medicinal uses :

Contains an alkaloid. *Laurotetanine* which is demulcent, aphrodisac, diuretic, emolient, dystenteric and a remedy against scorpion sting.

Family : THYMELAEACEAE.

Daphne cannabina Wall.

(Beng.—*Pahari-sone.*)
(Nep.—*Kagate, L. Dhenok.*)

A shrub, 7—8 ft., bark is made of strong fibres, branches glabrous, except the youngest, leafy at the tips. Leaves thinly coriaceous, nerves faint; petiole very short. Flowers white, purple or yellowish, very sweet scented; bracts oblong or lanceolate. Perianth ½ in., tube rather slender, lobes broad or narrow, ovate, acute. Fruit ovoid, succulent, red or orange. Flowering in autumn and fruiting in cold weather.

Distribution : Temperate Himalaya; from Chamba to Bhutan, alt. 5—7,000 ft. in the west and 6—10,000 ft. in the east. Khasia mountains, alt. 3—6,000 ft. Common shrub in the middle hill forests. Bark fibre is very tough and strong and made into rope and paper.

Parts used : Root.

Medicinal uses :

Roots are used as antidotes. Its appliance causes diarrhoea and vomitting tendencies which is said to clean out the poison from an affected person.

Family : LORANTHACEAE.

Viscum album Linn.

(Plate 43, page 141.)

(Beng.—*Mijilto.*)
(Eng.—*Mistletoe.*)
(Nep.—*Harchur.*)

A semi-parasitic evergreen shrub on branches of trees; large green bush, branches round jointed, each branch bears two green leathery leaves a year. Leaves sessile, obovate-cuneate very coriaceous, flat 1—2 in. long, broad narrow, obscurely 3—5 nerved. Flowers secrete honey dioecious, sessile 3—5 in a cluster of three to five, bracts concave. Perianth-segments 3—4, triangular, thick, acute, deciduous with embedded stamens. Fruit pseudo-berry, white ¼—½ in. long ellipsoid. Flowering in early cold weather and fruiting in spring.

Distribution : Tropical and temperate Himalaya; from Kashmir to Nepal. Common on trees in the lower and middle hill forests.

Parts used : Whole plant.

Medicinal uses :

Properties resolvent and laxative, a solvent of corrupt humors which it withdraws from the system. When steeped in hot water, strained, and beaten up with the kernels of the walnut or castor oil (which is the usual form of administration), it clears the system of adust bile and phlegm, removes obstruction, and is a remedy for lumbago, piles and applied externally it promotes the suppuration, or causes the dispersion of tumors or enlargements. Sportsmen use it as birdlime, and dyers as a mordant for crimson. It is generally used by local hill people as poultice for treatment of muscular pain, due to a fall or from other injury and in cases of fracture. A decoction of plant is also given in fever accompanied with aching limbs.

Family : EUPHORBIACEAE.

Homonoia riparia Lour.

(Beng.—*Deshi-willow.*)
(Nep.—*Khola ruie.*)

A large rigid diffuse shrub with numerous erect stems marked with prominent leaf-scars, tomentose above. Leaves linear, linear-lanceolate or linear-oblong, willow-like, 3—10 in. long by ·3—1 in. broad, entire, or with wavy margins, or sometimes toothed or serrulate towards the tip, closely pubescent on the nerves beneath. Male spikes 1·5—4 in. long with tomentose rachis; bract ·04—·05 in. ovate acuminate, bracteoles smaller, lanceolate. Female spikes 2—3 in., bracts as in the male, rachis grey tomentose, sepals lanceolate, 5—6 in. ·07 in. long, nearly equal, pubescent. Ovary tomentose. Capsule tomentose ·2—·25 in. diam., seeds bright crimson. Flowering in early summer and fruiting in autumn.

Distribution : Rocky river banks. Sikkim Himalaya, alt. 1—2,000 ft. Assam and the Khasia hills and southward to Burma, Tenasserim and the Andaman islands, and Bundelkund, Deccan Peninsula from the Concan southward Ceylon, common in Sikkim in the lower hill forests by the side of hill-streams.

Parts used : Root.

Medicinal uses :

Decoction of the root is used in piles, stone in bladder, gonorrhoea, syphilis and thirst, laxative and diuretic.

Mallotus philippinensis Muell.

(Lep.—*Puroa, tukla.*)
(Nep.—*Sinduria, safedmallata.*)

A tree, 20—30 ft., branched low, with ovate or rhomboid, acute or acuminate leaves, covered beneath when young, as are the shoots, with a greenish-yellow glandular pubescence, and permanently with small red glands. Male flowers clustered in racemes 6—10 in. long. Female racemes 2—3 in. long. Capsule smooth, but densely covered with red glands. Flowering in early autumn and fruiting in cold weather.

Distribution : Throughout tropical India, along the foot of the Himalaya from Kashmir eastwards, all over Bengal and Burma, Singapore and the Andaman islands, and from Sind southwards to Ceylon. Common in lower hill forests in Terai.

Parts used : Fruit.

Medicinal uses :

The powder prepared from the tricoccous fruit is used as an anthelmentic, vermifuge and purgative medicine. It is also used as a remedy for tape-worm.

Phyllanthus emblica Linn.

(Plate 44, page 142.)

(Beng.—*Amloki.*)
(Hind.—*Aunala.*)
(Sans.—*Amlakam, Dhatriphala.*)

A deciduous small tree, 20—30 ft. tall, bark flaking conchoidally; branchlets slender, pubescent. Leaves equal and symmetrically set, like the leaflets of a pinnate leaf, glabrous or puberulous beneath; stipules scarious, lacerate. Flowers yellow, racemed on the branches. Perianth 5—6, obovate-oblong. Staminal column short, stamens 3. Disk of male obsolete, of fem. a lacerate cup. Ovary globose; styles connate at the base; arms recurved, very large, dilated and twice branched. Fruit round ½ to 1½ in. diam., obscurely 6-lobed, sour in taste, containing about 6 seeds.

Distribution : Throughout Tropical India, wild or planted, from the base of the Himalaya, from Jammu eastwards to Ceylon and Malacca. Common in the lower hill forests ascending up to 3,000 ft. in Darjeeling Sikkim.

Parts used : Bark, flower and fruit.

Medicinal uses :

It is one of the best and the oldest medicines used in diarrhoea and dysentery. Its fresh juice mixed with honey and the milk is given in gonorrhoea. "Take powdered Emblica 32 tolas, prepared iron 32 tolas, liquorice powder 16 tolas, mix them together, and soak in the juice of *Tinospora cordifolia* seven times successively. This preparation is given in jaundice, anaemia and dyspepsia, in doses from 20 to 40 grains." Juice of the fruit taken with pure cow's ghee and powdered pipul and honey cures obstinate hiccough. The juice taken with honey cures white leucorrhoea in women. It is one of the ingredients of *Triphala* used as purgative. *Sanjivani* pills made with other ingredients is used in typhoid, snake-bite cases, and cholera. It relieves pain in urine trouble and bring sensation in vagina.

Family : URTICACEAE.

Ficus cunia Ham.

(Beng.—*Jogidomur.*)
(Nep.—*Khaniun.*)

A low tree. Leaves ½—1 in., narrow elliptic to oblong-lanceolate with unequal semi-sagittate bases larger basal lobe 3—4, smaller 1 nerved; petiole ⅛—⅔ in., scabrid; stipules ¾—1 in., linear-lanceolate, puberulous. Receptacles

½ in. diam., ripe red brown; basal bracts 3; peduncle short. Male sepals 3; anther ovate. Gall and fem. sepals about 4, lanceolate, united below; gall ovary globose smooth; style very short, lateral. Achene broadly ovoid, emarginate on one side, tuberculate, viscid; style very long, lateral; stigma large, bifid. Fruits seed edible made into Chatni, taste—sour. Flowering and fruiting almost throughout the year.

Distribution : Sub-Himalayan forests; from Chenub to Bhutan; Central India; Assam, the Khasia Mountains, Chittagong and Burma. Very common in Darjeeling district up to 2,000 ft.

Parts used : Root and fruit.

Medicinal uses :

Fruit juice, if taken regularly and the affected parts is washed with it, cures leprosy. Juice of root bark cooked in milk cures bladder complaints.

Morus indica Linn.

(Beng.—*Tunt.*)
(Lep.—*Mekrap, nambyong.*)
(Nep.—*Kimba.*)

Small tree. Leaves 2—5 in. long, ovate with three nerves near the base. Flowers unisexual, fruits black when ripe. Flowering in cold weather, fruiting in spring. Habit of M. alba, but cultivated usually as a shrub, of which it is perhaps a form with long points to the rougher leaves, connate styles, and obovate female sepals.

Distribution : Temperate and sub-tropical Himalaya, from Kashmir to Sikkim, ascending to 7,000 ft., wild and cultivated for feeding silkworm in Bengal (in Siliguri white M. alba is grown as bush and tree mulberry); Assam, Burma. Common in Terai of Darjeeling and Sikkim.

Parts used : Bark, root and fruit.

Medicinal uses :

The fruit has an agreeable aromatic and acid flavour, is cooling and laxative, allays thirst, and removes fevers. The bark is supposed to be vermifuge and purgative. The root is considered anthelmintic and astringent. A decoction of the leaves is used as a gargle in inflammation and thickening of the vocal cords and curing hoarse voice.

Pouzolzia hirta Hassk.

(Beng.—*Pathuraharjora.*)
(Lep.—*Chiple.*)

Stem 6 in. to 3 ft., often branched, slender and decumbent or subscandent. Leaves usually membranous, 3 nerved, with rarely a short extra basal pair; stipules broad, shortly acuminate. Fruit very variable in size and breadth, dull black when ripe, with strong ribs; achene black or white shining. Flowering in rainy and autumn season and fruiting in cold weather.

Distribution : Tropical Himalaya, from Chamba, Kumaon, Sikkim, Assam, the Khasia hills, alt. 1—5,000 ft., Cachar and the Jhees. Bihar on Pareshnath, alt. 3,000 ft., Nicobar islands. Common over rocks in Terai of Darjeeling and Sikkim.

Parts used : Root.

Medicinal uses :

Roots are used for dislocation and fructures.

Urtica parviflora Linn.

(Beng.—*Pahareh-Bichuti.*)
(Eng.—*Nettle.*)
(Nep.—*Seusni.*)

Herbaceous, slender, monoecious, glabrous or pubescent, stinging hairs copious stiff, leaves ovate or ovate-cordate or lanceolate acuminate doubly crenate or serrate, stipules connate. Cymes slender diffuse axillary and forming an erect terminal pyramidal panicle, inner fruiting sepals rounded twice as long as the outer.

Distribution : Abundant in the lower middle hill forests ascending up to 8,000 ft. all over Darjeeling and Sikkim.

Parts used : Root, leaves and flowers.

Medicinal uses :

Roots are used as one of the properties of medicine for fractures and dislocation. Leaves and flowering twigs are eaten as vegetable after the boiled water is decanted and cooked as a tonic and clearing agent after child-birth. Young leaves are eaten as spinach.

Family : JUGLANDACEAE.

Juglans regia Linn.

(Beng.—*Akrot.*)
(Eng.—*Indian Walnut.*)
(Lep.—*Kanola.*)
(Nep.—*Okhar.*)

A large deciduous tree, shoots tomentose. Leaves 6—12 in., young tomentose; leaflets subsessile, 3—8 in., glabrous or with the 15—20 pairs of nerves beneath pubescent, terminal petiolulate. Monoecious, male spikes 2—5 in.; pendent, bracts stipulate, lobed. Fem. Fl. 1—3; petals linear-lanceolate, green. Fruit ellipsoid green, smooth or pubescent. Nut thick-shelled in the wild form, with greatly thickened margins of the valves. Flowering in spring and fruiting in autumn.

Distribution : Temperate Himalaya and western Tibet, alt. 3—10,000 ft. from Kashmir and Nubra eastwards; wild and cultivated. Khasia hills, Ava hills, Beluchistan. Common in Middle hill forests, Darjeeling and Sikkim, Kashmir nuts are better than Sikkim nuts.

Parts used : Bark, leaves and fruits.

Medicinal uses :

The bark is used as an anthelmintic and detergent; the leaves are astringent and tonic, in decoction are supposed to be specific in strumous sores, and to be anthelmintic; the fruit is also believed to have an alternative effect in rheumatism.

Family : CUPULIFERAE.

Betula utilis Don.

(Plate 45, page 143.)

(Beng.—*Bhujapatra.*)
(Nep.—*Phuspat, bhujpata.*)
(Sans.—*Bhurjapatra.*)

A tree, 40—50 ft., or shrub at high altitudes; bark peeling in horizontal flakes. Leaves 2—3 in.; nerves 8—12 pairs; petiole $\frac{1}{3}$—$\frac{2}{3}$ in. Bracts of male ciliate, stipes scaly. Anthers glabrous except the tip. Fem. spikes 1—2 in., by $\frac{1}{2}$—$\frac{2}{3}$ in. diam.; wings of nut equalling or narrower than the scale. Flowering in the rains and fruiting in autumn.

Distribution : Temperate Himalaya and western Tibet; from Kashmir, alt. 7—12,000 ft. to Sikkim, alt. 9—14,000 ft. and Bhutan. Abundant above 10—12,000 ft. in Sikkim and Darjeeling. It is, however, absent at Grattong *en route* to Jalap la.

Parts used : Bark.

Medicinal uses :

The decoction of the bark is used as a wash in otorrhoea and poisoned wounds and puss. The infusion of the bark is used as a carminative; it is prescribed also in hysteria. It has also certain aromatic and antiseptic properties.

GYMNOSPERMAE.

Family : GNETACEAE.

Ephedra sexatiles Royle.

var. *sikkimensis* (staff.) Florin.

(Plate 46, page 144.)

(Beng.—*Sikkim Ephedra.*)
(Tib.—*Ma Houng.*)

A low-growing rigid tufted shrub with usually a guarled jointed stem and erect green branches, 6 in.—4 ft. Spikelets ¼— in., subsessile often whorled; fruiting with often fleshy red succulent bracts, 1-2 seeded. Seeds biconvex or plano-convex.

Distribution : Temperate and Alpine Himalaya and western Tibet in the bleak, snowy drier regions, alt. 7—12,000 ft.; 12—16,000 ft. in Sikkim.

Parts used : Whole plant. Sikkim-grown Ephedra is very poor in alkaloid content which may be due to storage, age and edaphic and climatic conditions.

Medicinal uses :

It has got the following properties; cardiac and circulatory, stimulant. Diuretic in urticaria, angio-neurotic oedema in asthma. Its chemical analysis shows that it contains 0·5698 per cent. alkaloid calculated as ephedrine.

Family : CONIFERAE.

Abies webbiana Lind.

(Beng.—*Talispata.*)
(Nep.—*Gobre salla.*)
(Sans.—*Talispatra.*)

A lofty black stout evergreen tree, attaining 150 ft., and a girth of trunk of 30 ft., crown cylindric, branches horizontal flat, more or less in tiers. Leaves spirally arranged but more or less bifarious, very variable in length, persisting for 8—10 years, flat, about 1½ in. broad, channelled down the middle, very dark green and shining, tip very variable; midrib raised beneath; petiole very short, silvery underneath. Male cones sessile, solitary or clustered. Fem. cones 4—6 by 1½—3 in. diam., bluish, ripening in the same year, top and base rounded; outer margins of scales rounded. Seeds oblong or obovoid, with the wing ½—1 in. long. Flowering in spring and fruiting in autumn.

Distribution : Temperate and sub-alpine Himalaya. Abundant in Darjeeling and Sikkim above 8,000 ft. to 12,000 ft.

Parts used : Leaves.

Medicinal uses :

Leaves are carminative, expectorant, stomachic, tonic, astringent. The medicine prepared from the leaves mixed with ginger, cardamom, clove and sugar is used in asthma, bronchitis, etc. Leaves yield an essential oil. It is a tonic and used in hoarse voice, internal haemorrhage and tuberculosis.

Cedras libani Barrl.

(Beng.—*Debdaru.*)
(Eng.—*Deodar.*)

A lofty robust tree, attaining 250 ft., with a girth of trunk 36 ft., and 600 years' age; bark thick, furrowed vertically and cracked transversely. Leaves usually glaucous green, acute, persistent for 3—5 years; sheaths very short. Cones 4—5 by 3—4 in., top rounded; scales very numerous, margin thin. Seeds ½ in. long; wing longer, broadly triangular with rounded sides. Flowering in autumn and fruits take a year to develop properly.

Distribution : N.W. Himalaya, from Kumaon westwards. Common above 6,000 ft. in Sikkim.

Parts used : Wood and oil.

Medicinal uses :

The aromatic wood is considered carminative, diuretic and useful in fever, flatulence, dropsy, urinary diseases. The oil is used in skin diseases and is a good remedy for leprosy. The powdered wood and sunt taken with boiled water stops palpitation of the heart due to flatulence. The paste of wood is used in gonorrhoea, rheumatism and urticaria and taken internally, it cures hiccough and breathing trouble in asthma.

Juniperus recurva Ham.

(Beng.—*Juniper Jhau.*)
(Nep.—*Teepi.*)

A shrub or small tree of graceful, drooping habit, attaining a height of 30—50 ft. in the Himalaya, and usually narrowly or broadly pyramidal in shape. Bark greyish brown, thin, pelling off in fibrous strips. Branches and branchlets ultimately recurved or pendent. Leaves dull or greyish green, awl-shaped, densely overlapping, in whorls of 3, all pointing forward and more or less closely pressed. Male flowers terminal or in the axils of the leaves of the ultimate divisions of the branchlets, about $\frac{1}{6}$ in. long with 12—16 stamens. Fruit axillary, ripening in the second year, dark purplish brown, ovoid, $\frac{3}{8}$ in. long; scales 3—6 united, each with a triangular, spreading point. Seed solitary, ovoid, pitted. Flowering in the rains and fruits in autumn.

Distribution : Temperate and Alpine Himalaya, common in Sikkim at 10,000 ft. and above.

Parts used : Wood.

Medicinal uses :

Smoke of green wood—emetic. The leaves and twigs are sweet scented and burnt as incence to drive out mosquitoes and insects. The ripe fruits of this species and *Juniperus pseudo-sabina* occurring as low spreading bush above 11 to 12,000 ft. are used as flavoring agent in the preparation of beer.

Taxus baccata Linn.

(Beng.—*Lichujhau.*)
(Eng.—*Yew.*)
(Nep.—*Dhengre-salla.*)

A tall tree of valuable timber, attaining 100 ft. in height with spreading branches bearing coriaceous, dark green linear acuminate leaves. Seeds ovoid, olive-green with hard seed-coat, enclosed in the fleshy red cuplike structure. Flowering in spring and the fruit ripens in autumn.

Distribution : Temperate Himalaya, alt. 6—11,000 ft., Khasia hills at 5,000 ft., Upper Burma. Common in Singalella and Rechi La, from 8—10,000 ft. and in Sikkim.

Parts used : Aril.

Medicinal uses :

The aril of fruit is carminative, expectorant, stomachic and tonic.

The leaves are poisonous.

MONOCOTYLEDONES.

Family : ORCHIDEAE.

Saccolobium papillosum Lindl.

(Beng.—*Rasna.*)

(Sans.—*Brikhadhin, Gandhat, Nakuli.*)

Epiphytic herbs. Stem 2—3 ft., as thick as a goose-quill. Leaves obliquely notched, 4—6 in. long, scape closely scarred to the base ; flowers $\frac{2}{3}$ in. diam.; ovary very short. Capsule $1\frac{1}{4}$ in., fusiform. The lip is broader, oblong ovate. Flowering in autumn and fruiting in cold weather.

Distribution : Bengal and the lower Himalaya Mountains from Sikkim eastwards, Assam, the Gangetic delta, the Circars and Tenasserim. Common epiphytic orchid in lower hill forests in Terai and higher up in Darjeeling and Sikkim.

Parts used : Root.

Medicinal uses :

Its roots are considered to have cooling properties. It is said to be a specific for rheumatism and often used with other ingredients. It is invariably given as a substitute for Sarsaparilla.

Vanda Roxburghii is also called Rasna and used more or less for similar purpose.

Family : SCITAMINEAE.

Alpinia galanga Sw.

(Beng.—*Kulaijan.*)

(Sans.—*Dumparastma, Kulinjana.*)

Rootstock perennial, tuberous, slightly aromatic herb. Leafy stem 6—7 ft. Leaves 1—2 ft. by 4—6 in., green and glossy on both sides. Panicle dence-fid, $\frac{1}{2}$—1 ft., rachis densely pubescent, branches numerous short ; pedicels $\frac{1}{8}$—$\frac{1}{6}$ in.; bracts small, ovate, calyx greenish-white, $\frac{1}{4}$ in. oblique at the throat. Corolla segments $\frac{1}{3}$—$\frac{1}{2}$ in. Lip distinctly clawed, $\frac{1}{2}$ in. basal glands ascending reddish, linear-subulate. Stamen arcuate, shorter than the lip. Ovules 1—2 in a cell. Fruit orange-red, the size of a small cherry. Flowering and fruiting in summer.

Distribution : Throughout India from the foot of the Himalayas to Ceylon and Malacca. Abundant in moist and swampy Terai region of Darjeeling and Sikkim.

Parts used : Rhizome.

Medicinal uses :

The rhizomes of this species are aromatic, pungent, and bitter, and are used in the form of an infusion in fever, rheumatism, and catarrhal affections.

Amomum aromaticum Roxb.

(Plate 47, page 145.)

(Beng.—*Soranga-alach.*)
(Hind.—*Morang illachi.*)

Leafy herb, stem 3—4 ft. Leaves ½—1 ft. by 2—4 in., and glabrous on both sides. Spike small, globose, peduncle generally short, rarely longer and decumbent; outer bracts 1 in., ovate, pale crown. Corolla-tube 1 in.; segments obtuse, nearly as long as the tube, white, tinged with brown. Lip pale yellow, twice as long as the corolla segments, outer half deflexed. Anther-crest large, petaloid, lobes rounded. Capsule 1 in., oblong, trigonous. Flowering in late rains and fruiting in autumn.

Distribution : Eastern Himalaya, tropical region; Nepal, Sikkim, Khasia hills, Sylhet and Northern Bengal.

Parts used : Seeds.

Medicinal uses :

The seeds and oil are used in stomach trouble. Used in flavouring curries and chewed with betel.

Amomum subulatum Roxb.

(Beng.—*Bara-alach.*)
(Nep.—*Bara ilachi.*)

A perennial herb with leafy stem 3—6 ft. high. Leaves 1—2 ft. by 3—4 in., green, glabrous on both surfaces. Spike at the base very dense, shortly peduncled, 2—3 in.; bracts red-brown, outer 1 in., ovate, inner shorter and obtuse. Calyx and corolla-tube 1 in.; segments obtuse, shorter than the tube; upper cuspidate. Lip yellowish white, rather longer than the corolla segments. Filament very short; anther-crest entire. Capsule 1 in., globose, reddish brown, densely echinate. Flowering in the rains and fruiting in autumn.

Distribution : Eastern Himalaya. Abundantly cultivated between 2—4,000 ft. in Sikkim and Darjeeling district.

Parts used : Seeds.

Medicinal uses :

The seeds yield a medicinal oil. It is an agreeable, aromatic stimulant.

It acts as a stomachic and is said to allay irritability of the stomach produced either by cholera or some other affections. The decoction of cardamum is used as a gargle in affections of the teeth and gums. In combination with the seeds of melons it is used as a diuretic in cases of gravel of the kidneys. It is good for patients suffering from gonorrhoea.

Costus speciosus Smith.

(Beng.—*Kesu.*)
(Sans.—*Kemuka, Pushkara mulaka.*)

Leafy stem 6—10 ft. stout. Leaves ½—1 ft. or more, oblong, acute, thinly silky beneath. Spikes very dense-fid 2—4 in.; bracts ovate, bright red, 1—1½ in. Calyx 1 in.; segments 3, ovate cuspidate. Corolla-segments white,

oblong 1—1½ in. Lip white, suborbicular 2—3 in., the margins incurved and meeting. Filament 1½—2 in. including the oblong petaloid-connective. Capsule 1 in., globose, red, crowned with the persistent calyx. Flowering towards the end of rains and fruiting in autumn.

Distribution : Throughout India from the Central and Eastern Himalaya, ascending to 4,000 ft. to Ceylon. Common in Terai up to 2,000 ft. in the swampy areas along the fringe of lower hill forests.

Parts used : Root.

Medicinal uses :

Rhizomes are used in venereal diseases with mixture of sugar. It is also useful for chest pains and used as ginger. It is apphrodisiac.

Curcuma zedoaria Rosc.

(Beng.—*Sati.*)

(Sans. and Hind.—*Karchura, Kaur, Sati.*)

Rootstock ovoid, tubers many, scented and bitter. Leaves 1—2 ft., oblong, acuminate. Spikes vernal, ½ ft. by 3 in. broad; flowering bracts 1½ in., ovate green, flowers pale yellow, rather shorter than the bracts. Calyx whitish, obtusely toothed, scarcely half as long as the corolla-tube. Corolla-tube funnel-shaped. Capsule ovoid trigonous, smooth, dehiscing irregularly. Seeds oblong, aril lanceolate white. Flowering towards the end of rains and fruiting in autumn.

Distribution : Eastern Himalaya, wild; cultivated throughout India. Common in west places in Terai of Darjeeling and Sikkim.

Parts used : Rhizome.

Medicinal uses :

The fresh root in considered to be cooling and diuretic, it checks leucorrheal and gonorrheal discharges and purifies the blood. The juice of the leaves is given in dropsy. It is used in skin diseases also.

Hedychium spicatum Ham.

(Beng. and Hind.—*Karpurkachuri.*)

(Sans.—*Karpurakachali.*)

Annual herbs. Rootstock horizontal, tuberous root-fibres not much thickened. Leaves reaching 1 ft. or more. Spikes sometimes 1 ft.; flowers ascending and closely imbricate. Corolla-tube 2—2½ in., segments 1 in., linear; staminodes 1 in., lanceolate, lip ½—¾ in. broad, not at all clawed, lobes 2 rounded; filament pale red; anther linear, ¼—⅓ in. Capsule glabrous, globose. Flowering in the rains and fruiting in autumn.

Distribution : Sub-tropical Himalaya; Nepal, Kumaon. Common in the wet places in Terai of Darjeeling and Sikkim.

Parts used : Root and rhizome.

Medicinal uses :

The aromatic rootstocks are used as a stomachic, carminative, tonic and stimulant.

Kaempferia rotunda Linn.

(Beng.—*Bhuichampa.*)
(Hind.—*Chandramule.*)
(Sans.—*Bhumie champak.*)

Stemless perennial herb about a foot high. Rootstock tuberous; root-fibres many, very thick. Leaves erect, oblong, petiole short channelled. Spikes 4—6 fid., bracts oblong, acute, outer short, the inner 2—3 in. long. Flowers long, scented, white, yellow or violet. Calyx nearly as long as the Corolla-tube, minutely toothed, slit down one side. Corolla-tube 2—3 in.; segments spreading, nearly as long as the tube. Lip rather shorter, reflexed, 2-lobed, the middle lobes ¾—1 in. broad, deeply tinged with lilac or red-purple; staminodes 1½—2 in.; anther crest cut half way down into two lanceolate lobes, with often a small tooth between them. Flowering in summer and fruiting in the early rains.

Distribution : Throughout India from the Himalaya to Ceylon often cultivated.

Parts used : Root and tuberous rootstock.

Medicinal uses :

Extract from tubers are used for fractures and dislocation. It is a valuable medicine for dropsy.

Zingiber officinale Rosc.

(Plate 48, page 146.)

(Beng.—*Ada.*)
(Hind.—*Sunt.*)
(Nep.—*Adrak.*)

A biennial herb, rootstock bearing many sessile tubers. Leafy stem 3—4 ft. Leaves 6—13 by 1 in., tapering gradually to the point. Spikes 2—3 by 1 in. diam.; peduncle ½—1 ft.; bracts about 1 in. Corolla-segments lanceolate, subequal, under an inch long. Lip shorter than the corolla-segments. Stamen dark purple, as long as the lip. Flowering in the rains and fruiting in autumn.

Distribution : Widely cultivated in India and favourite crop for cultivation by the Hill people in Darjeeling and Sikkim up to 4,000 ft.

Parts used : Rhizome.

Medicinal uses :

Ginger is the rhizome scarped to remove the dark outer skin, and dried in the sun. It is known in commerce as unbleached Jamaica ginger. It is the main ingredient in medicine used for fever, cold, urticaria, goiter. It is a valuable medicine for cold, asthma, palpitation, piles and dropsy. Eaten with butter it cures rheumatism. Juice of ginger and turmeric taken with honey cures cold and asthma, and mixed with lemon juice cures dyspepsia. Powder of dried ginger applied on the forehead with boiled water cures headache. It has anti-septic properties and is useful in poisoning cases. It is an appetiser and taken with salt cures flatulence and throat trouble.

Family : HAEMODORACEAE.

Ophiopogon intermedius Don.

(Beng.—*Piyaji-murba.*)

Scapigerous herbs, rootstock short not very stout. Leaves 6—24 in. by $\frac{1}{8}$—$\frac{1}{2}$ in., margins minutely erose. Scape slender as long as the leaves or shorter. Flowers solitary or fascicled $\frac{1}{4}$—$\frac{1}{3}$ in. diam.; white; anthers linear-oblong, filaments very short or nil. Flowering in spring and summer and fruiting in rains.

Distribution : Temperate Himalaya; from Kashmir eastwards, alt. 5—9,000 ft. Khasia and Manipore hills, alt. 5—7,000 ft. Ghats of Malabar, Mysore, Ceylon. Common in Middle and Upper hill forests as low, harbaceous grass-like weed with linear leaves on moist soil, abundant in Darjeeling and Sikkim.

Parts used : Tuber.

Medicinal uses :

Tubers are used in dropsy with good results.

Family : IRIDEAE.

Iris nepalensis Don.

(Beng.—*Iris.*)

(Nep.—*Koor.*)

Herb with sympodial rhizome. Rootstock with densely fibrous sheaths, and copious fleshy finger-like roots; stem $\frac{1}{2}$—1 ft.; flower heads 1—2. Leaves linear, 6 in. long at flowering time, elongating to 24 by $\frac{1}{4}$ in.; streaked with purple lines and dots. Spathes $1\frac{1}{2}$—2 in. long, outer valves thin, green, persistent; pedicels very short. Perianth-tube $1\frac{1}{2}$ in., limb 1—$1\frac{1}{2}$ in., pale line; blade of sepals $\frac{1}{2}$ in. broad, crest yellow; petals $\frac{1}{3}$ in. broad; style-arms 1 in. and less. Capsule oblong, trigonous, 1—$1\frac{1}{2}$ in., enclosed in the persistent spathes. Flowering in the rains and fruiting in autumn.

Distribution : Temperate Himalaya; from the Punjab and Western Tibet to Khasia hills. Common in Darjeeling and Sikkim at 6—10,000 ft.

Parts used : Root.

Medicinal uses :

It is used externally as an application to small sores and pimples and also used in biliary troubles. From the large number of diseases in which this drug is recommended, it would appear to be regarded as a panacea.

Family : AMARYLLIDEAE.

Curculigo orchioides Gaertn.

(Beng.—*Talmuli.*)

(Hind.—*Krishnamuli.*)

(Sans.—*Mushali.*)

Rootstock tuberous or elongate, rather stout, sometimes 1 ft. long. Leaves 6—18 in., petiole 6 in. or less. Scape 1 in., clavate, flattened, hidden by the

leaf-sheaths. Flowers distichous, lowest 2 sexual, the rest all male; bracts lanceolate. Perianth segments ½—⅔ in. Ovary villous, the stipes and perianth above epigeous; stigma 3 cleft; cells 6—8 ovules. Capsule ½ inch., oblong, hypogeous, 1—4 seeded, beak slender; septe spongy. Seeds ⅛ in. long, oblong, deeply grooved in wavy lines, black, shining. Male flower with no ovary, style or stigma. Flowering in summer to rains and fruiting in autumn.

Distribution : Sub-tropical Himalaya; from Kumaon eastwards, ascending to 6,000 ft. The Khasia hills, Manipore and the Western Ghats from Concan southwards. Common on hill sides up to 8,000 ft.

Parts used :

Medicinal uses :

It is prescribed for asthma, piles, jaundice, diarrhoea, impotency, nervous debility, colic and gonorrhoea; it is considered to be demulcent diuretic, tonic and aphrodisiac, and is often combined with aromatics and bitters. Mixed with roots of *Asparagus racemosus, Sphaeranthus indicus, Tinospora cordifolia* and seeds of *Butea frondosa* and root of Palmyra palm and taken with honey and cow's milk it prevents weakness due to old age and bring in young strength and spirit in old men and women producing freshness in face and body.

Family : LILIACEAE.

Asparagus racemosus Willd.

(Beng.—*Satamuli.*)
(Hind.—*Satawar.*)
(Nep.—*Satamule.*)

A rather slender climbing excessively undershrub ; root tuberous. Spines ¼—½ in., straight or subrecurved. Cladodes 1 in., channelled, beneath. Racemes 1—2 in.; pedicles ⅛ in., jointed in the middle. Flowers sweet scented. Perianth $_1\frac{1}{2}$—⅛ in. diam. Anthers minute, oblong, purplish. Berry ⅛—¼ in. diam. Ovules 6—8 in. Flowering in autumn and fruiting in cold weather.

Distribution : Himalaya; Kashmir to Sikkim and Assam. Common in the open lower and middle hill forests in Darjeeling and Sikkim.

Parts used : Roots and leaves.

Medicinal uses :

It is used in medicine for the following qualities, viz., refrigerant, demulcent, diuretic, anti-dysenteric. The root is used as a remedy against amenorrhoea. The root is used as an ingredient of many medicines. It is aphrodisiac, good tonic, prevents flatulence and good for biles. The oil made after mixing with various other plants increases potency in male, and sterile women become productive. Taken with milk it cures piles. Leaves taken after fried in ghee remove night blindness. Powdered root taken with cold water cures urine trouble. It is also beneficial in nervous breaks, dyspepsia, dysentery, preventive of small-pox and beneficial in the treatment of impotency.

Family : ARACEAE.

Acorus calamus Linn.

(Beng.—*Bach.*)
(Eng.—*Sweet flag.*)
(Sans.—*Vacha.*)

Rootstock (rhizome) very aromatic. Leaves 3—6 ft. by ⅔—1¼ in., erect 2-ranked margin entire or slightly waved. Peduncle ⅛—⅜ in. broad. Spathe 6—30 in. long. Spadix 2—4 in., ½—¾ in. diam.; slightly curved. Flowers bisexual. Perianth about equalling the ovary. Flowering in the rains and fruiting in autumn.

Distribution : Throughout India and Ceylon in marshes, wild or cultivated ascending the Himalaya 3,000 to 6,000 ft. in Darjeeling, Sikkim, Bhutan, Manipore, Naga hills. Common in waste marshy areas.

Parts used : Root and rhizome. Rongo grown plants yield total volaline oil (v/w.) 4.5 per cent. much higher than B.P.C. standard.

Medicinal uses :

Rhizomes are used for coughs and cold. *Boch* stops vomitting if taken in small doses. It is a preventive against malaria and stops stomachic, flatulence, pain in the stomach. If taken with quinine stops remittent fever. The smell of *Boch* drives away snake. If taken 15 to 20 grams every two to three hours stops asthma. It is an anti-septic and used in the treatment of eczema and other skin diseases.

Scindapsus officinalis Schott.

(Beng.—*Gajpipul.*)
(Sans.—*Gaja pippali.*)

Stem as thick as the little finger. Leaves dark green, 5—12 in. by 2—3 in., ovate or cordate. Peduncle solitary, terminal, much shorter than the petiole. Spathe about 4—6 in. long, green without, yellow within, beak slender. Spadix equalling the spathe, elongating in fruit, greenish yellow. Stigma elongate; fruit hemispheric. Fruiting spadix sometimes a span long. Berries few only ripening, fleshy. Seed ovate, cordate. Flowering in the rains and fruiting in cold weather.

Distribution : Tropical Himalaya; from Sikkim eastwards. Bengal, Chittagong, Burma and the Andaman Islands. Common on forest trees in the outskirts of Darjeeling and Sikkim in the lower and middle hill forests. It is cultivated in Midnapore, West Bengal.

Parts used : Bark and fruit.

Medicinal uses :

The dried fruit is a stimulant, diaphoretic and anthelmintic. It is said to be aromatic and carminative, and useful in diarrhœa, asthma and other affections caused by deranged phlegm. Among the Santals the fruit is applied externally for rheumatism.

Family : GRAMINEAE.

Avena sativa Linn.

(Beng.—*Jai.*)
(Eng.—*Oat.*)

Clums simple ; leaf sheaths glabrous ; ligules shortly ovate 3·5—6 mm. long ; blades linear or lanceolate-linear, glabrous, scaberulous. Panicles open ; branches spreading equally all round or contracted and secund ; spikelets 22—30 mm. long or longer, usually with a 1-awned floret at the base and one or two awnless florets above or with all the florets awnless; rachilla tough or tardily disarticulating at the base, glabrous or almost so ; glumes broad lanceolate 7—10-nerved ; lemmas lanceolate, acuminate, shortly bifid or 2—4 toothed, glabrous, rarely with a few scattered hairs, the lower 17—25 mm. long ; ovary hairy all over ; grain tightly enclosed by the lemma and palea, free, silky all over.

Distribution : Cultivated in the West Himalaya and Sikkim, Balipara frontier Tract. A rather common crop but not so widely cultivated in these hill ranges as much as rice, *kodo, makai,* and wheat.

Parts used : Whole plant.

Medicinal uses :

It is most useful as a nutrient and is described as a perfect food. Oatmeal porridge does not agree with every one. In cases where the bodily vigour is low and the body ill-nourished, creamed Oatmeal Blanc-mange is very valuable. In the form of tincture it is recommended for all liable to much nervous strain and is used in diabetis. The dose is from 10 to 20 drops in a little hot water taken twice a day. It is a nutritous cattle food, but sometimes due to production of hydrocyanic acid the spikes has a poisonous effect.

Eleusine coracana Gaertn.

(Plate 49, page 147.)

(Beng.—*Merua, Marna.*)
(Hind.—*Mandua.*)
(Nep.—*Kodo.*)

Annual grasses. Leaves often far over-topping the stem, 30—60 cm. long, 5—6 mm. broad, with compressed, broad, with compressed loose sheathes and bigules of hairs. Spikes 4—7, sub-erect, with ends or even the whole spike frequently incurved, rhachis of spikes often pubescent at the base, somewhat itrigonous, or flattened on the back, spikelets much congested, awnless, 3—5 flowered. Lemmas broader and more ovate than in *E. indica* and often with 1 to 2 nerves in the margins, variable in size and up to 5 mm. long. Grain globose, dark brown, smooth in some varieties, at other times somewhat rugose, with a depressed black hilum and slightly flattened on one side. Flowering in autumn and fruiting in cold weather.

Distribution : Cultivated widely in the hills all over Darjeeling, Sikkim and Bhutan.

Parts used : Whole plant.

Medicinal uses :

It is astringent and nutritious. Liquor is manufactured by fermenting in the usual way all over the West and East Himalayas. It is the most favourite drink among the hill men. It is stimulant, invigorating and act as a mild purgative. It is also used as a poultice.

FILICALES.

Family : POLYPODIACEAE.

Adiantum capellus-veneris Linn.

(Beng.—*Hansapadi.*)
(Hind.—*Hansaraj.*)
(Eng.—*Maidenhairfern.*)
(Sans.—*Hansa-padi.*)

Stem suberect, rather slender 4—9 in. long, polished, blackish, naked. Frond with a short terminal and numerous erecto-patent lateral branches on each side, the lowest slightly branched again ; segments ½—1 in. broad, the base cuneate, the outer edge rounded, deeply lobed from the circumference in the direction of the centre, and the lobes again bluntly crenated, lowest petiole ¼ in.—1; texture pellucido-herbaceous; rachis and both surfaces naked. Sori roundish or obreniform ; placed in roundish sinuses of the crenations.

Distribution : In the open areas and along the fringe of the lower and middle hill forests in Darjeeling and Sikkim.

Parts used : Leaves.

Medicinal uses :

Its leaves pasted with pepper is used in fever, and mixed with honey relieves cold. Decoction of the leaves cures pain in the stomach. Fresh juice taken with sugar or honey is used in irregular monthly course in women.

Polypodium quercifolium Linn.

(Beng.—*Garur.*)
(Hind.—*Kankali.*)

Rhizome stout, the scales bright brown, ¼—½ in. long, lanceolate—acuminate, the base cordate. Frond dimorphous, the barren ones sessile, 3—12 in. long, 2—6 in. broad, brown, rigid, bluntly lobed often halfway down, the fertile ones long stalked, 2—3 ft. long, 1 ft. or more broad, cut down nearly to the rachis into entire erecto-patent lobes 6—9 in. long, ½—1½ in. broad ; texture rigid ; both sides naked ; main veins distinct to the edge, with 4—6 quadrangular areolae between them between the midrib and edge, enclosing each two large sori and copious lesser areolae.

Distribution : Grow as epiphytic often clasping stems of trees in a circle in the lower and middle hill forests in Darjeeling and Sikkim abundant. (See Photo II.)

Parts used : Leaves.

Medicinal uses :

It is used in liver trouble and dyspepsia.

EQUISETALES.

Family : EQUISETACEAE.

Equisetum debile Roxb.

(Beng.—*Ashalaj.*)
(Eng.—*Horse-tails.*)
(Nep.—*Kurkure jhar.*)

Barren and fertile stem alike, generally 1—4 ft. long, erect, simple or with whorl or branches ; ribs 8—20 ; sheaths tight ¼—¾ in. long, including the lanceolate, acuminate, deciduous tooth. Spike 1—6 in. long, sub-sessile, dense, oblong, brown. Cones are formed in spring and summer.

Distribution : Tropical Asia from Himalayas and Ceylon. It grows abundantly round about Darjeeling, all over Sikkim, very common in rather moist places along the sides of waterfall, springs and rivers.

Parts used : Entire herb.

Medicinal uses :

It has a cooling effect in Gonorrhœa.

LYCOPODIALES.

Family : LYCOPODIACEAE.

Lycopodium clavatum Linn.

(Plate 50, page 148.)

(Beng.—*Lati Moss.*)
(Eng.—*Clubmoss.*)

Main stem trailing along the hill sides or on ground ; lower branches often ½ ft. long, apparently dicholomous, but really monopodial, roots dicholomously branched. Leaves lanceolate with distinct awn, green, firm, often denticulate, crowed on the stem; mid-rib prominent. Spikes 1—3 on a peduncled with distant adpressed bracts, cylindrical, 1—6 in. long; bracts broad, ovate. Cones are formed in spring and summer.

Distribution : Widely distributed all over the Darjeeling and Sikkim. Very common in the district of Darjeeling and Sikkim trailing over the rocky hill-sides.

Parts used : Plant and spores.

Medicinal uses :

It is diuretic, demulcent, anti-septic, emmenagogue and used in rheumatism and pulmonary disorders. It is also a remedy for internal use in urinary disorders, catarrhal cystitis and in chronic kidney diseases causing pain in kidneys, ureters and dyspepsia and catarrhal gastritis. It is also used to stop haemorrhage after child-birth.

MUSCI.

Family : POLYTRICHACEAE.

Polytrichum juniperinum Willd.

(Beng.—*Sikhamoss.*)

Stem slender unbranched, 2—3 in. long with small awl-shaped red-tipped leaves overlapping and crowded in the upper part of the stem. Capsule cylindrical with 4 angles. Capsules are formed in autumn.

Distribution : Kashmir, Hazara district, Kagan valley, Bhutan from 8—13,000 ft.; found near Senchal (Darjeeling district), alt. 8,000 ft.

Parts used :

Medicinal uses :

It is a diuretic and very valuable remedy against dropsy, urinary obstruction and suppression.

LICHENES.

Family : PELTIGERACEAE.

Peltigera canina Willd.

(Beng.—*Patamataghosa.*)

Thallus foliaceous, fairly large, thick, sub-ascending, lobate ; lobes divided in a digitate manner ; margin sinuate and partly crenulate ; surface slightly pruinose, bluish green when moist; beneath whitish with prominent pale brown nerves, glaucous, grey or fawn-coloured when dry.

Distribution : Among mosses on the sides of the mountains in moist shady places. All over Darjeeling and Sikkim, alt. 4—7,000 ft. Ghoom Road, Victoria Falls.

Parts used : Whole plant.

Medicinal uses :

It yields an efficacious medicine used in hydrophobia and jaundice.

Family : STICTACEAE.

Lobaria pulmonaria Hoffm.

(Beng.—*Golmataghosa.*)

Thallus foliose, attached to the substratum more or less growing centrally and spreading freely on all sides, rigid and shining, olive green when moist and dark brown when dry. Surface pitted reticulate and profusely sorediferous on the ridges.

Distribution : On stones near water or on bark of tree trunks. Darjeeling (Tiger Hill) and Sikkim, alt. 6—7,000 ft., Assam.

Parts used : Whole plant.

Medicinal uses :

Drug prepared from this lichen is used for strengthening hair, remedy for lung troubles and for hæmorrhages and asthma. It is also used for perfumes and cosmetics. The hill men use it for curing eczema on the head and cleaning hairs, also used for brewing and tanning.

Family : USNACEAE.

Usnea sikkimensis Biswas. Sp. Nov.

(Beng.—*Darimataghosa.*)

Thallus fruticosa, sub-erecta, pendulosa, et fibrillosa, basi adfixa. Spermagones minute, circularis, ranuli afixa.

(Biswas : The Lichen Flora of India, No. 614, P. 110. Jour. As. Soc. of Bengal, Vol. XIII, No. 2, 1947.)

Thallus fruticose, sub-erect or pendulous, attached by a basal sheath, branched, fibrillose. Spermogones occur as minute dots on the surface of the drooping branches.

Distribution : Tiger Hill, Darjeeling, alt. 7,852 ft. Commonly found growing on branches of trees in Darjeeling and Sikkim Himalaya.

Parts used : Whole plant.

Medicinal uses :

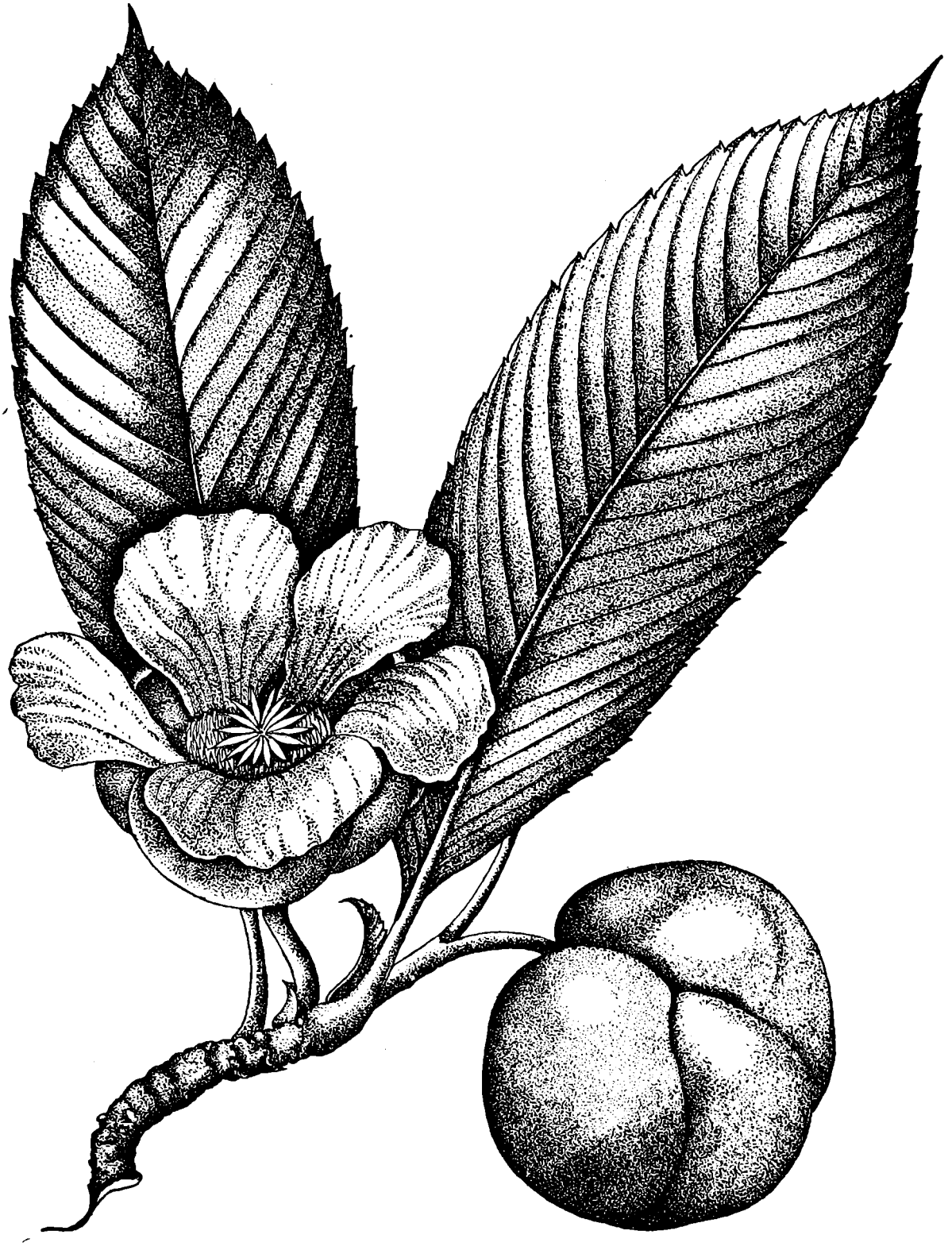
The drug prepared from this lichen as powder (hair-powder) is used to strengthen hair. It acts as a remedy against lung troubles, haemorrhage and asthma.

This is a very distinct species differing from the rest of *usnea* as described here for the first time as new species.

PLATE 1

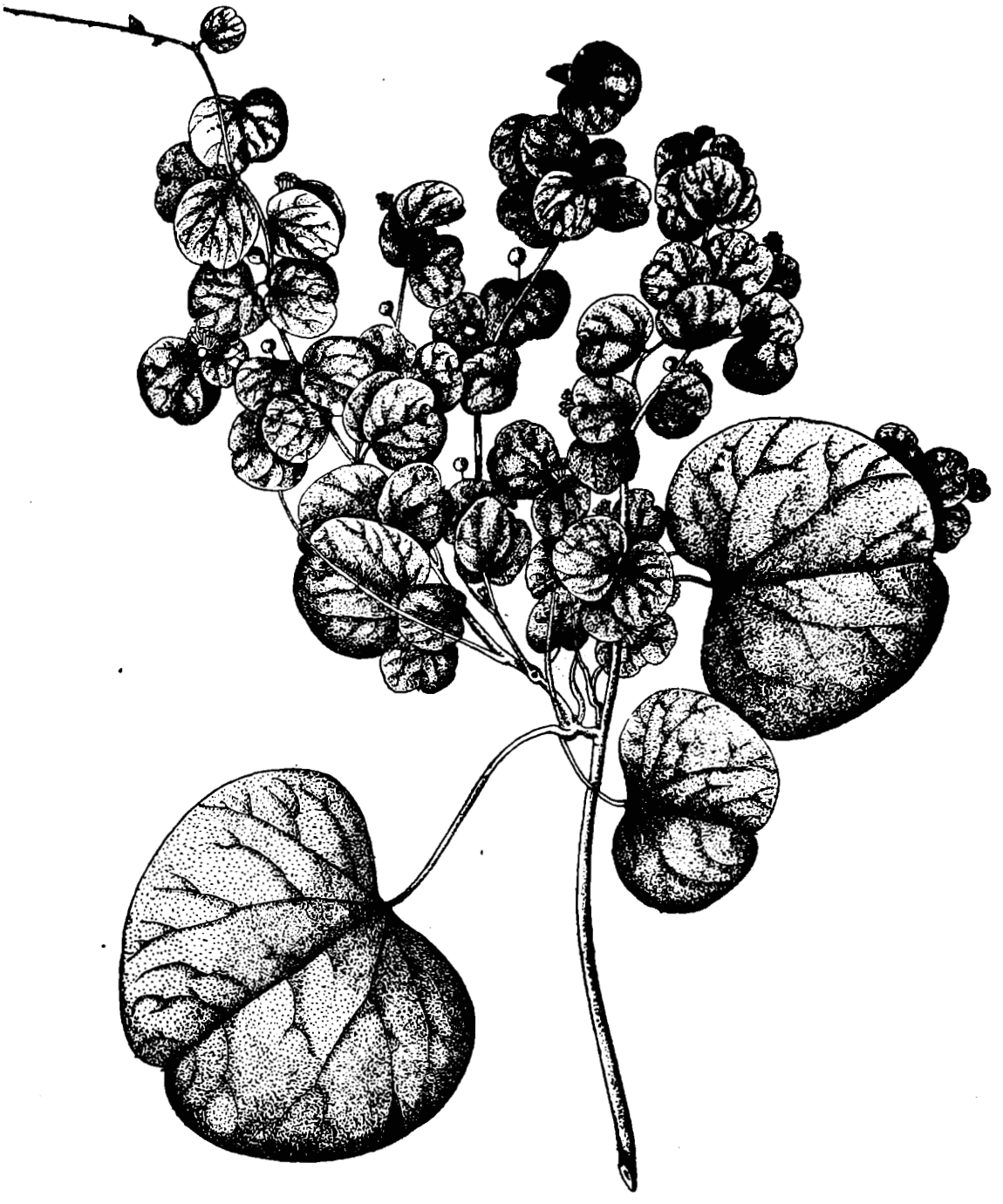
Aconitum ferox Wall

PLATE 2



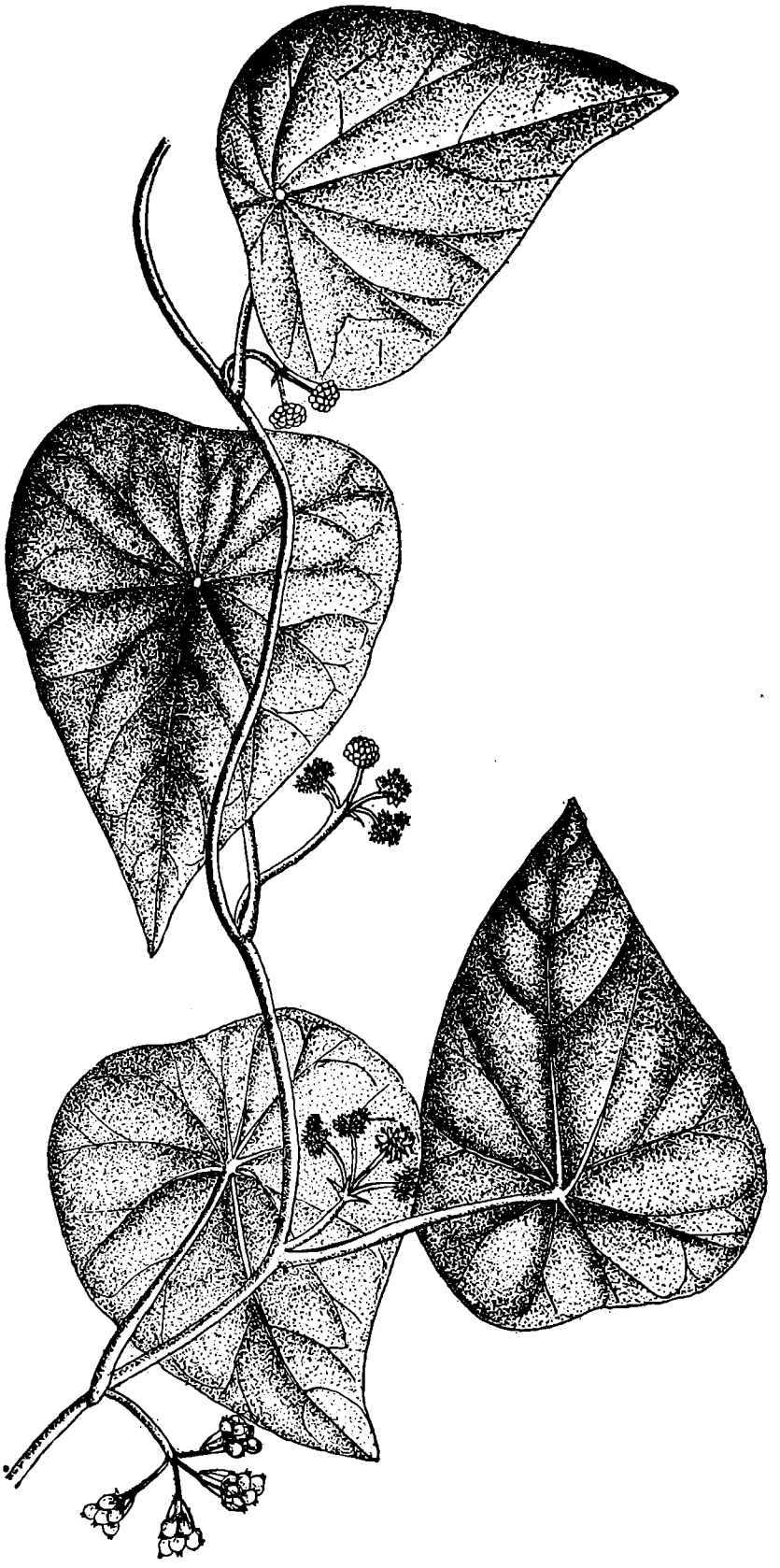
Dillenia indica Linn.

PLATE 3



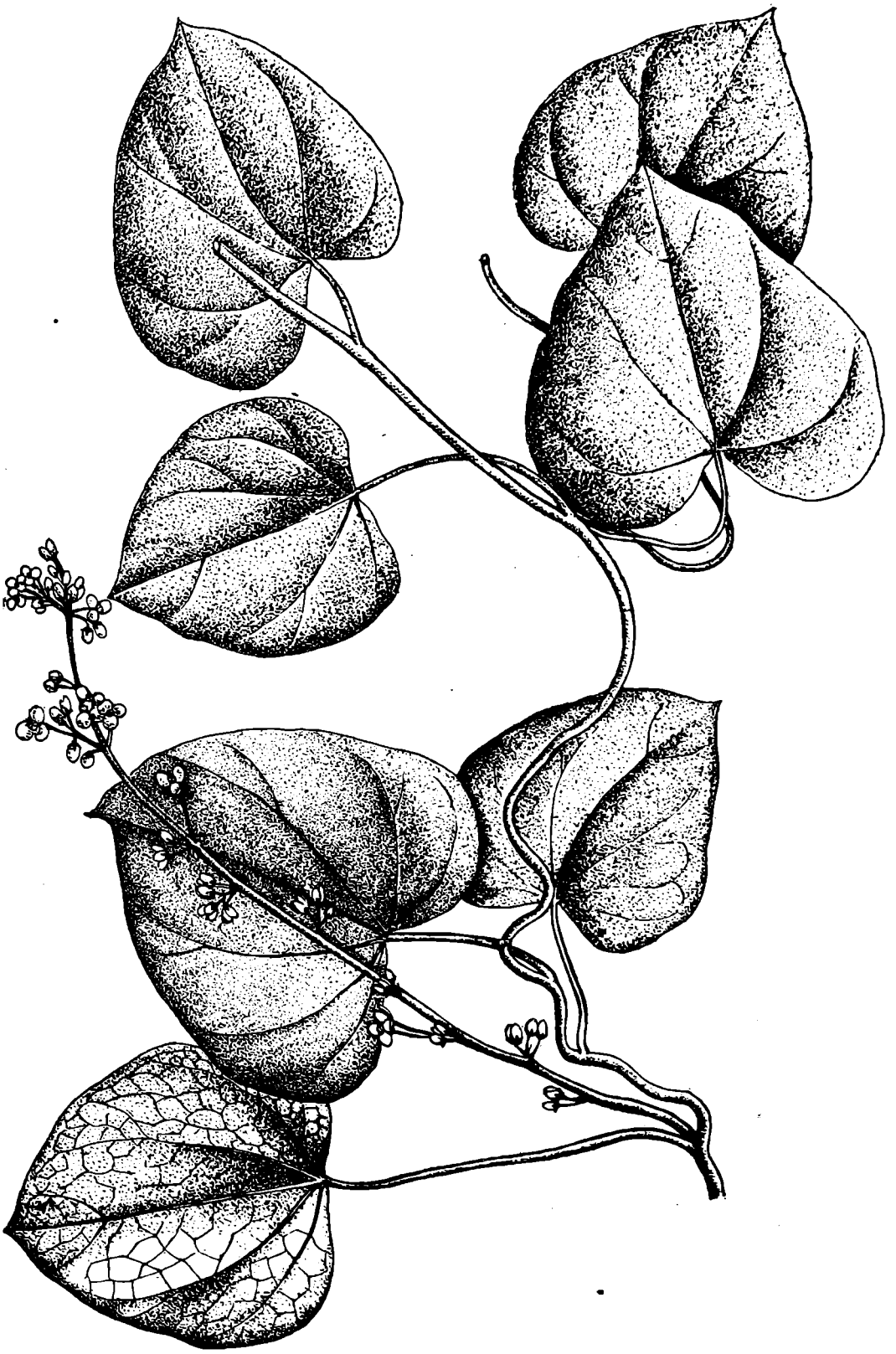
Cissampelos pareira Linn.

PLATE 4



Stephania hernandifolia Walp.

PLATE 5

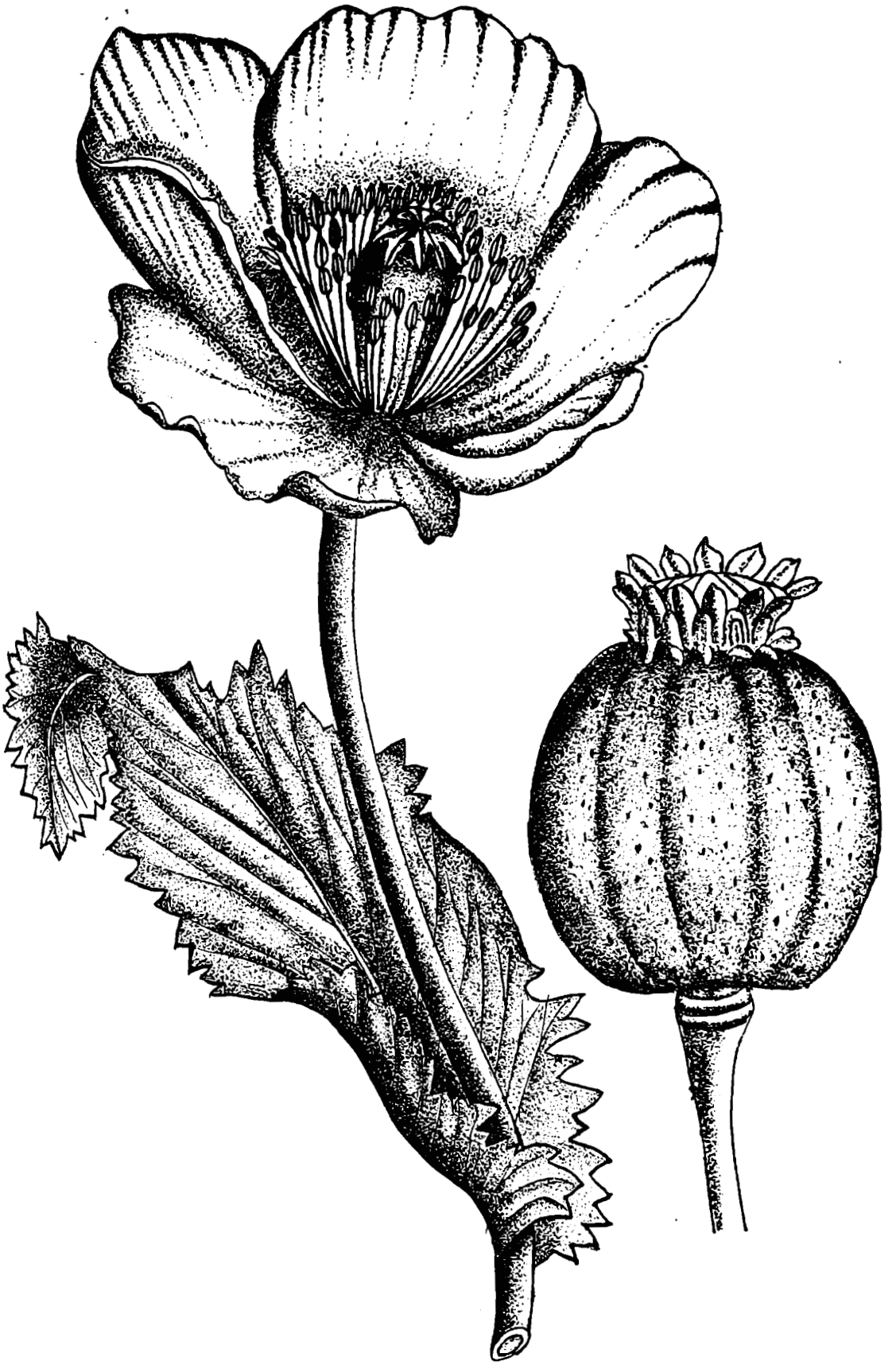


Tinospora cordifolia Miers.

PLATE 6

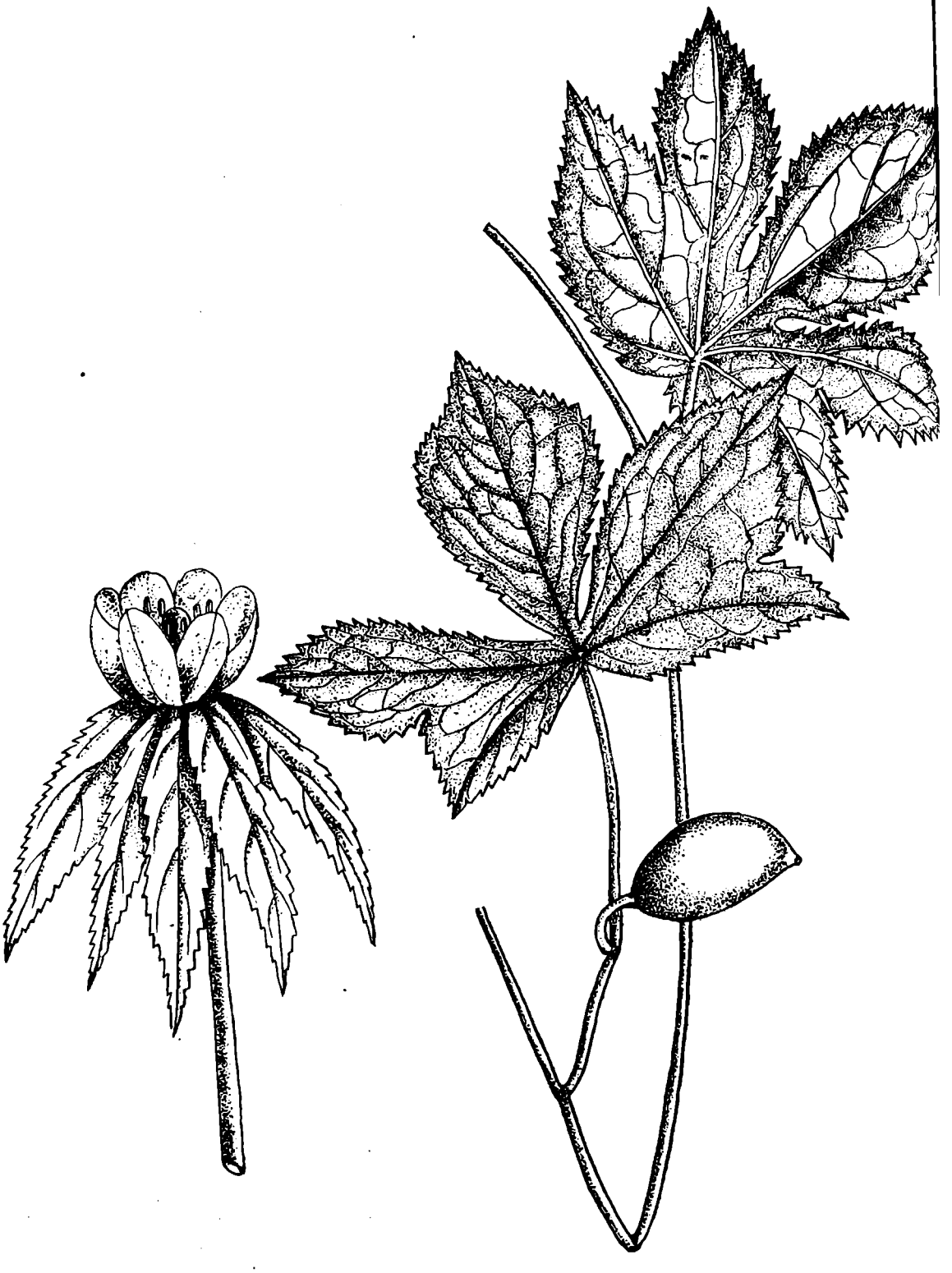
Berberis aristata DC.

PLATE 7



Papaver somniferum Linn.

PLATE 8

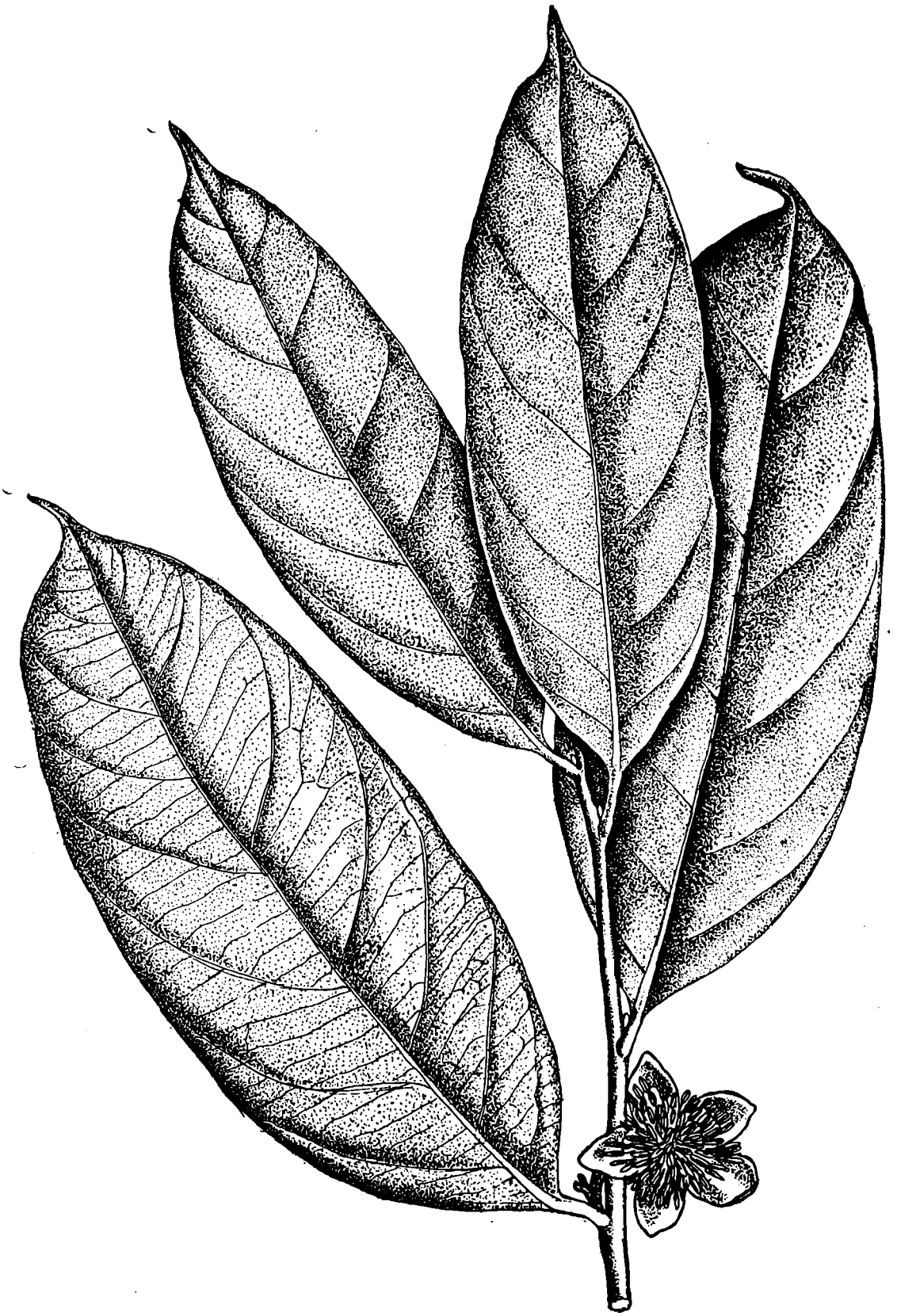


Podophyllum emodi Wall.

PLATE 9

Dicentra thalictrifolia Hf. & T.

PLATE 10



Gynocardia odorata R. Br.

PLATE 11

Polygala arillata Ham.

PLATE 12

Drymaria cordata Willd.

PLATE 13

Hypericum patulum Linn.

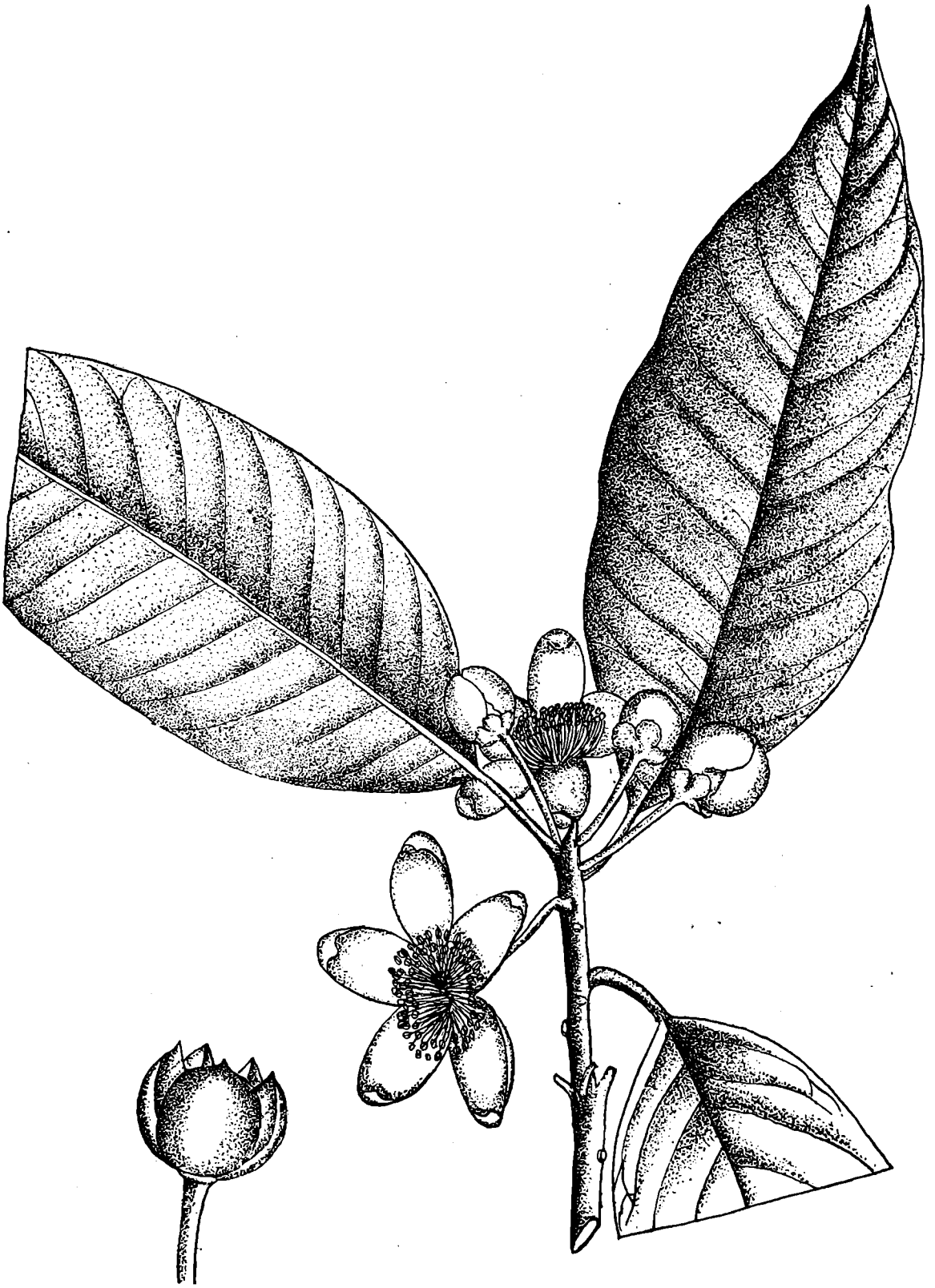
PLATE 14

Garcinia Zanthochymus Hook.f.

PLATE 15

Mesua ferrea Linn.

PLATE 16



Schima wallichii Choisy.

PLATE 17

Abutilon indicum G. Don.

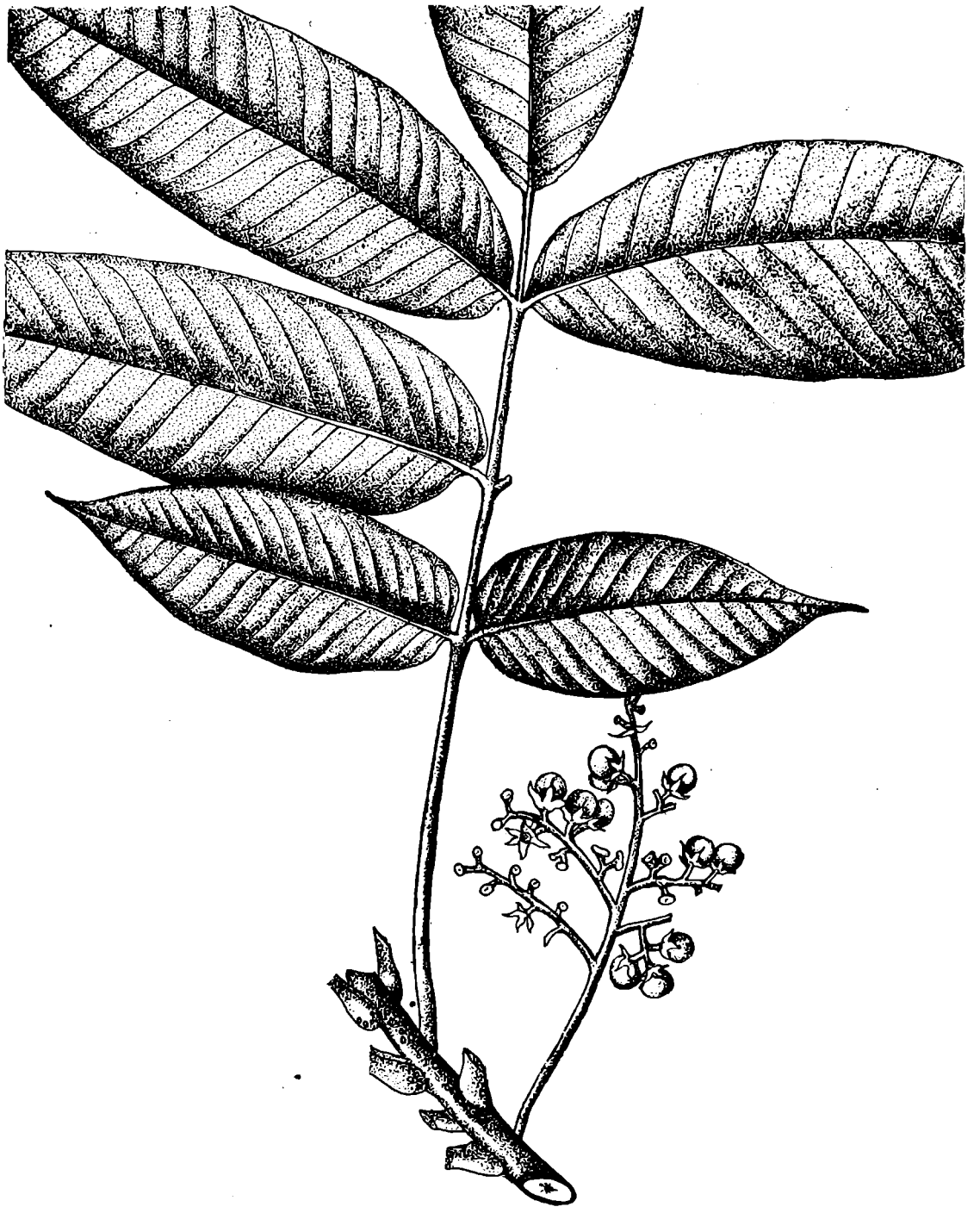
PLATE 18

Cedrela toona Roxb.

PLATE 19

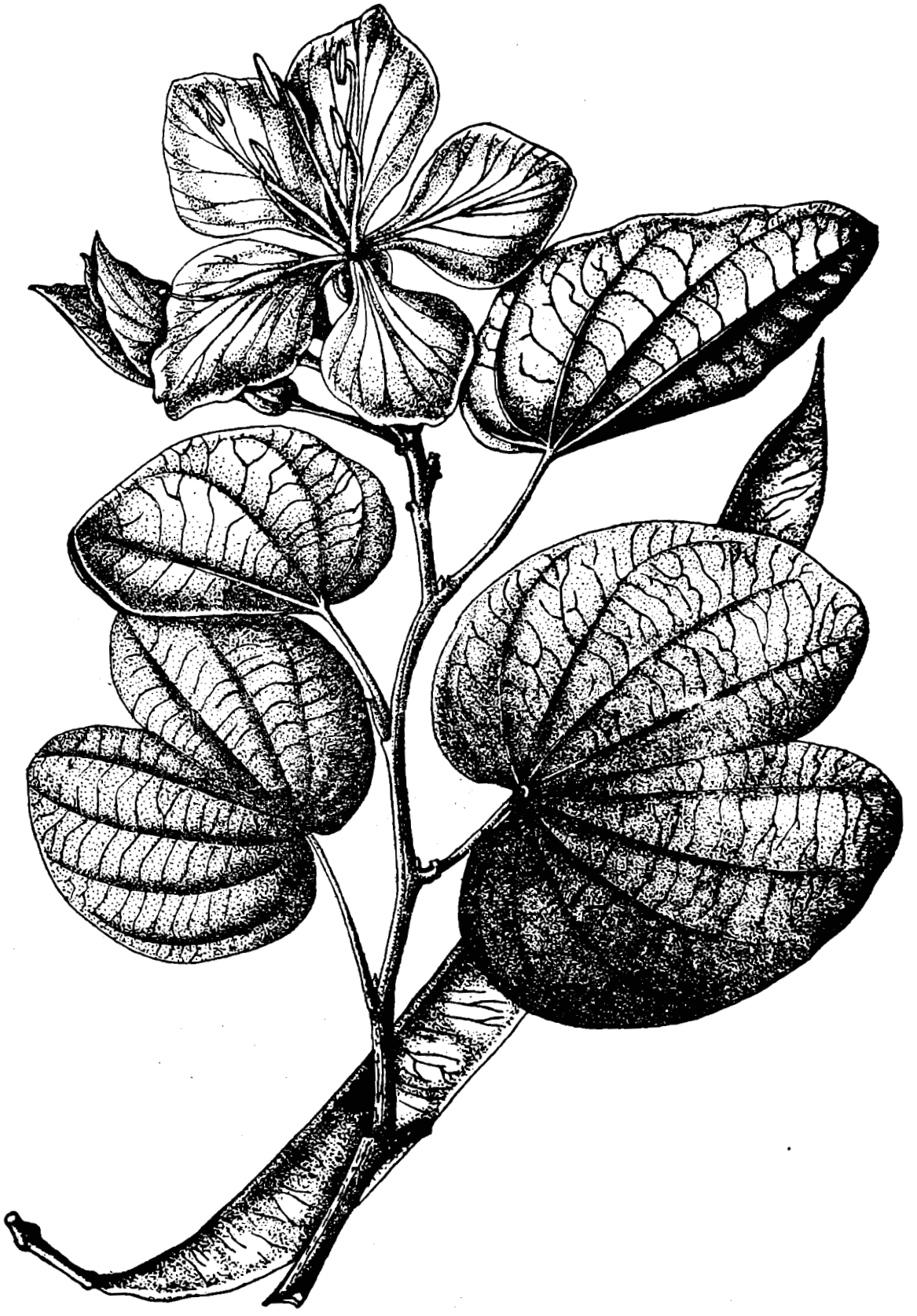
Celastrus paniculata Willd.

PLATE 20



Rhus insignis Hook.f.

PLATE 21



Bauhinia variegata Linn.

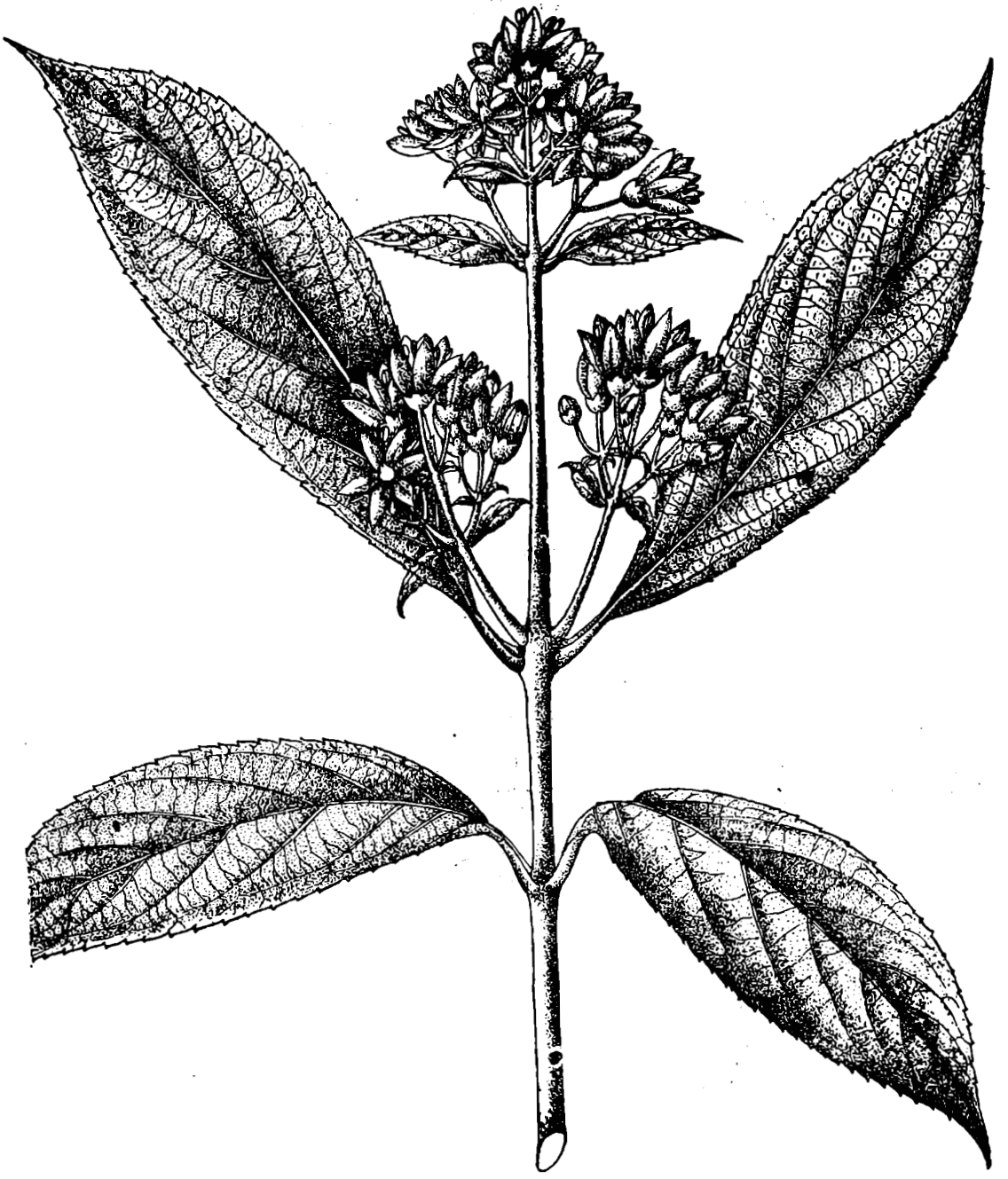
PLATE 22

Flemingia congesta Roxb.

PLATE 23

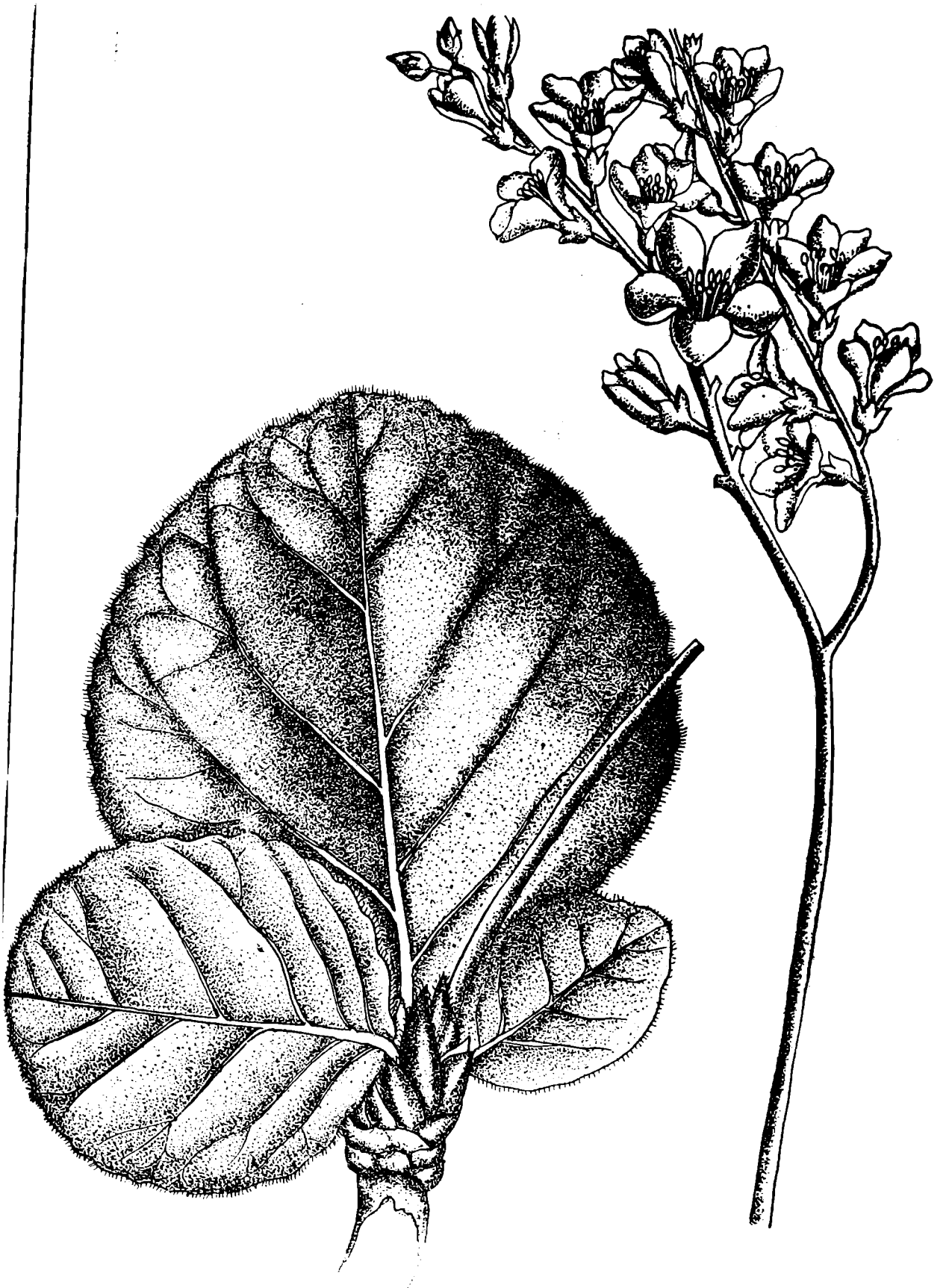
Prunus puddum Roxb.

PLATE 24



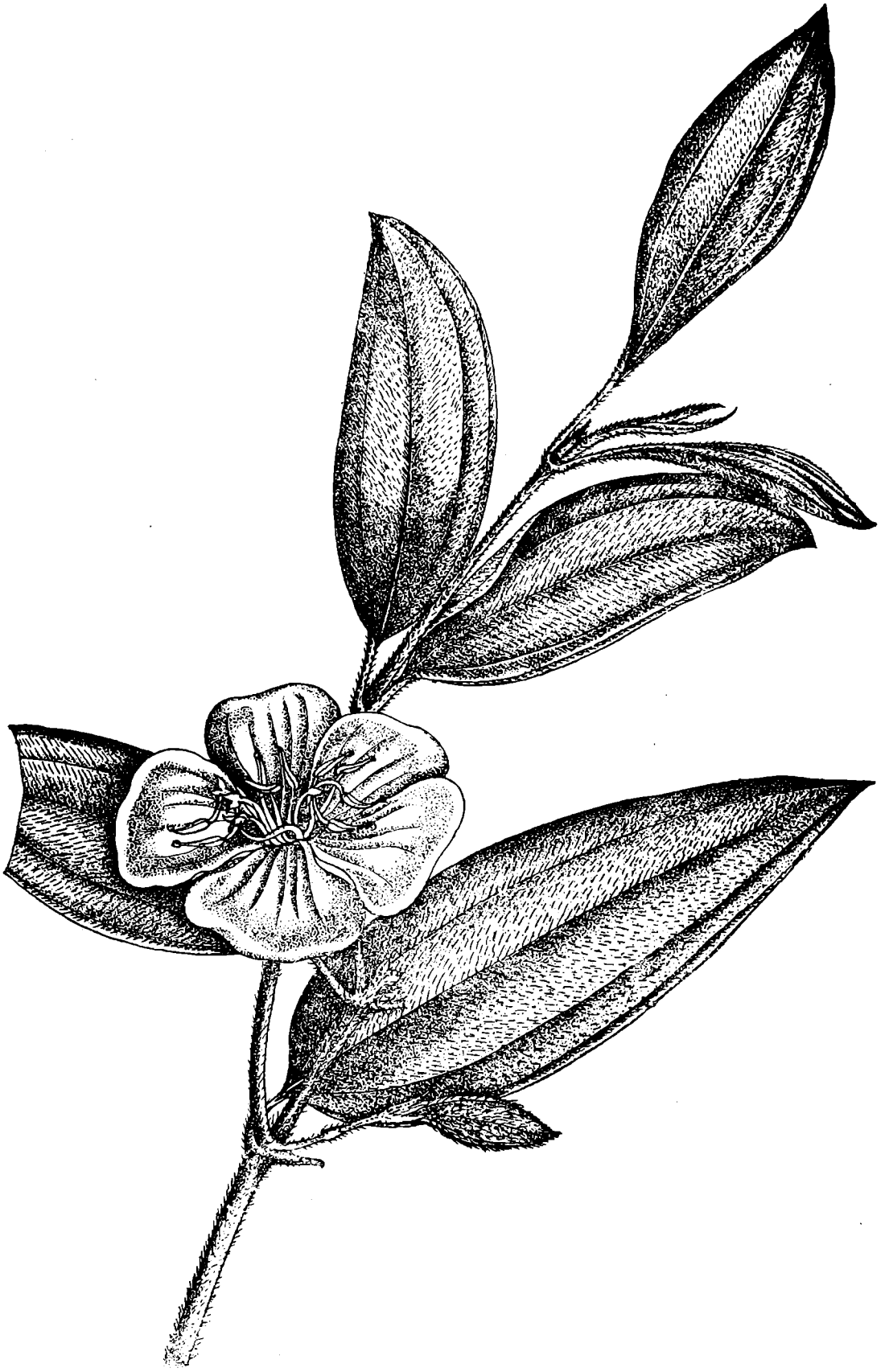
Dichroa febrifuga **Lour.**

PLATE 25



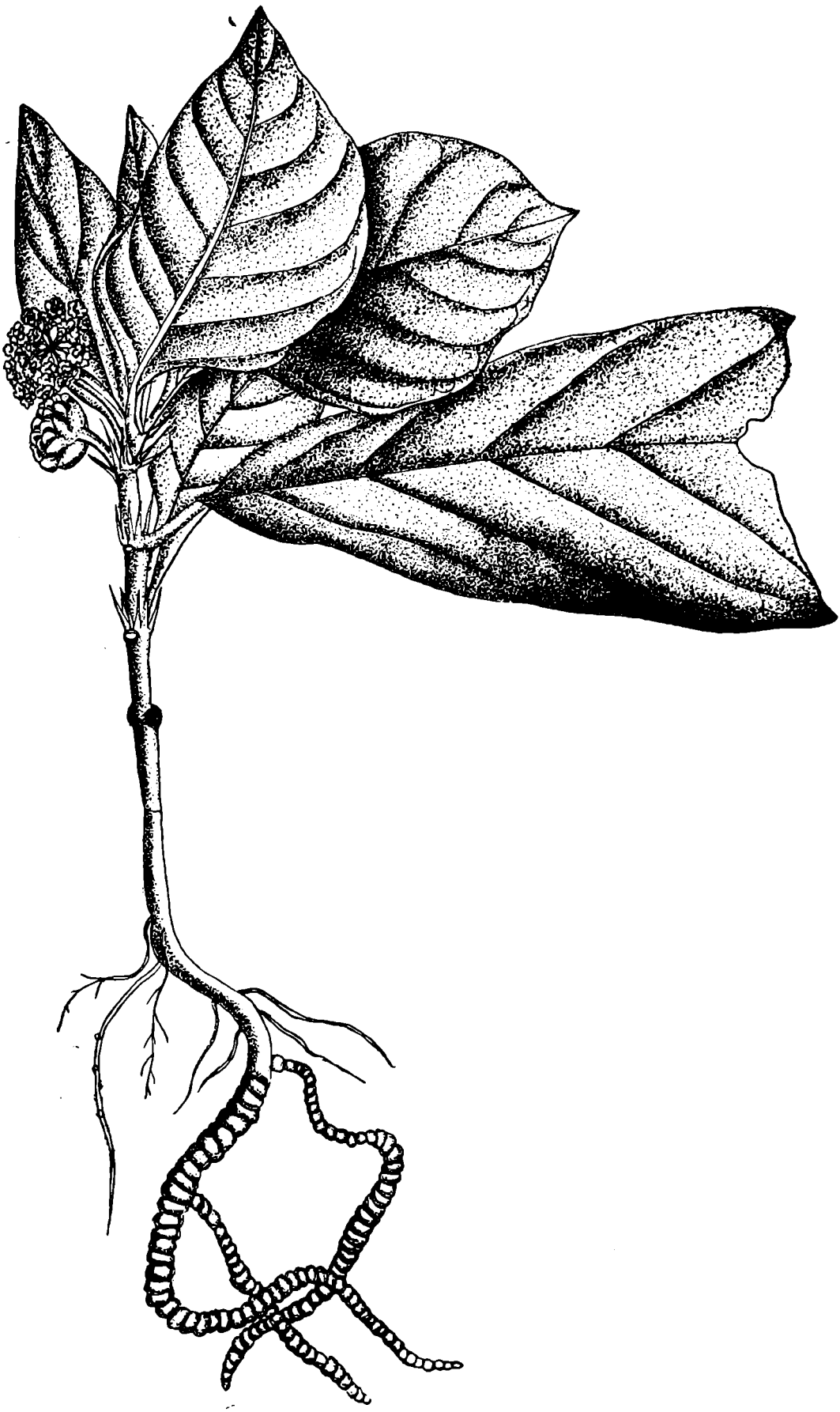
Saxifraga ligulata Wall.

PLATE 26



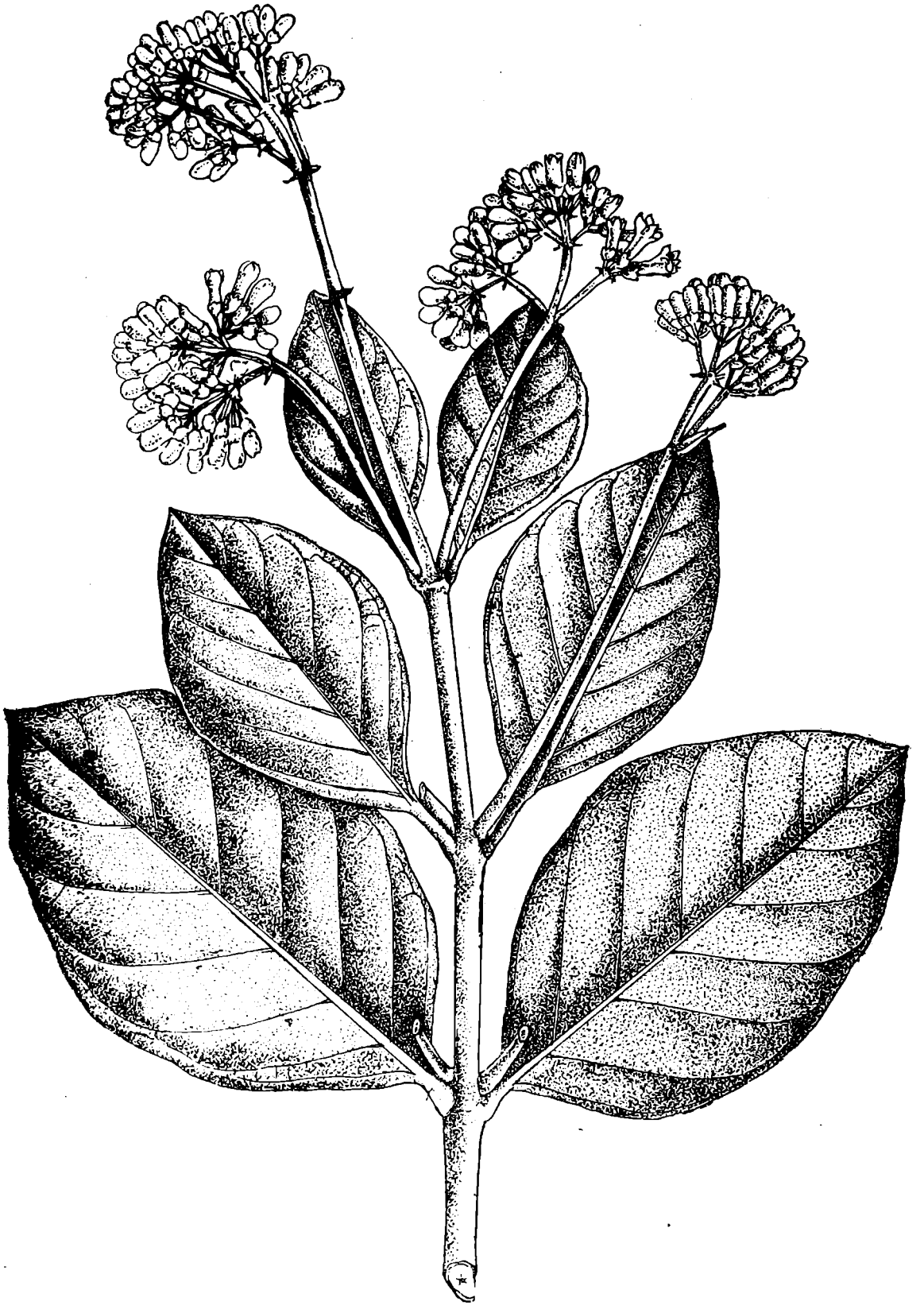
Melastoma malabathricum Linn.

PLATE 27



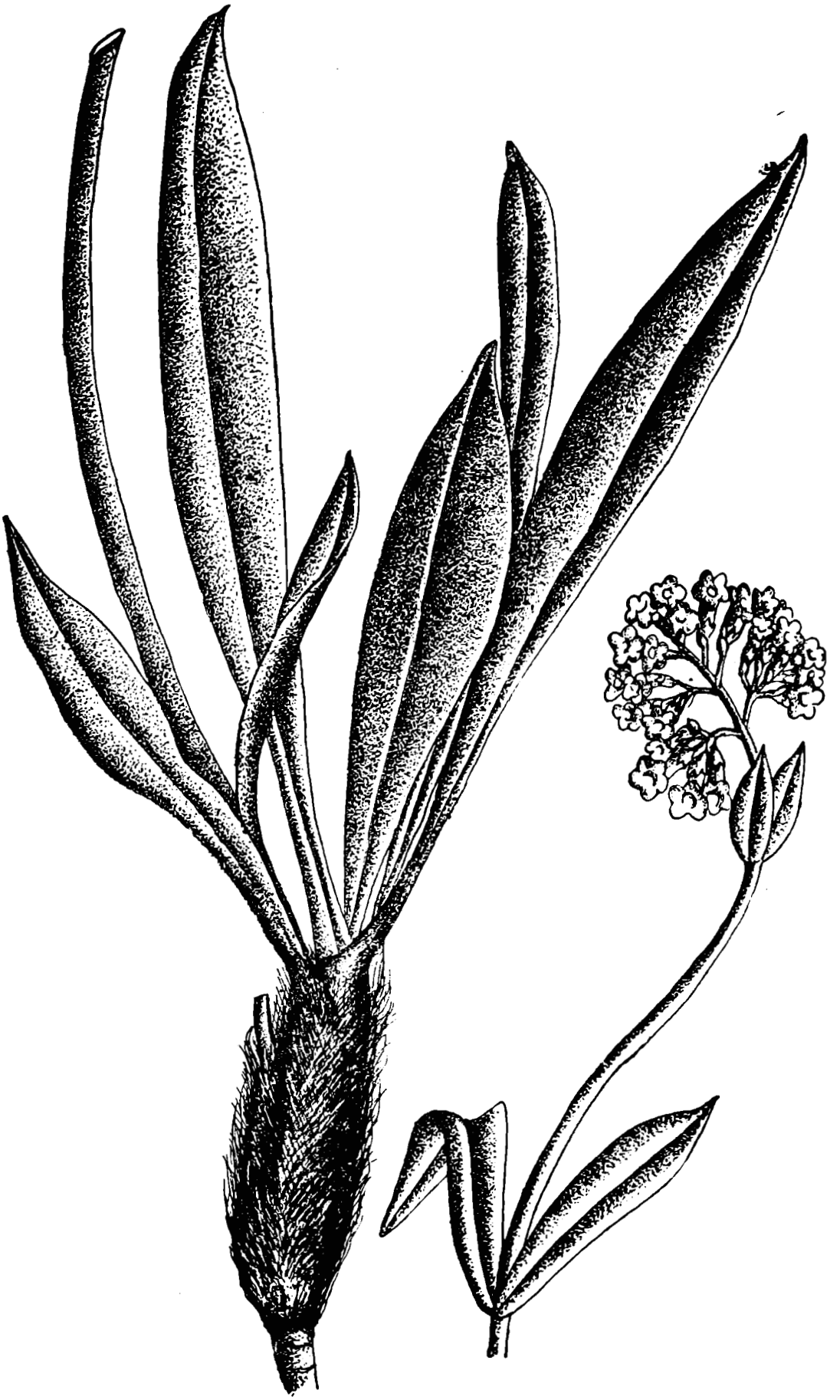
Cephaelis ipecacuanha Rich.

PLATE 28



Cinchona officinalis Linn.

PLATE 29



Nardostachys jatamansi DC.

PLATE 30

Artemisia vulgaris Linn.

PLATE 31

Rhododendron campanulatum D. Don.

PLATE 32

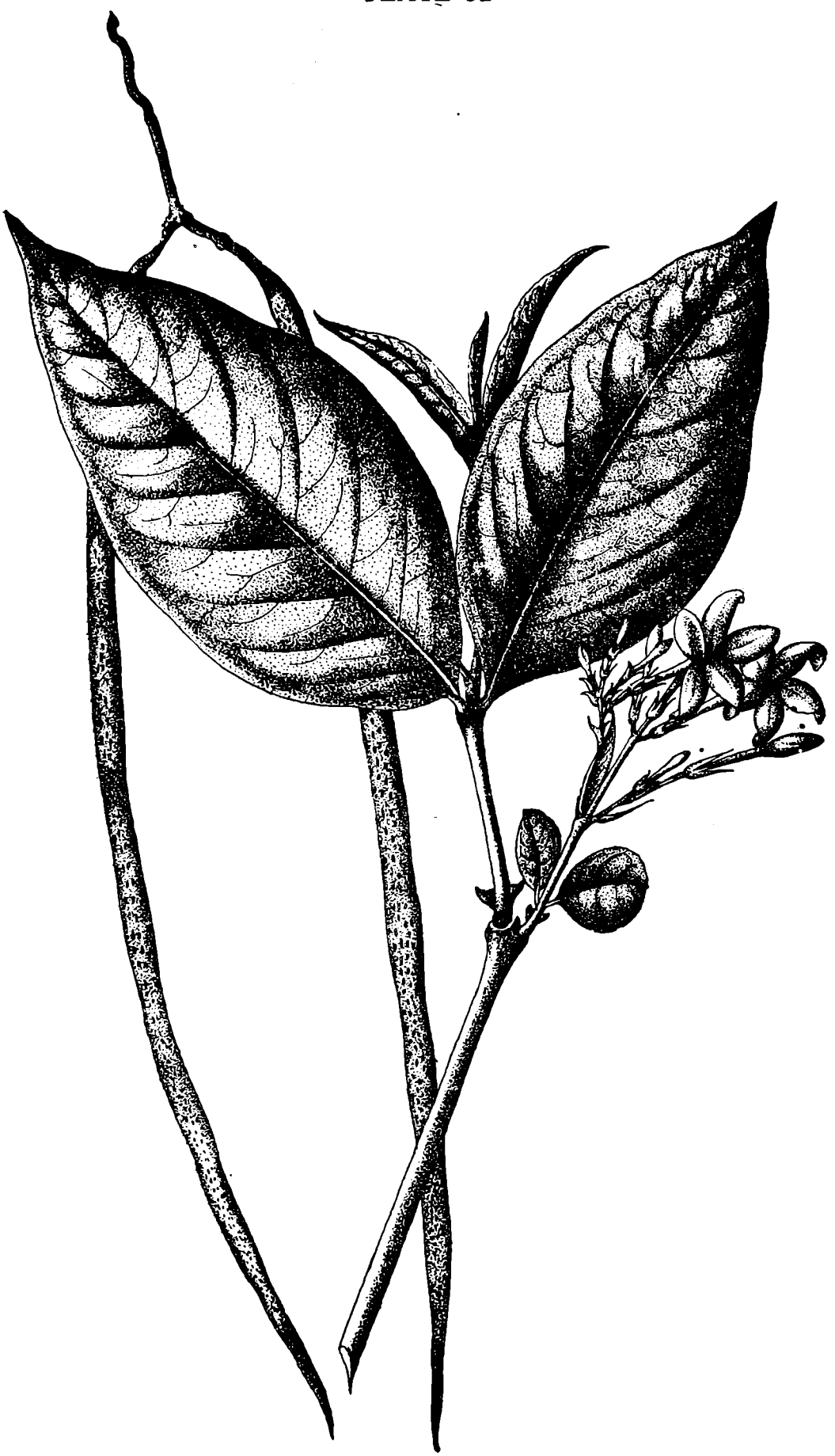
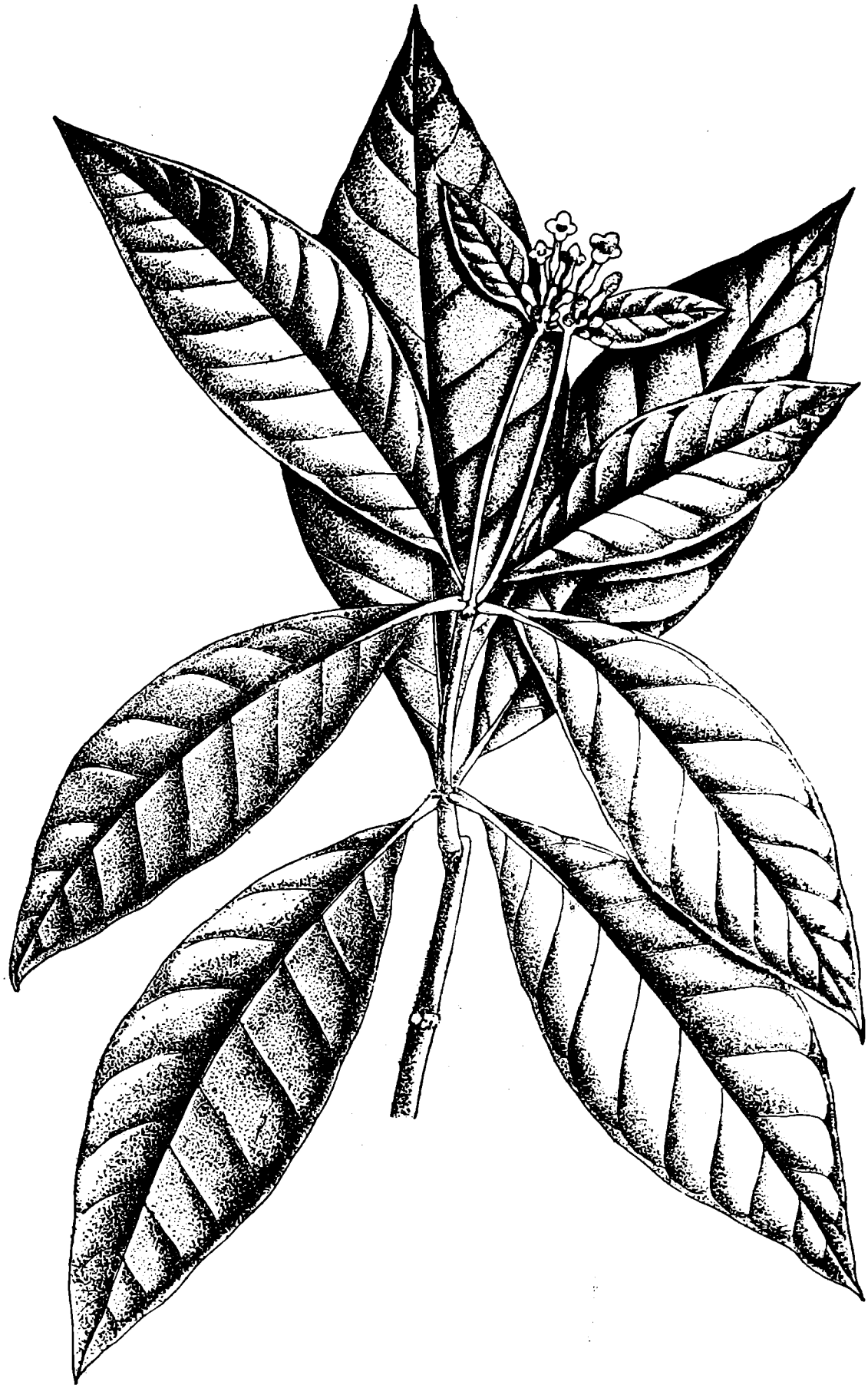
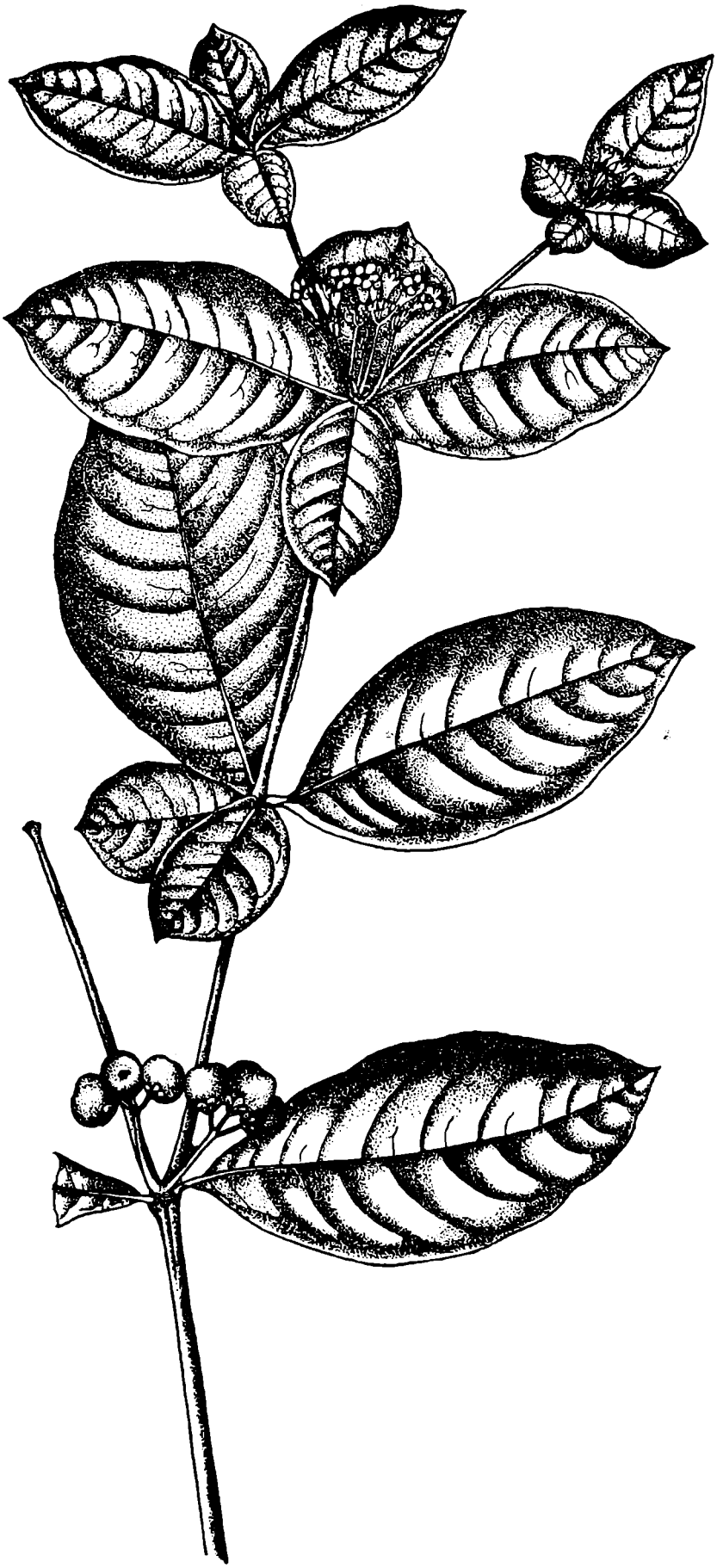


PLATE 33



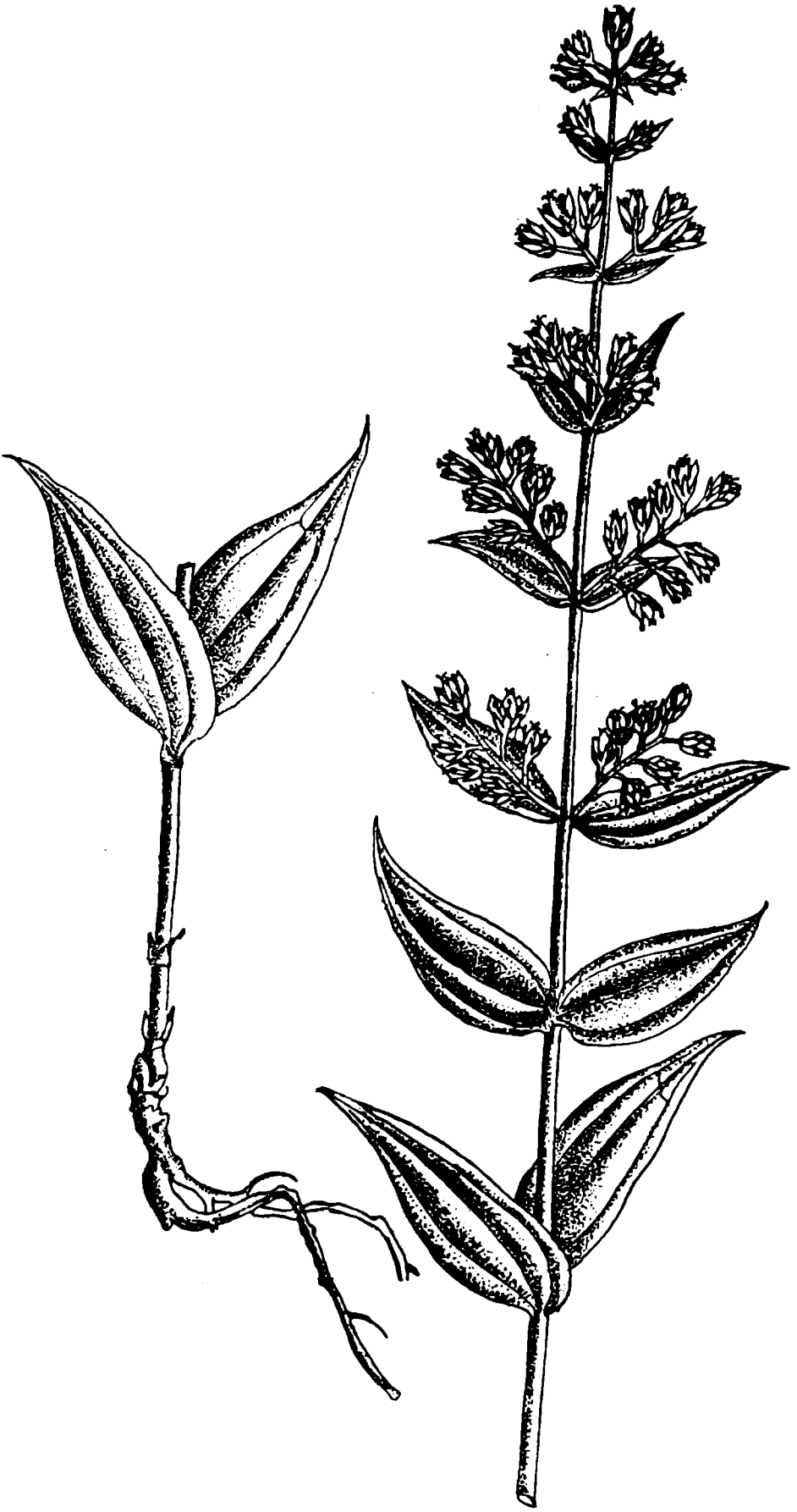
Rauvolfia serpentina Benth.

PLATE 34



Rauvolfia canescens Linn.

PLATE 35



Swertia chirata Ham.

PLATE 36

Hyoscyamus niger Linn.

PLATE 37

Picrorhiza kurroon Benth.

PLATE 38

Adhatoda vasica Nees

PLATE 39

Mentha viridis Linn.

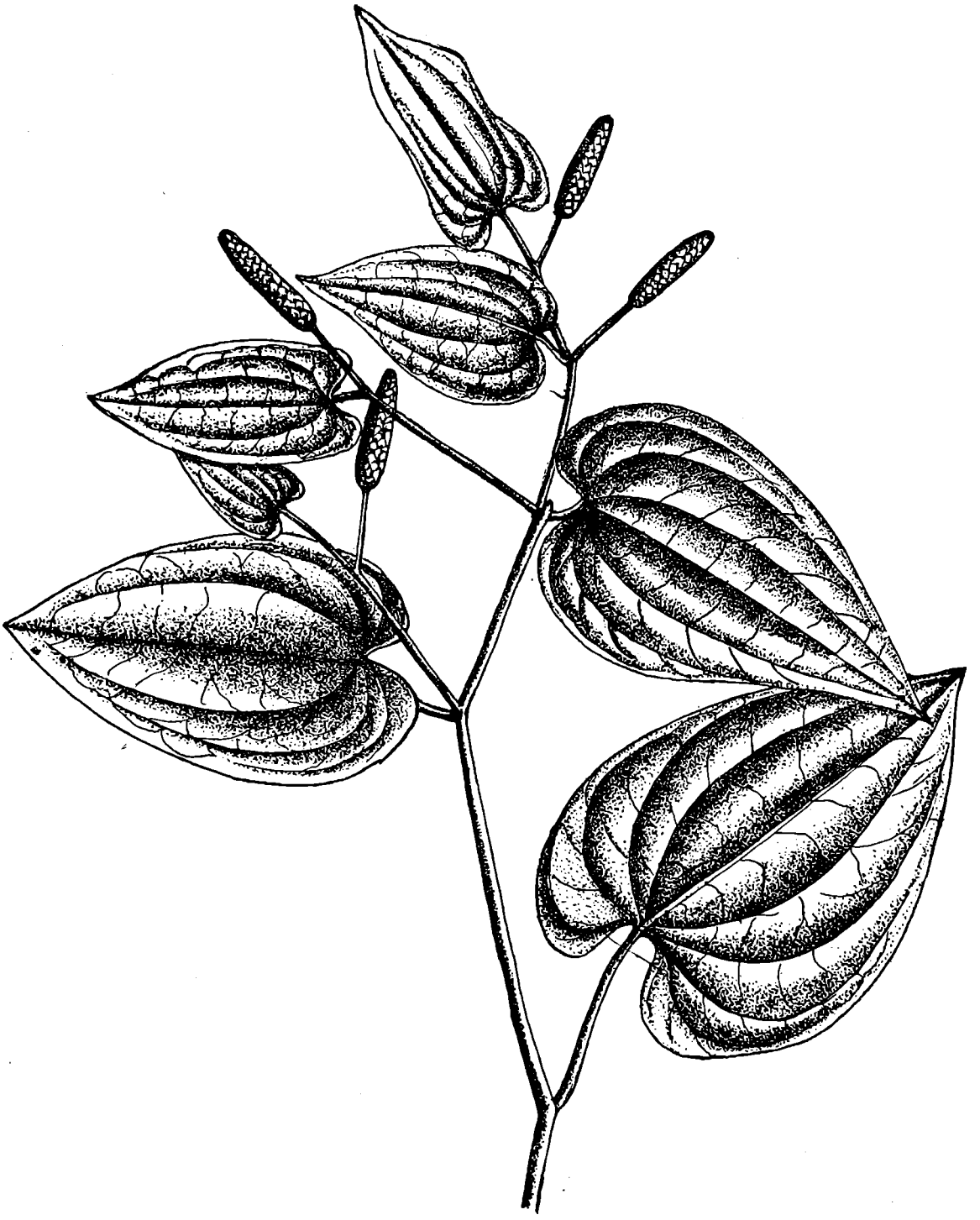
PLATE 40

Achyranthes aspera Linn.

PLATE 41

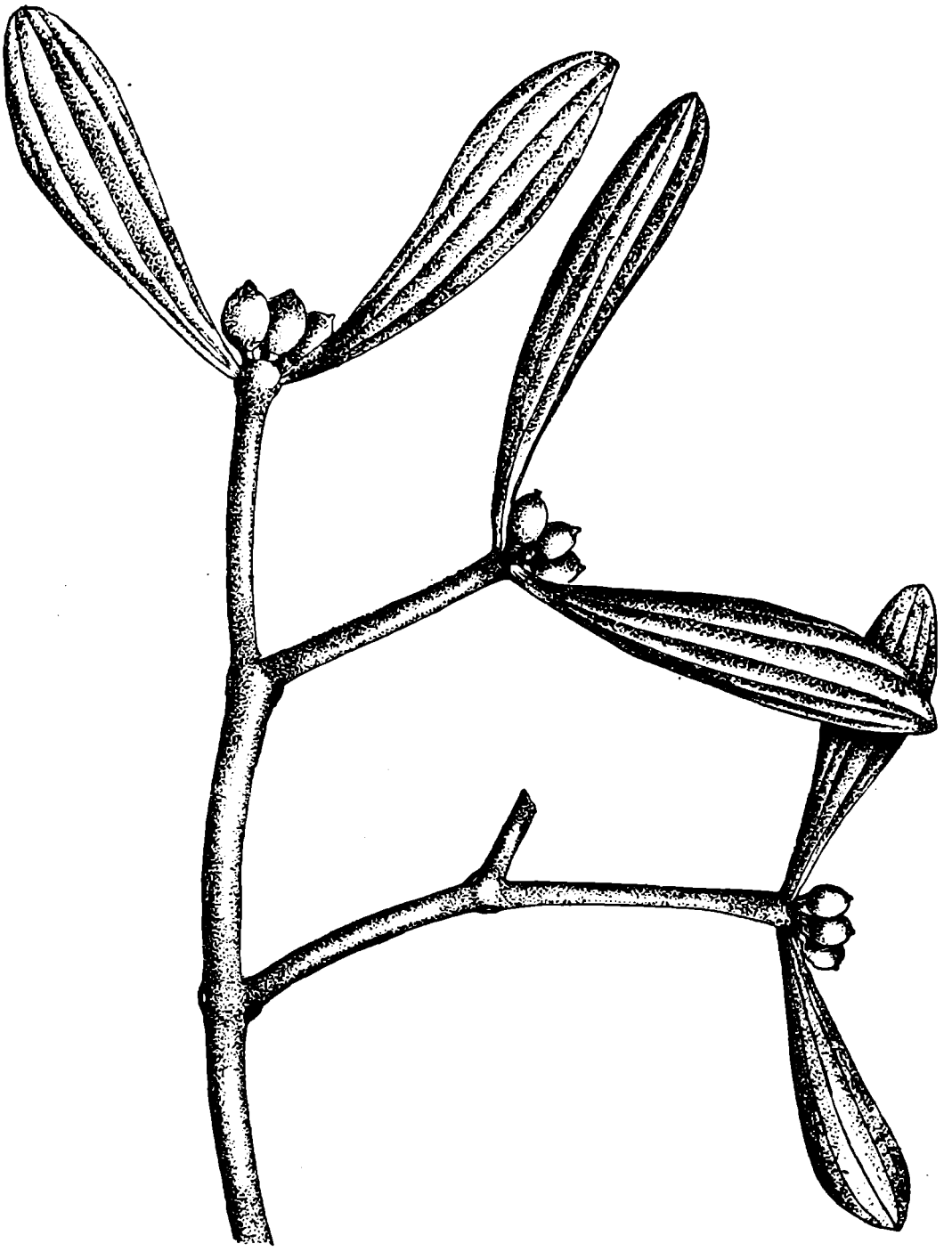
Rheum emodi Wall.

PLATE 42



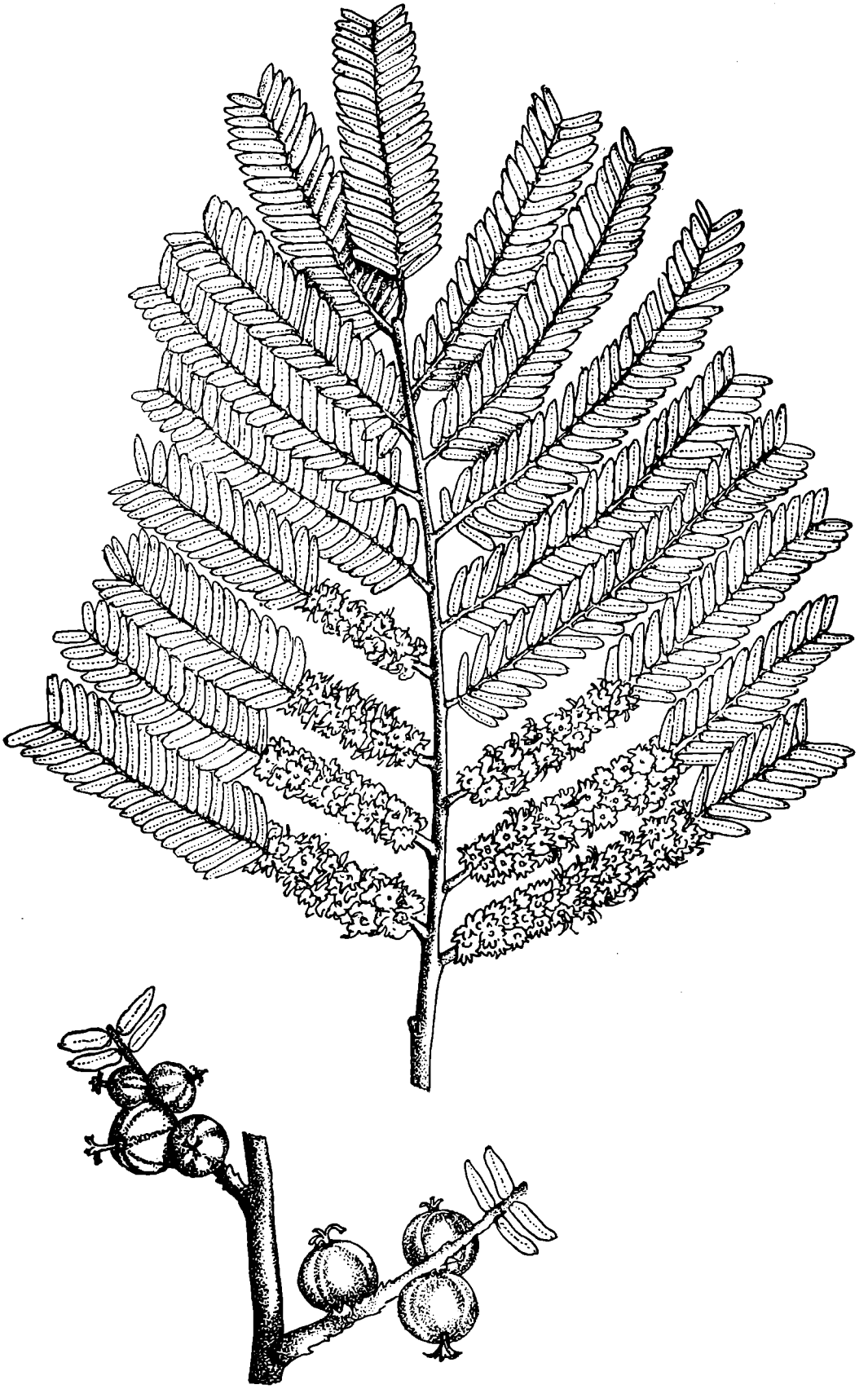
Piper longum Linn.

PLATE 43



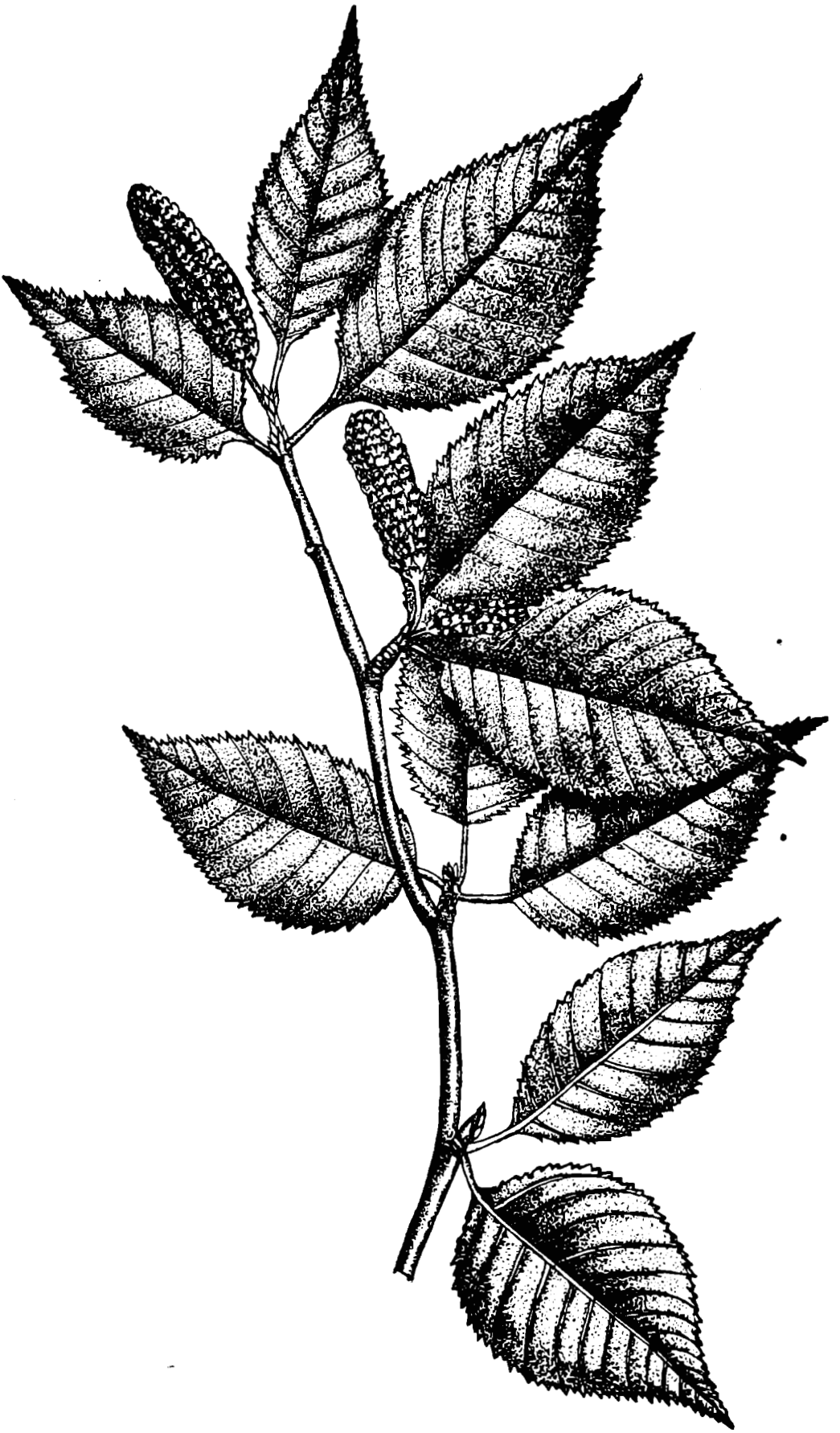
Viscum album Linn.

PLATE 44



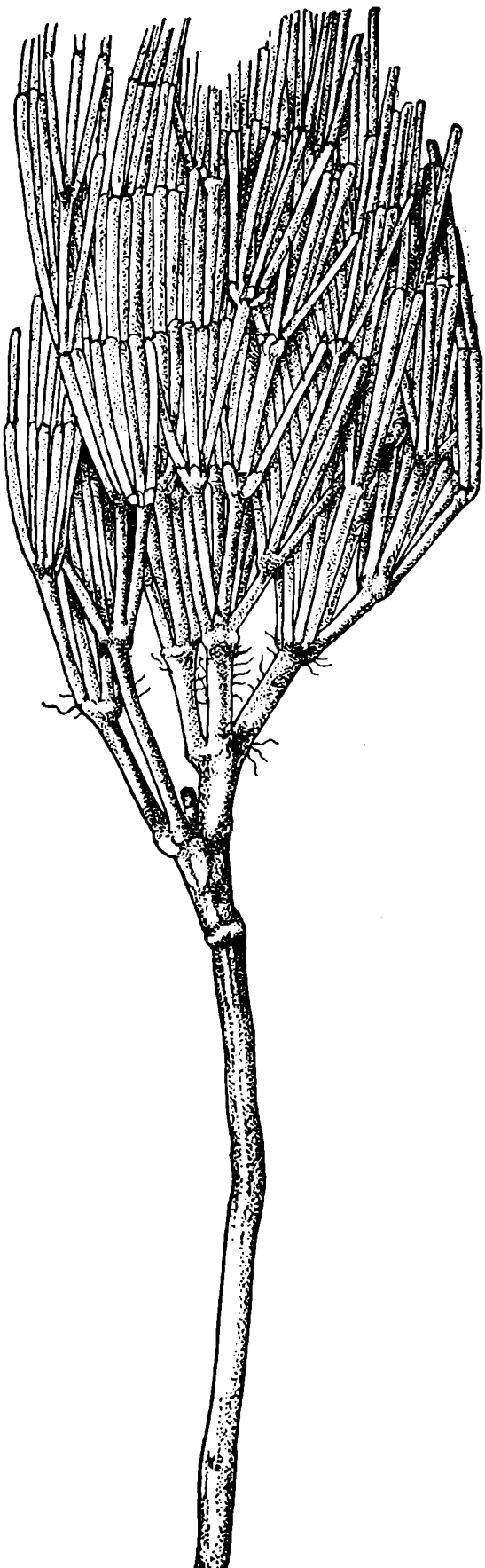
Phyllanthus emblica Linn.

PLATE 45



Betula utilis Don.

PLATE 46

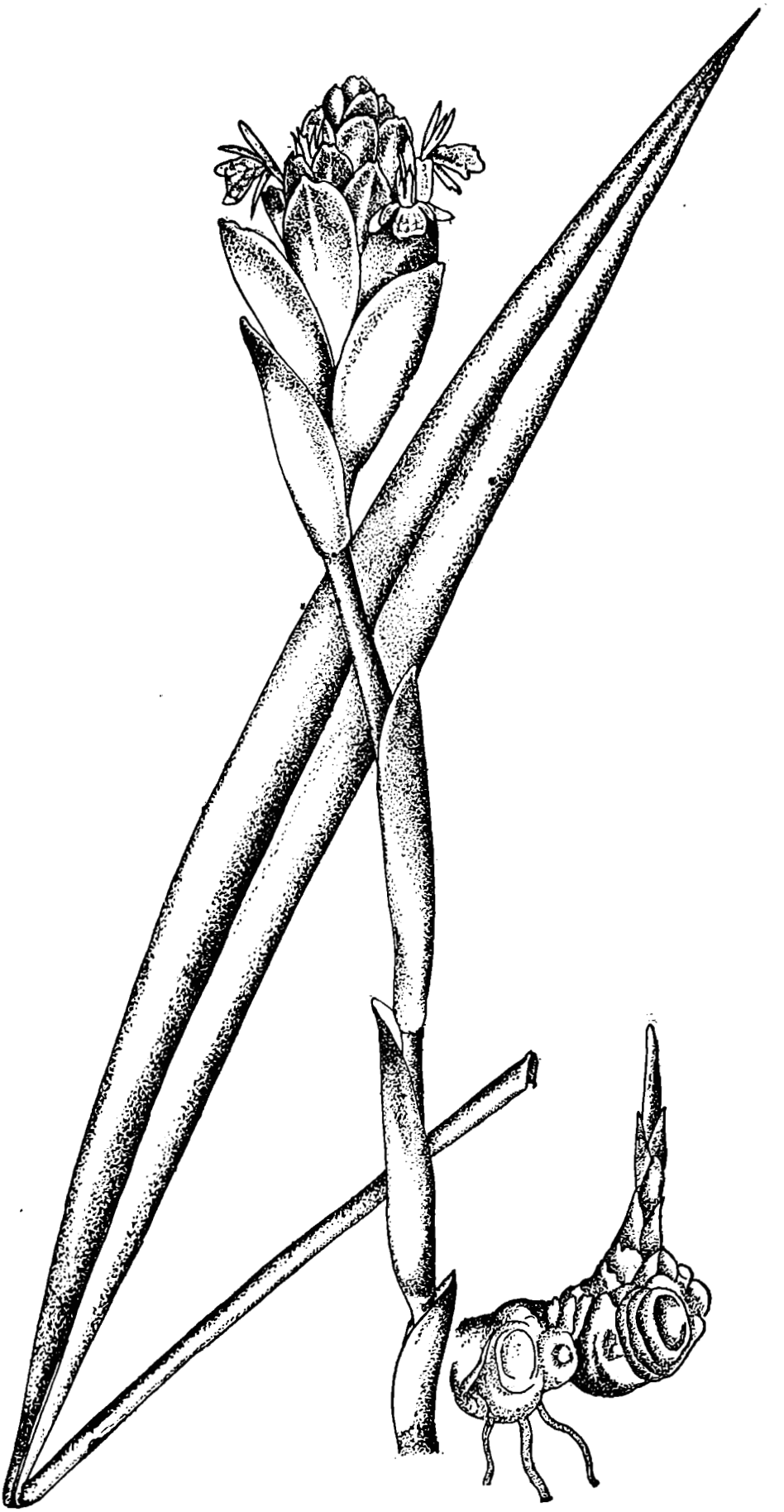


Ephedra sexatilis Royle, var. *Sikkimensis* (Stapf.) Florin.

PLATE 47

Amomum aromaticum Roxb.

PLATE 48



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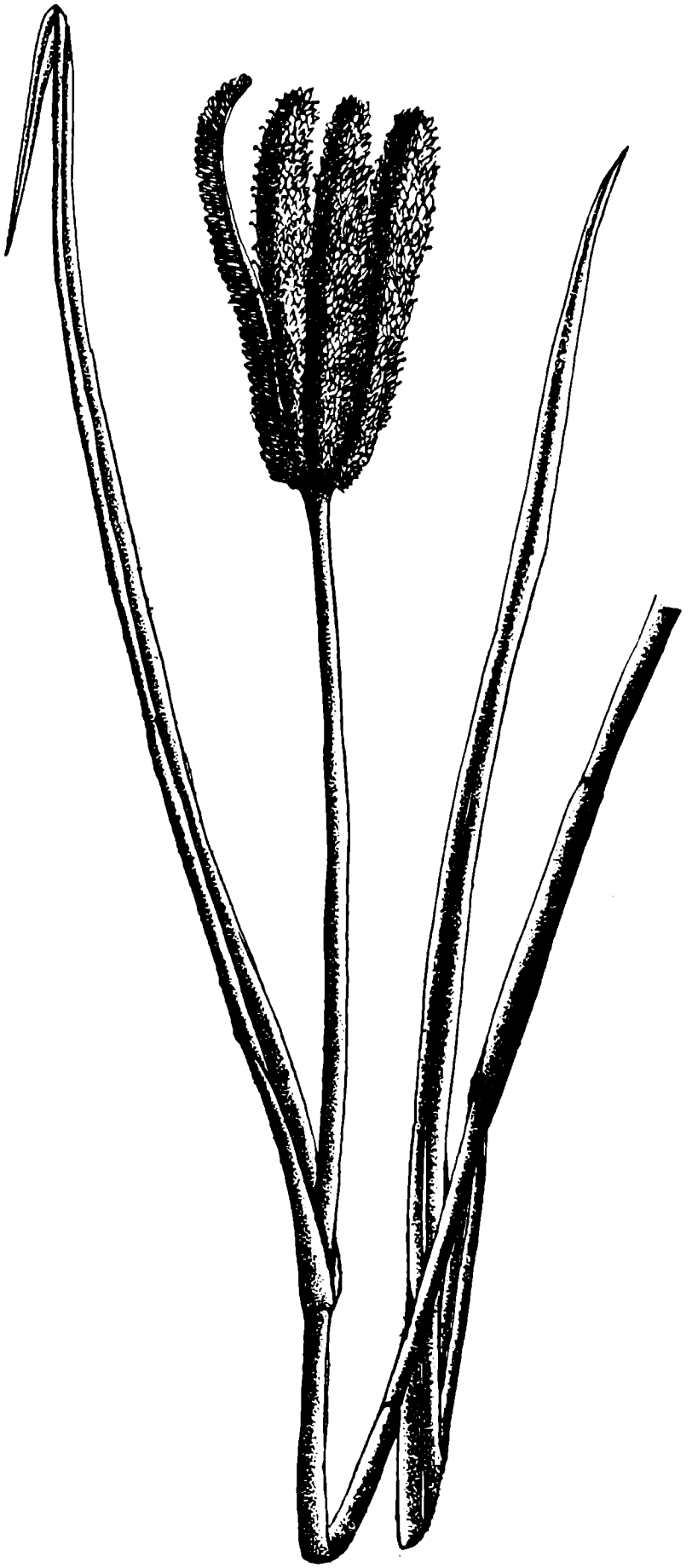
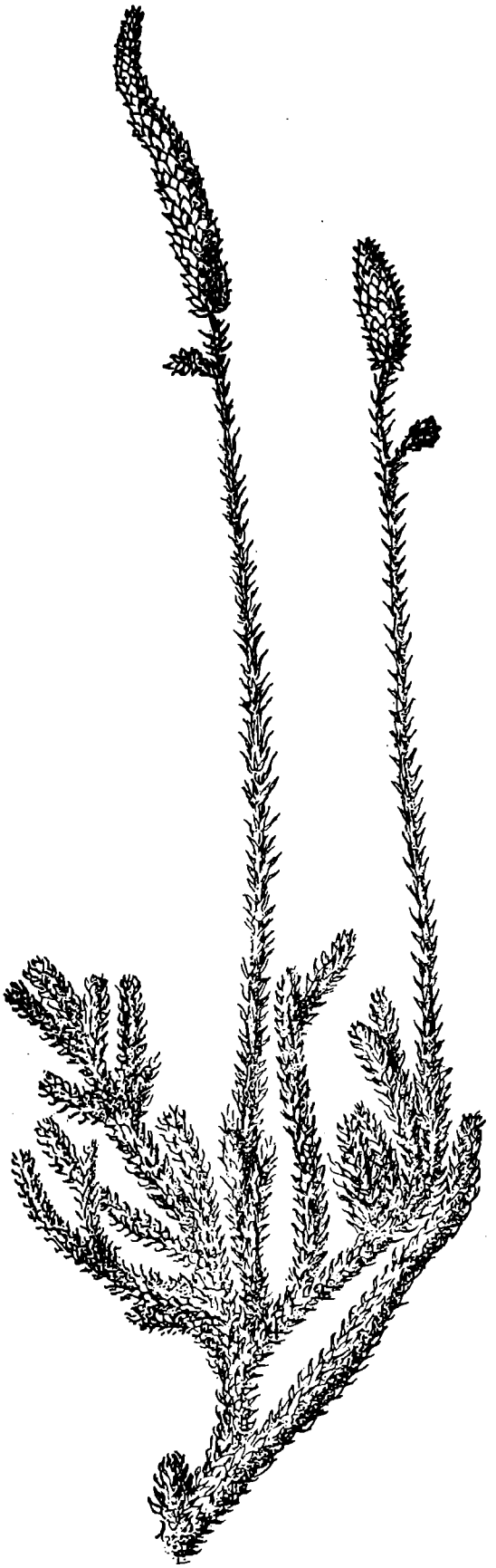


Eleusine coracana Gaertn.

PLATE 50



Lycopodium clavatum Linn.

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