ICONES ROXBURGHIANAE

OR

DRAWINGS OF INDIAN PLANTS

BOTANICAL SURVEY OF INDIA
CALCUTTA
1964

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FASC I

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FOREWORD

The illustrations that are hereby offered to the botanical public form part of a very rich collection of water-colour drawings preserved in the Indian Botanic Garden, Calcutta.

These illustrations were prepared under the direct supervision of Dr. William Roxburgh by local artists. The original drawings were all made to natural scale; in our reproduction we have been forced to reduce the size to about half of the original; to offset this reduction, we have added a scale on each plate, that will show interested botanists the actual size of the Roxburghian drawing. This scale has been added to our reproduction, the original drawings have been in no way altered or disfigured.

It is our aim to bring out several fascicles of drawings every year, until all the species described by Roxburgh in his *Flora Indica* as new and illustrated in his Icones have been given to the public. We have omitted from this series only such plants as were drawn under Roxburgh's direction but the names of which were credited by Roxburgh to earlier authors.

Publication of this series was taken up in 1963, the 175th year since the foundation of Indian Botanic Garden. On January 1st, 1963, the said Garden was transferred to the administrative control of the Botanical Survey of India. We offer this our effort to the memory of William Roxburgh, the 'Father of Indian Botany' and to the honour of Independent India.

H. SANTAPAU
Director
Botanical Survey of India

Calcutta, June 1st, 1964.

INTRODUCTION

William Roxburgh has rightly been called the 'Father of Indian Botany'. He was the first post-Linnean Botanist to describe in scientific terminology the large collections of plants that he himself gathered or had others gather for him. Roxburgh came to India in the service of the Honourable East India Company in 1776 and was stationed for some time at Samalkot on the East coast, near the mouth of the Godavari; in 1793 he was transferred to Calcutta as the Superintendent of the Botanic Garden, which had been founded by Lt. Col. R. Kyd in 1787; Roxburgh retired from India on account of ill health in 1813, and died in Scotland in February, 1815.

The results of Roxburgh's studies on Indian plants were embodied in his *Flora Indica;* the MS of this book was completed by Roxburgh before his departure from India, and was left in the charge of William Carey, who in 1820 and 1824 brought out the first and second volume respectively of the first edition, with additions by N. Wallich. In 1832, Carey brought out the second edition in three volumes without any of Wallich additions; this second edition represents Roxburgh's mind, except that a small part of the original MS dealing with cryptogams was omitted or left unpublished.

Throughout his career in India Roxburgh was methodical in his dealing with Indian plants. As soon as a plant was collected, he described it in detail and had life-size colour drawings made of the same by local artists. In this way Roxburgh during his service in India described over 2500 species of plants and left illustrations of the same. As for the specimens on which the description and drawing were based, Roxburgh seems to have been rather liberal in distributing the same to his correspondents in Europe; very few of Roxburgh's specimens are to be found in the Calcutta Garden at present.

In the last few years a good number of Roxburgh's specimens have been traced in various European herbaria; the Lambert Botanical Museum, now housed in the Delessert's Herbarium, at Geneva, is supposed to have contained 2,000 to 2,250 of Roxburgh's plants, though many seem to have come from South Africa, Malaya and other parts of eastern Asia; a fair number of Roxburghian specimens are in Brussels Botanic Garden, formerly the property of the Linnean Society of London; the British Museum has also some specimens, from the collections of Sir Joseph Banks. Several other herbaria in Britain hold specimens of Roxburgh. But there does not seem to be anywhere a complete set of Roxburgh's specimens; moreover the specimens which survive, are not in the best condition for critical study of the plants described by Roxburgh in his *Flora Indica.*

C. B. Clarke in the reprinted edition of Roxburgh's *Flora Indica,* page v, 1874, mentions that Roxburgh "left at the Calcutta Botanic Garden a set of life-sized coloured drawings, with botanical dissections, of plants 2,542 in number, among which mearly all the Indian species described in his *Flora Indica* are depicted. By these (of which a duplicate set is preserved in the India House, Westminster) the species in the *Flora Indica* may be verified" The duplicate set mentioned by Clarke is now kept in Kew Herbarium and forms the subject of a lengthy paper by J. R. Sealy (*Kew Bull.* 1956 : 297—399, 1956) from which some of the details in this Introduction have been taken.

Roxburgh numbered all his species as soon as a description was finished; the same number was attached to the coloured drawings. One MS of Roxburgh in Kew Herbarium shows all the species listed in numerical order; comparison of this MS with the plates makes it possible to identify the latter by their numbers. In the Central National Herbarium, Calcutta, there is a MS copy of Roxburgh's *Flora Indica,* consisting of a volume of 51·5×35·5 cm and of 541 pages, written in a very elegant hand; the order in this MS is the same as in the printed book of 1832. Species in this MS volume have been numbered, but the numbers are not consecutive.

The Calcutta Collection of Drawings

The collection of Roxburgh's drawings or Icones has been bound in 35 volumes; the set consists of 2,533 plates. The size of individual plate is approximately 44×29 cm, though there are slight variations in size. The original plates have been fixed on sheets of the same or slightly larger size and bound in volumes; when this binding was effected, there are no indications in the volumes themselves, but in time we hope to find such details in the archives of the Botanic Garden.

The order of the binding in a general way follows the arrangement of Hooker's *Flora of British India.* To give an example, the following are the contents of Vol. 1: Ranunculaceae (plates 1—5); Dilleniaceae (plates 6—9); Magnoliaceae (plates 10—14); Annonaceae (plates 15—32); Menispermaceae (plates 33—46); Berberidaceae (plates 47—54); Cruciferae (plates 55—59, 61, 64—70); Nymphaeaceae (plates 60, 62—63); Capparidaceae (plates 71—85). The numbering of the plates in these volumes is not consecutive.

Each plate bears the Roxburghian number, written in good ink, which has turned somewhat reddish. In addition to the Roxburghian species number, other numbers have been added to the plates, the meaning of which is somewhat obscure at present. To give an example : there is a plate with the following title : "31 — 19 — 1. 60. *Kydia fraterna* R. 674". The last number, 674, is the species number of Roxburgh's MS; the first group of three figures is of recent origin, and is written in blue and red pencil, "31 — 19" in blue, "1" in red; at first it appeared as if such figures might refer to the number of the family (31), then to the genus within the family (19), then to the species within the genus (1); this interpretation does not seem to be correct, for some numbers may be repeated for several different plants, thus, *e.g.*, "31—19—7" is repeated for 5 or 6 plants, which belong to more than one genus, and are certainly different species.

The condition of the paper needs a few words of explanation. In general the paper consists of a stout sheet of unglazed drawing paper; its colour has deteriorated considerably from what must have been white, in most cases the paper is somewhat yellowish and often foxed.

The colouring of the plates has also deteriorated to some extent; this deterioration may at times be in part due to the discoloration of the paper, but more often it is due to the colour itself having become dim or dull with age.

REPRODUCTION OF THE DRAWINGS

The original plates cannot be used directly for the preparation of colour blocks. In addition to the danger of damage, to which the plates would be exposed in the process, the colour of the paper and the changed colour of the paintings would make it difficult to obtain good blocks for publication. In the preparation of the plates for the press we have followed this method. Each plate is carefully traced from the original on artists' tracing paper; from this tracing, the illustration is transferred to white bristol board of good quality. On this white drawing paper colours are added as seen in the original; but the actual tones of colouring are taken from actual living specimens in the Botanic Garden. In this way we have tried to insure that the plates to be offered to the public in the present undertaking will show the exact structure and colour that Roxburgh's plates did show when they were freshly painted. For reasons of economy we have been forced to reduce the size of the original plates; Roxburgh's drawings all show plants in natural size. Any departure from the original size might prove misleading, and for this reason, to our reproduction of Roxburgh's drawing (not to the original), we have added a scale accurately to show the size of the plant or plant parts. We have long deliberated on what should be the size of our reproduction; the original size has many reasons to recommend it; only two reasons have suggested reducing the size, the first is economy, the second ease in handling the published book. We do hope that the format we have selected will prove easier to handle than the original folio of Roxburgh's Icones, without at the same time detracting from the value of the reproduction.

We have selected from among the 2,533 plates only such species as were described by Roxburgh as new species in *Flora Indica;* other species, named by Linne, Willdenow, etc. will not be introduced in this series.

Publication will be by families, following the order of *Flora of British India*, which is the basic book on which the main provincial and local floras of India have been written. There will, therefore, be no straight sequence of Roxburgh's numbers in our publication. Our plan is to bring out the work in fascicles of appropriate size, with 1—24 plates per fascicle. Each plate will be accompanied by the text of *Flora Indica*, 1832 edition, this being the unaltered text as left by Roxburgh. We shall try to give for each plate the correct botanical name, as at present accepted among botanists, in accordance with the *International Code of Botanical Nomenclature*, together with the synonym of Roxburgh, when the latter differs from the former.

Our plan for publication of Roxburgh's *Icones* contemplates the issuing of about 100 plates per year. This means that the entire publication may take about ten years, since the number of new species described by Roxburgh in *Flora Indica* and illustrated in our Calcutta collection is a little over 1,000. As stated in the original Advertisement, it is not possible for us to fix the price of the entire publication in advance; prices will depend on actual costs at the time of printing. Subscribers to the whole set will get the set at about cost price; after publication the price will be raised by about one third.

On the 1st January, 1963, the Indian Botanic Garden was transferred from the Government of West Bengal to the Government of India and placed under the direct administration of the Botanical Survey of India. The Garden was then celebrating its 175th year since its foundation. The present publication is offered to the public as a token of respect to the memory of William Roxburgh, the 'Father of Indian Botany' and the man in great measure responsible for the great contributions that the Indian Botanic Garden has made throughout its 175 years of existence not only to Botany but also to the economy of India.

Plate No.	*Name*	*Roxburgh's Icon No.*
1	*Clematis gouriana* Roxb.	1453
2	*Dillenia pentagyna* Roxb.	102
3	*Uvaria dioeca* Roxb.	2291
	Uvaria bracteata Roxb.	2290
4	*Uvaria cordifolia* Roxb.	2526
	Unona dumosa Roxb.	2294
5	*Unona longiflora* Roxb.	2293
6	*Berberis asiatica* Roxb.	1962
7	*Roydsia suaveolens* Roxb.	2287
8	*Flacourtia inermis* Roxb.	1713-2453
9	*Portulaca tuberosa* Roxb.	
10	*Tamarix dioeca* Roxb.	1390
11	*Bergia ammanioides* Roxb.	552
12	*Hypericum cernuum* Roxb.	1280
13	*Garcinia cowa* Roxb.	945
14	*Garcinia kydia* Roxb.	2282
15	*Garcinia lanceofoelia* Roxb.	2278
16	*Garcinia paniculata* Roxb.	1064
17	*Garcinia pedunculata* Roxb. (female)	1562
18	*Garcinia pedunculata* Roxb. (male)	1711
19	*Dipterocarpus alatus* Roxb.	
20	*Dipterocarpus tuberculatus* Roxb.	
21	*Shorea talura* Roxb. (flowers)	2073
22	*Shorea talura* Roxb. (fruits)	1567
23	*Shorea tumbuggaia* Roxb.	1566
24	*Hopea odorata* Roxb.	1247

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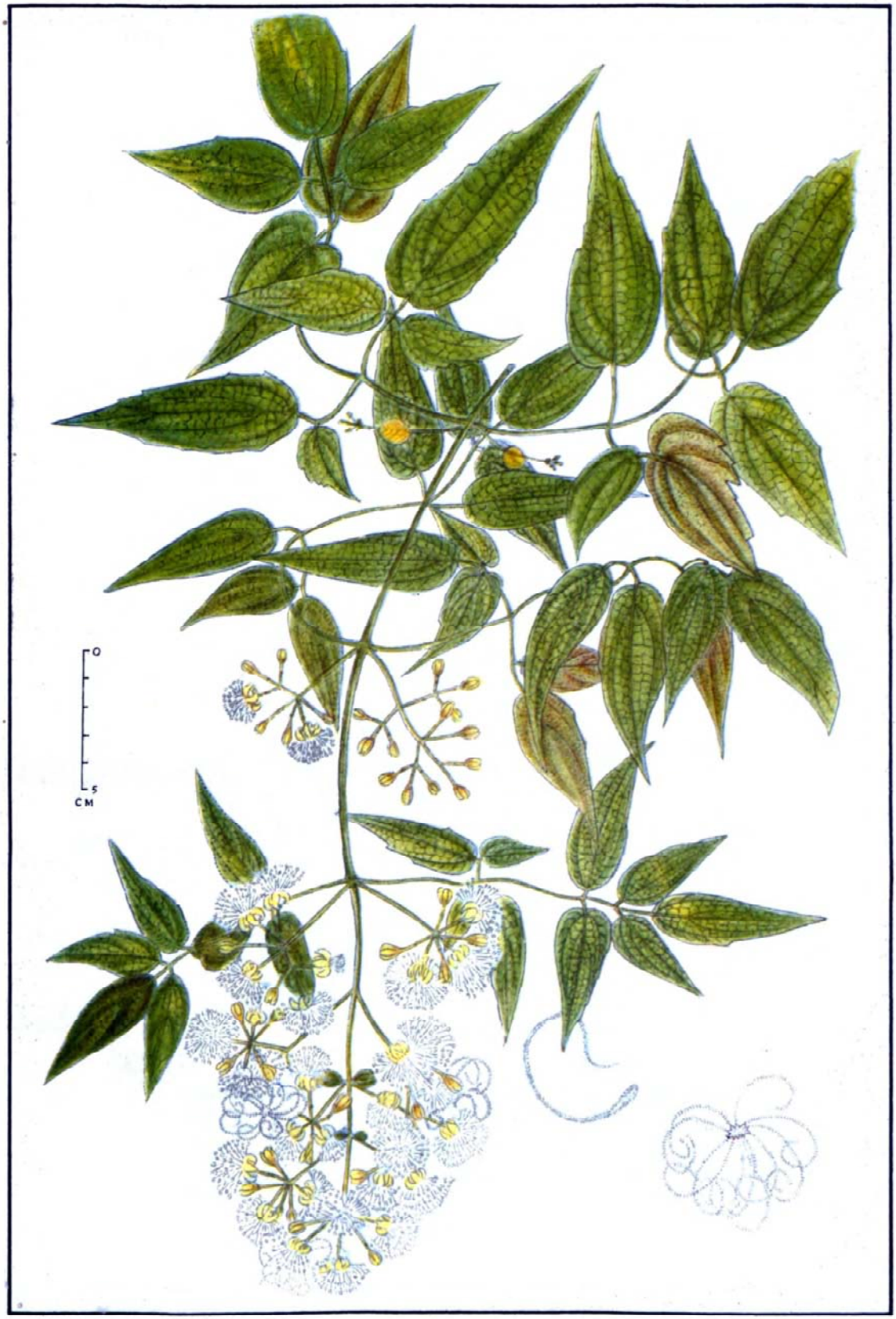
1. CLEMATIS GOURIANA Roxb.

Shrubby, climbing. *Leaves* decompound; *leaflets* ovate, lanceolate, entire. *Peduncles* axillary and terminal, trichotomous, many-flowered. *Petals* four, lanceolate, revolute.

A native of the interior of Bengal, flowers about the close of the rains; in the environs of the ancient city of Gour, it forms with *Porana panicula* extensive, lovely festoons.

(W. Roxburgh, *Flora Indica* 2: 670, 1832)



CLEMATIS GOURIANA Roxb.

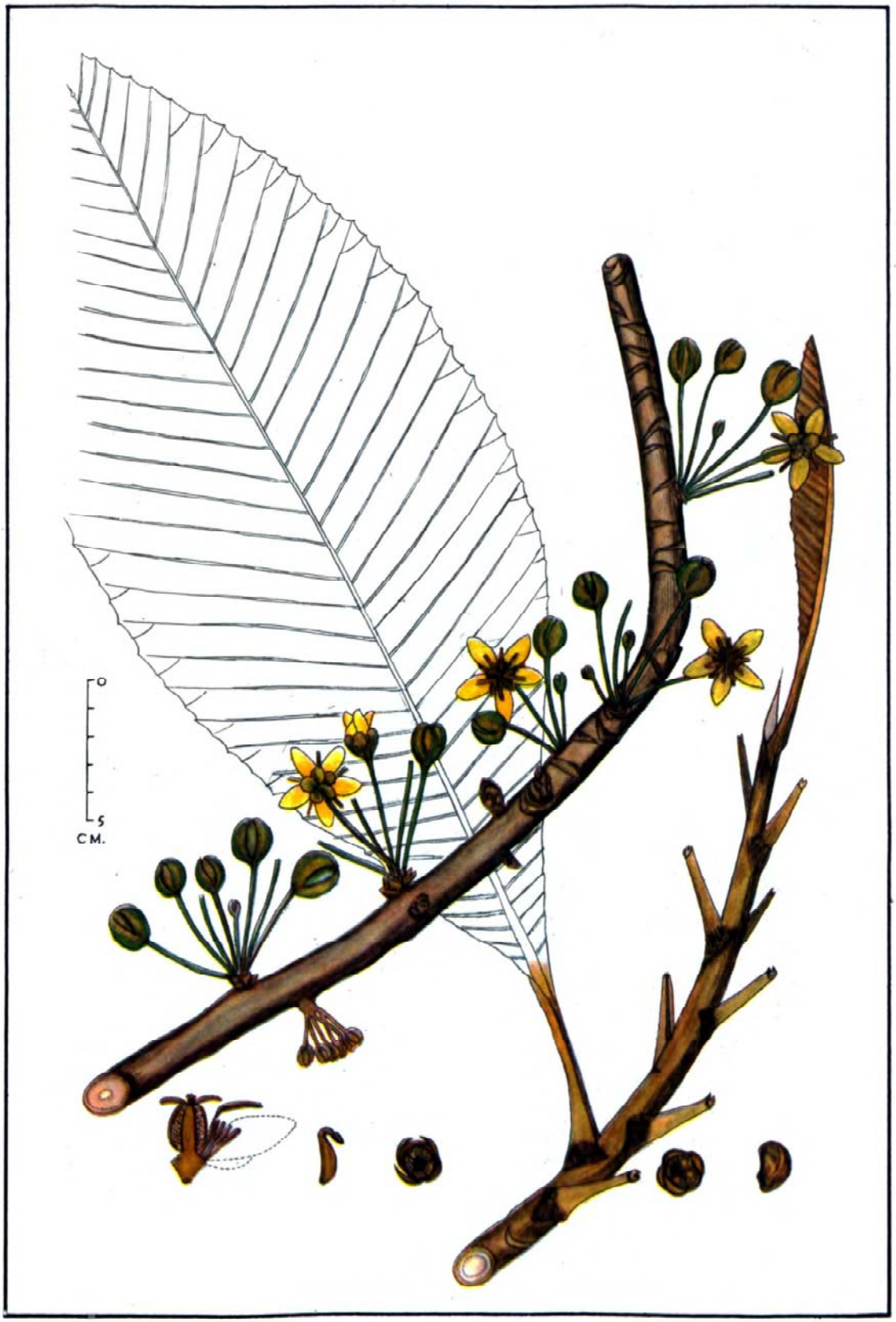
2. DILLENIA PENTAGYNA Roxb.

Leaves petioled, broad-lanceolate, acutely serrate. *Peduncles* one-flowered, lateral, fascicled. *Capsules* five.

Teling. Rowadan.

This is a large timber tree, a native of the Northern Circars; it flowers in March and April.

(W. Roxburgh, *Flora Indica* 2: 652, 1832)



DILLENIA PENTAGYNA Roxb.

3. UVARIA DIOECA Roxb.

Shrubby. *Leaves* from lanceolate to oblong, acuminate, smooth. *Peduncles* lateral, two-flowered. *Calyx* six-leaved. *Corol* three-petalled. *Berries* fusiform, one-seeded.

Tusbee is the vernacular name in Silhet, where the shrub is indigenous. It flowers in April and May, and the seed ripens in September. *Trunk* short, soon dividing into many branches and bifarious villous branchlets. *Leaves* short-petioled, bifarious from lanceolate to oblong, entire, smooth, except while very young, taper-pointed, from three to six inches long, and from one to two broad. *Peduncles* lateral, and generally below the leaves, two together, or bifid, villous, about an inch long. *Bractes* lanceolate, villous. *Flowers* of a middle size, drooping. On some shrubs I could discover only male and on others only female, but in size and colour the same. *Male calyx* in this species must be described to consist of three, ovate, equal, lanceolate leaflets. *Petals* six, nearly adhering to each other from the middle downwards, resembling a monopetalous corol, hairy, much longer than the calyx, red. *Stamina* numerous, covering the whole sub-globular receptacle. *Filaments* scarcely any. *Anthers* turbinate, with a polleniferous groove on each side. *Germs* none. *Female calyx* and *corol* as in the male. *Stamina* none. *Germs* numerous, covering the whole of the receptacle, hairy, one-celled; and containing one ovula, attached to the bottom of the cell. *Style* short. *Stigma* recurved, large and obtuse. *Berries* numerous, long-pedicelled, of the size of a pea, smooth, one-celled; *seed* solitary. *Perisperm* round, conform to the seed, deeply penetrated with brown fissures, with the small straight embryo, lodged in its base, close to the umbilicus.

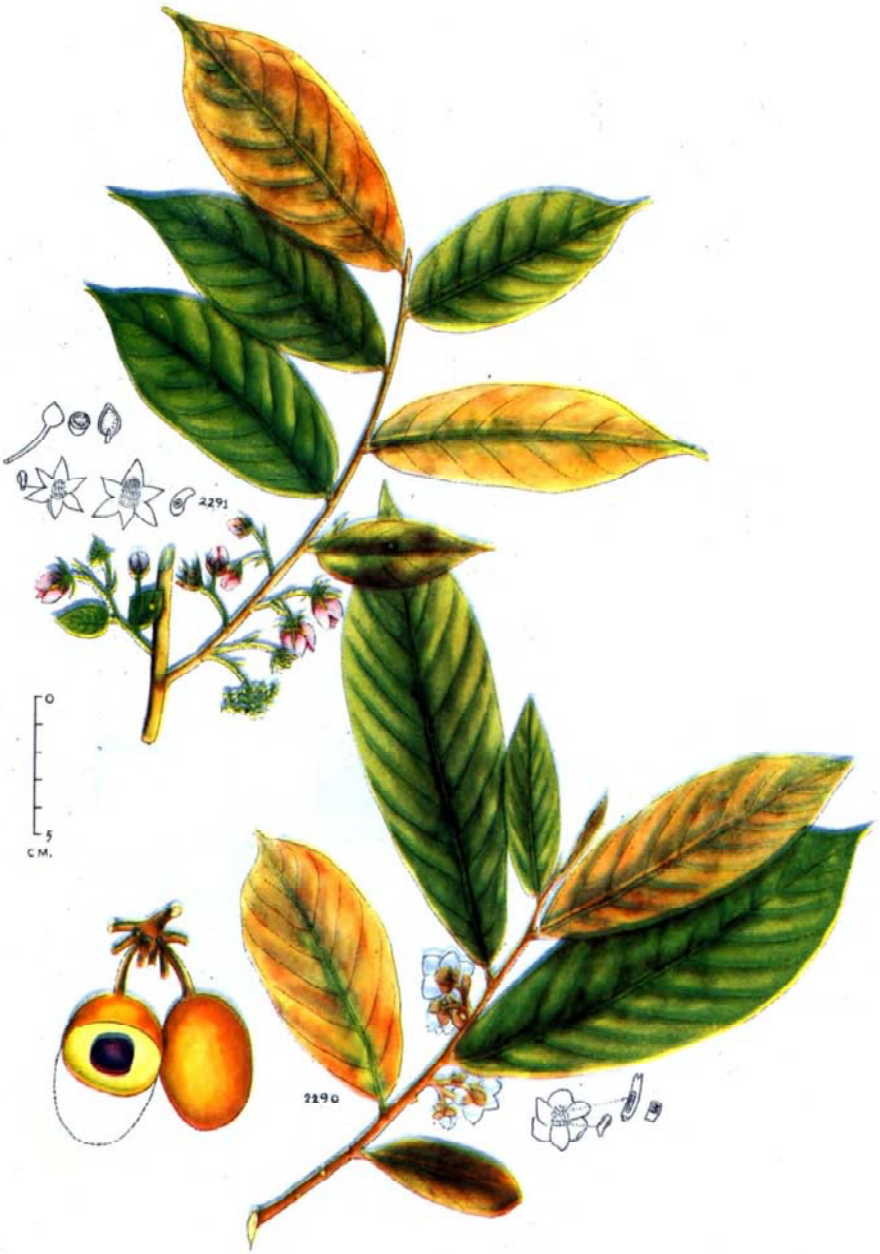
(W. Roxburgh, *Flora Indica* 2: 659, 1832)

UVARIA BRACTEATA Roxb.

Scandent, twigs villous. *Leaves* from lanceolate to oblong, villous. *Penduncles* between the leaves two-flowered, amply bracted. *Calyx* three-parted. *Petals* six, oval and nearly equal. *Berries* oval, of the size of a pullet's egg.

Jupa-bun kula is the vernacular name in Silhet, where it is indigenous; flowers in May, and the fruit ripens in September, and is then very inviting to the eye. *Trunk* and *branches* climbing over trees to a very considerable extent; the *young shoots* are round and very downy. *Leaves* bifarious, alternate, short-petioled, from lanceolate to oblong, entire, downy, particularly while young, from four to eight inches long, and two to three broad. *Peduncles* lateral, between the leaves, very downy, bifid, two-flowered. *Flowers* small, of a pale yellowish white, drooping. *Bractes* large and downy, one at the division of the common short penduncle and one on each pedicel. *Calyx* three-parted. *Segments* sub-orbicular, downy. *Petals* six, much larger than the calyx, nearly equal, oval, concave. *Filaments* numerous, short. *Anthers*, a groove on each side of the filaments. *Germs* many, in the disk, surrounded with the stamina, linear downy, one-celled; *ovula* many, in two rows; *attached* to the inside of the cell. *Style* scarcely any. *Stigma* bidentate. *Berries* few, pendulous, of the size of a small pullet's egg, from oval to oblong, obtuse at both ends, smooth, when ripe of a rich yellow. *Seeds* a few, oval, compressed smooth, rather longer than those of the common *Tamarind*, and of the same colour, and appearance. *Perisperm* and *embryo* as in the genus.

(W. Roxburgh, *Flora Indica* 2: 660, 1832)



UVARIA DIOECA Roxb. 2291

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UVARIA BRACTEĄTA Roxb. 2290

4. UVARIA CORDIFOLIA Roxb.

Shrubby. *Leaves* cordate, and ovate-cordate. *Peduncles* between the leaves, one-flowered; *petals* six, lanceolar, very long and sericeous.

A native of the moist valleys near Chittagong, where it grows to be a ramous shrub of about six feet in height, it blossoms in June, and the seed ripens in November.

(W. Roxburgh, *Flora Indica* 2: 662, 1832)

UNONA DUMOSA Roxb.

Scandent. *Leaves* linear, oblong, base cordate, parallel-veined, downy underneath. *Petals* six, oblong and very large. *Berries* composed of two or three oval joints.

Tooba chura, the vernacular name in Silhet, where it grows to be a very bushy climber. *Flowers* very large and pendulous, they appear during the hot season, and the seed ripens in October.

(W. Roxburgh, *Flora Indica* 2: 670, 1832)

UVARIA CORDIFOLIA Roxb. 2526

&

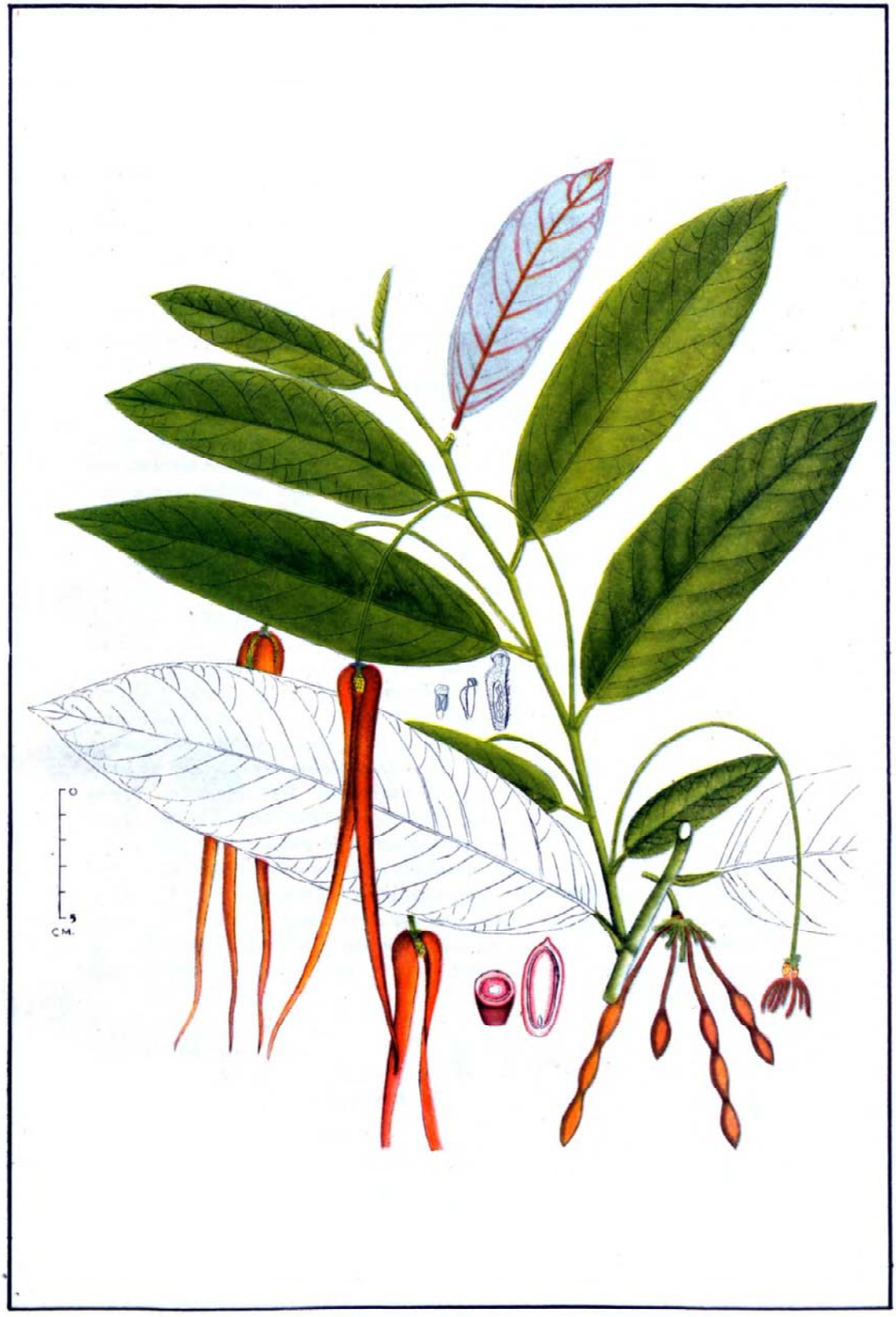
UNONA DUMOSA Roxb. 2294

5. UNONA LONGIFLORA Roxb.

Leaves linear-oblong. Flowers from two to three petalled, of great length and pendulous. Joints of the berries few and linear oblong.

Kulla-Kura, the vernacular name in Silhet, where it is indigenous; grows to the size of a large shrub or small bushy tree, flowers in April and May, and the seed ripens about the close of the rains. *Young shoots* quite smooth, round, and flexuous. *Leaves* alternate, bifarious, short-petioled, linear-oblong, entire, smooth on both sides, and particularly glaucous underneath, from six to twelve inches long, and from two to four broad. *Peduncles* axillary, solitary, from three to ten inches long, filiform, smooth, one-flowered. *Flowers* uncommonly long; pendulous; yellow on the outside, bright orange on the inside. *Calyx* tree-leaved; *leaflets* reniform, cordate, acuminate, very small, and hairy. *Petals* two, rarely three, ensiform, thick and fleshy, from six to eight inches long, with the sides smooth, yellow on the inside, orange without. *Stamina* numerous, glandular-headed, forming a hemispheric ball round the germs. *Germs* from ten to twenty, sessile, clavate, very hairy, one-celled, *ovula* a few, imbricated upwards, and vertically attached to the inner margin of the styles, short. *Stigmas* large, recurved. *Berries* several, long-pedicelled, drooping, from two to four, joints linear-oblong or subcylindric, smooth. *Seeds* one in each joint and of the same form, smooth. *Integument* polished, of the consistence of parchment. *Embryo* in the base of perisperm, two-valved, from its inside innumerable fibres project exactly as in *Uvaria.*

(W. Roxburgh, *Flora Indica* 2: 668, 1832)



UNONA LONGIFLORA Roxb.

6. BERBERIS ASIATICA Roxb.

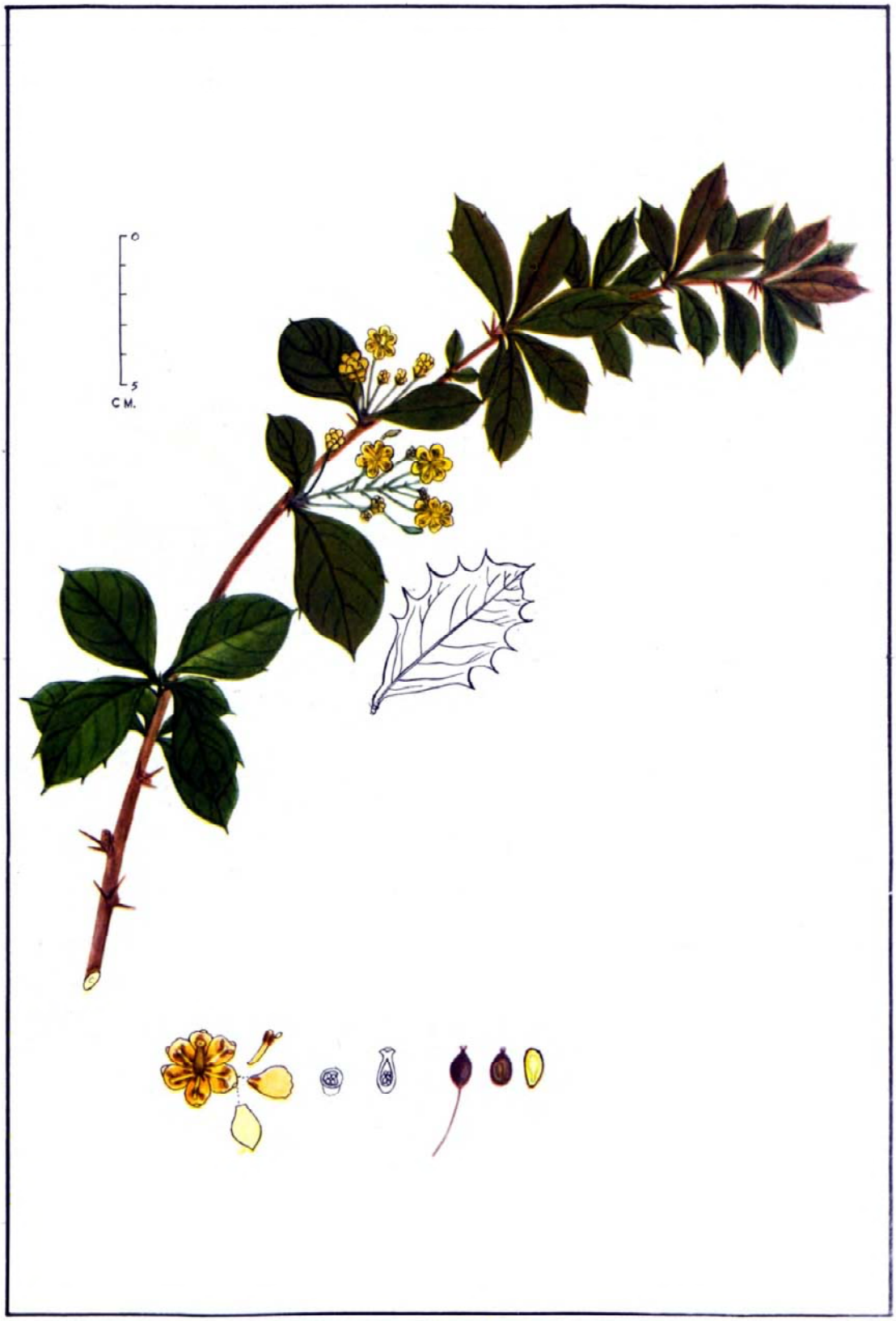
Shrubby. *Leaves* obovate-oblong, hard, spinous-toothed. *Spines* triple. *Racemes* axillary. *Pedicels* and *flowers* erect. *Nectarial* glands subcylindric. *Germs* from five to six-seeded.

Berberies ilicifolia. *Asiat. Researches.* 6. *p.* 357.

A native of the mountainous countries north of Hindoosthan, where it was first observed by Captain Hardwicke, on his journey to Shreenagur, and afterwards found by Dr. Buchanan in Nepal, from whence the latter sent seed to the Botanic Garden at Calcutta in 1802; in April 1808 the plants therefrom blossomed for the first time. In appearance it resembles the common Berbery bush of Europe.

Stems several from the same root, bending much to one side. *Branches* slender, after the first year spreading and drooping; *young shoots* angular, and furrowed. *Bark* of the old ligneous parts of a light ash colour, and yellow within; and so is the wood; the height of our shrubs now when seven years old, is from four to eight feet. *Spines* three, rarely five-fold from one base, straight, strong and sharp. *Leaves* in fascicles in the axills of the spines, sub-sessile, obovate and oblong; *margins* spinous, with circular sinuses between, texture hard, smooth on both sides, but reticulate with veins; from one to two inches long. *Stipules* small, subulate, petiolary, having some small scales intermixed with the insertions of the leaves. *Racemes* solitary, from the centre of the fascicles of leaves, many-flowered. *Pedicels* often as long as the racemes, straight, one-flowered; sometimes there is no raceme, and then several, long pedicelled flowers occupy its place. *Flowers* rather large, pure yellow. *Bractes* at the base of the pedicels triple, one-flowered, ovate, acute. *Calyx* about nine-leaved, imbricate. *Leaflets* unequal, yellow, smooth. The *exterior* three minute, and may be called bractes; the next three larger; the inner three still larger, and nearly as long as the petals. *Petals* six, in two series, round-obovate; exterior margins a little notched and curled in over the anthers. *Nectarial* glands subcylindric. *Filaments* shorter than the petals, and opposite to them, thick at top. *Anthers* apolleniferous, oblong, operculated pit on each side near the apex. *Germ* oblong, one-celled, on the inside is a ridge; four, five or six seeds are attached to its base. *Style* scarcely any. *Stigma* large, peltate, with a pit in the centre. *Berries* ovate, rather larger than the common *berbery* of Europe, smooth, with red, succulent, acid pulp; colour a dark purple, with a bloom over it, like that of the common plum, one-celled. *Seeds* two or three, attached as in the germ, oblong, somewhat rugose. *Integuments* two; the *exterior* one thick, spongy, and brown; the *inner* one membranaceous. *Perisperm* conform to the seed, yellow. *Chalaza* large and conspicuous on its apex. *Embryo* nearly as long as the perisperm, strawcoloured, erect. *Cotyledons* oblong. *Radicle* subcylindric, inferior.

(W. Roxburgh, *Flora Indica* 2: 182, 1832)

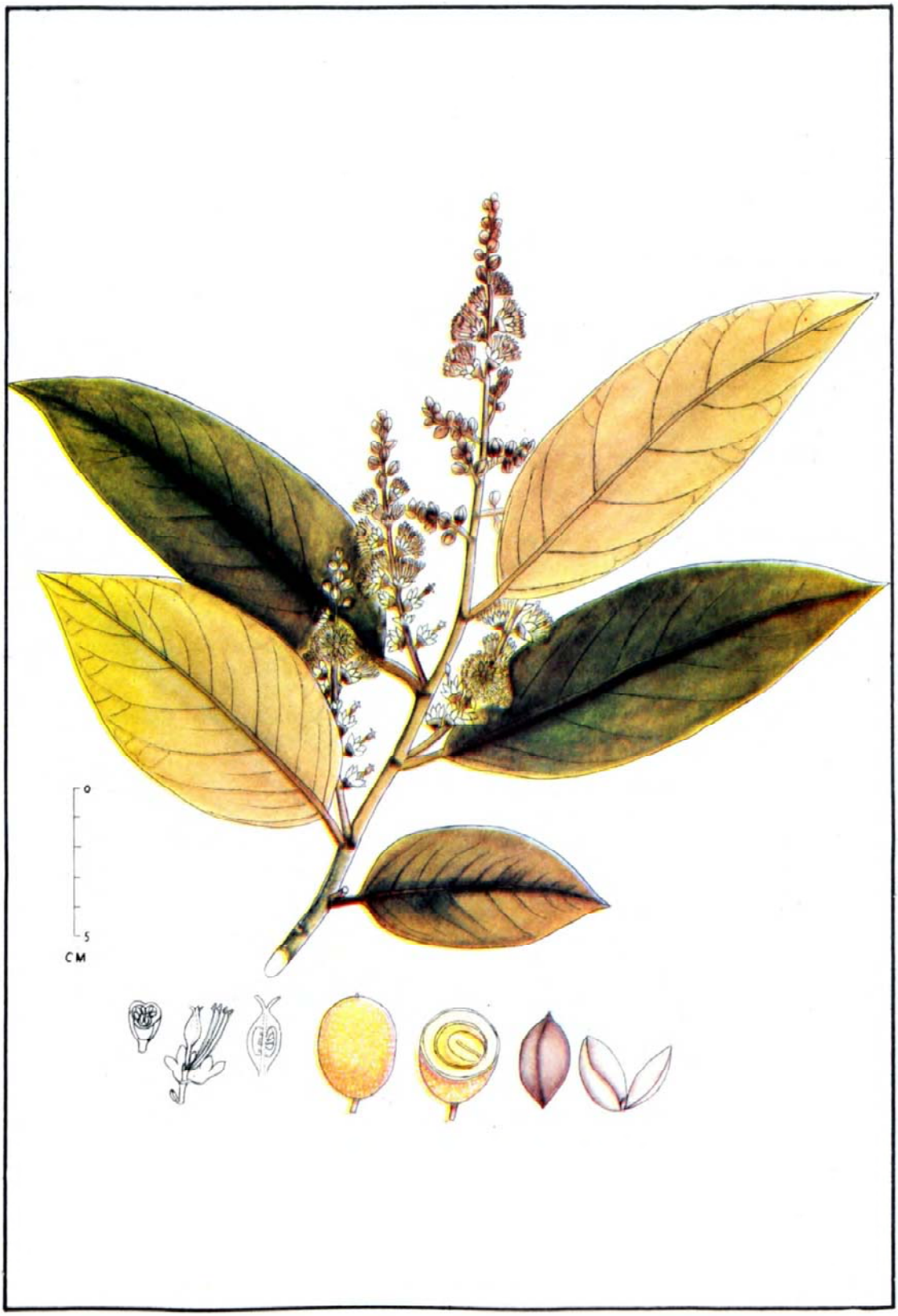


BERBERIS ASIATICA Roxb.

7. ROYDSIA SUAVEOLENS Roxb.

Madhuvee-luta, the vernacular name in Silhet, where the plant is indigenous. Flowering time, the month of March, when its numerous blossoms diffuse a strong, but pleasant odour through the forest, where they grow. The *seed* ripens in August and September. *Stem* stout, woody and with its numerous branches climbing over trees to a great extent. *Bark* of the young shoots green, void of pubescence, but covered with numerous, small, elevated, whitish specks. *Leaves* alternate, short petioled, oblong, entire, of a firm texture, and smooth on both sides, sometimes pointed, about six inches long, and about two and a half and three broad. *Stipules* none. *Inflorescence* terminal and axillary, when terminal it is generally a long slender panicle, as long as the leaves; when axillary, a simple raceme. *Flowers* numerous, alternate, short-pedicelled, pretty large, of a pale yellow, and fragrant. *Bractes* solitary, oblong; villous, one-flowered. *Calyx* inferior, one-leaved, six-cleft, villous. *Segments* ovate, in a double series, the exterior three rather longer than the others. *Corol* none, nor anything like a nectarial organ. *Filaments* numerous, (about 100), the length of the pistillum, the pedicel of which is inserted on the apex of a short column. *Anthers* incumbent. *Germ* pedicelled above the elevated receptacles of the stamina, oblong, three-celled, with about two rows of *ovula* in each, attached to the axis. *Style* very short. *Stigma* trifid. *Drupe* pedicelled, of the size of a large olive, oval, covered with a rather scabrous, orange-coloured, thin, brittle cortex, one-celled. *Pulp* in considerable quantity, soft and yellow. *Nut* oblong; *texture* of a ligneous nature, thin, one-celled, and three-valved. *Seeds* solitary, conform to the nut. *Integument* single, membranaceous. *Perisperm* none. *Embryo* erect. *Cotyledons* two, unequal, the larger one deeply concave, receiving the smaller one doubled into its concavity, as in *Shorea*; they are of a firm fleshy texture, and yellowish. *Radicle* inferior, and rather within the base of the cotyledons.

(W. Roxburgh, *Flora Indica* 2: 643. 1832)



ROYDSIA SUAVEOLENS Roxb.

8. FLACOURTIA INERMIS Roxb.

Arboreous, unarmed. *Leaves* oblong, crenate-serrate, polished. *Racemes* axillary, short. *Flowers* hermaphrodite. *Style* five-cleft.

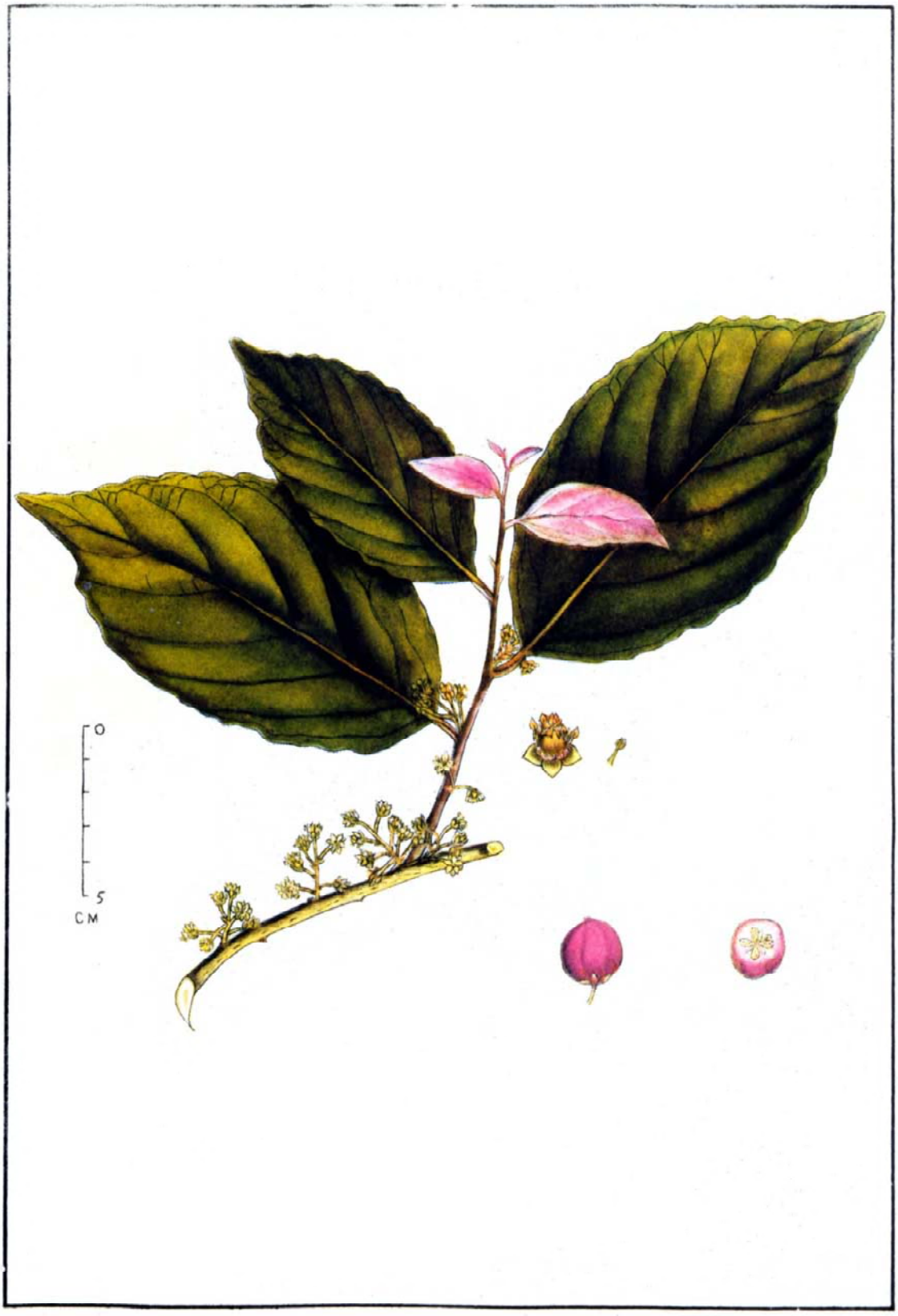
Mal. Tomitomi.

A native of the Moluccas, where the tree is cultivated for its edible fruit. It has lately been introduced into the Botanic Garden, where the tree thrives well, and blossoms during the dry season. The fruit ripens towards the close of the rains.

Trunk short, soon dividing into numerous branches which form a large, very dense head of great beauty. The *bark* smooth, brownish, and perfectly destitute of everything like thorns or pickles. *Leaves* alternate, short-petioled, elliptic, smooth, of a shining green on both sides; when they first expand, reddish, and then the tree is uncommonly gaudy, from three to six inches long. *Petioles* semi-cylindric. *Stipules* none. *Racemes* axillary, longer than the petioles, few-flowered. *Pedicels* clavate, jointed near the middle. *Bractes* ovate, caducous. *Calyx* deeply four or five-parted; *divisions* reinform, shorter than the stamens and pistil. *Corol* none. *Filaments* about twenty, inserted on a fleshy nectariferous ring, which surrounds the base of the germ. *Anthers* two-lobed. *Germ* ovate, five-celled, with two ovula in each, attached to the middle of the axis. *Style* five-cleft, spreading. *Berry* of the size and appearance of a red cherry, and like that fruit, very smooth. *Seeds* as far as ten, in five vertical pairs, much compressed, ovate, covered with a rough nuciform integument. *Perisperm* conform to the seed. *Embryo* straight. *Cotyledons* ovate. *Radicle* oblong, pointing to the umbilicus, or pointed end of the seed, which is next to the middle of the axis of the fruit.

The fruit is too sour to be eaten raw, but makes very good tarts. The tree is of a middle size, very ornamental, and a perfect evergreen in Bengal.

(W. Roxburgh, *Flora Indica* 3: 833, 1832)



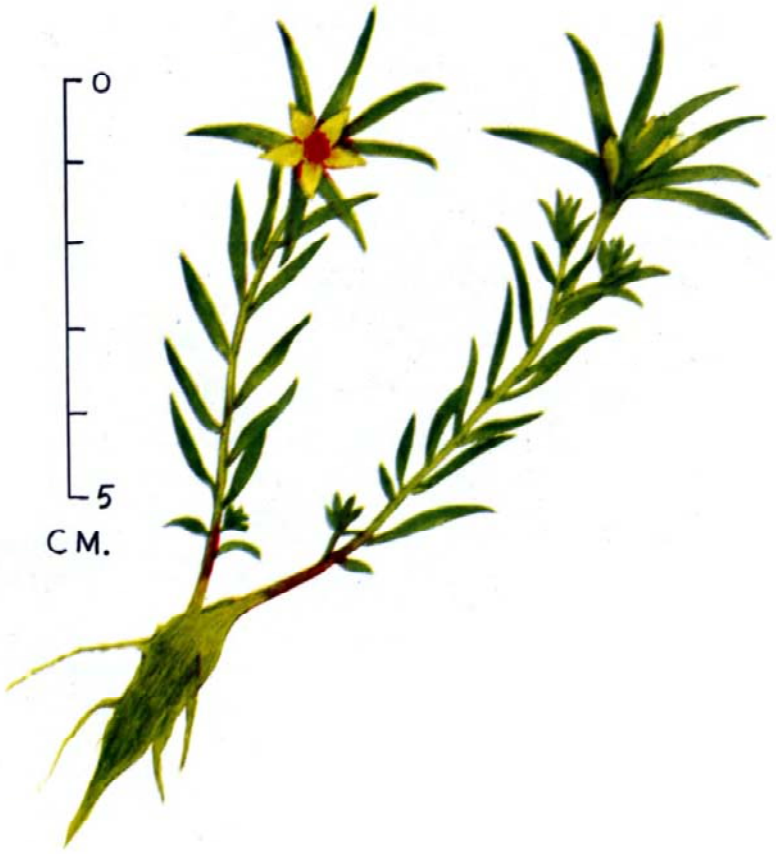
FLACOURTIA INERMIS Roxb.

9. PORTULACA TUBEROSA Roxb.

Root tuberosus and villous. *Leaves* alternate, lanceolate. *Flowers* terminal.

A native of the Circars. It flowers during the rainy season.

(W. Roxburgh, *Flora Indica* 2: 464, 1832)



PORTULACA TUBEROSA Roxb.

10. TAMARIX DIOECA Roxb.

Dioecious, arboreous. *Leaves* short, obliquely truncated. *Panicles* terminal. *Male flowers* pentandrous. *Female* with five abortive stamens.

Beng. Lal Jhou.

Picpula. *Asiat. Res.* 4 *p.* 268.

A native of the islands in the Ganges and of its banks above Sook-saugor, where it blossoms during the rains, at which period, in some situations, little more than the tops of the plants are to be seen above water. In our gardens it is in flower the greater part of the year and is highly ornamental.

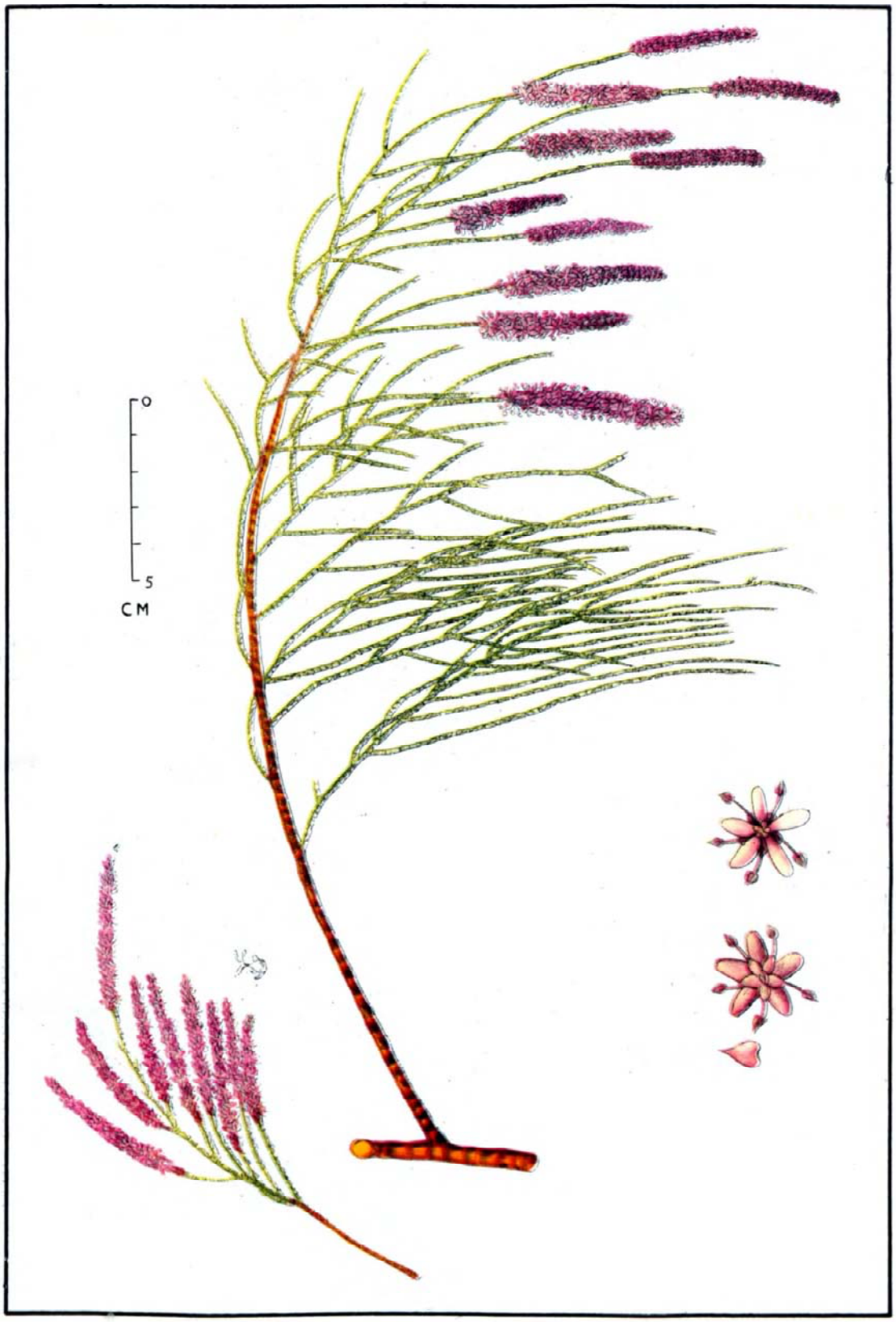
Trunk short, covered with dark-coloured, cracked bark. *Branches* very numerous, spreading in every direction with their extremities drooping. Leaves tubular, obliquely truncated, pointed, smooth; in fact, they appear more like joints of the bark than leaves. *Spikes* terminal, simple, cylindric, often drooping, and so numerous as to compose the most beautiful panicles on the extremities of the branches and branchlets. *Flowers* very numerous, sessile, small, rose-coloured, inodorous. *Bractes* triangular, acute, one-flowered.

MALE FLOWERS. *Calyx* five-leaved. *Corol* five-petalled. *Petals* linear oblong, emarginate. *Filaments* five, longer than the petals. *Anthers* purple, two-lobed with a projecting gland between them. *Pistillum* nothing more in all the flowers I examined, than a three-lobed gland in the centre of the flower.

FEMALE HERMAPHRODITE FLOWERS on a separate plant.

Calyx as in the male. *Petals* rather broader than in the male. *Filaments* five, the length of the germ. *Anthers* sagittate, glands without the appearance of pollen. *Germ* three-lobed. *Styles* three, longer than the corol. *Stigmas* clavate, recurved, retuse. *Capsules* conical, three-sided, one-celled, three-valved, hid in the withered calyx, and corol. *Seeds* numerous, compressed, seemingly imbricated.

(W. Roxburgh, *Flora Indica* 2: 101, 1832)



TAMARIX DIOECA Roxb.

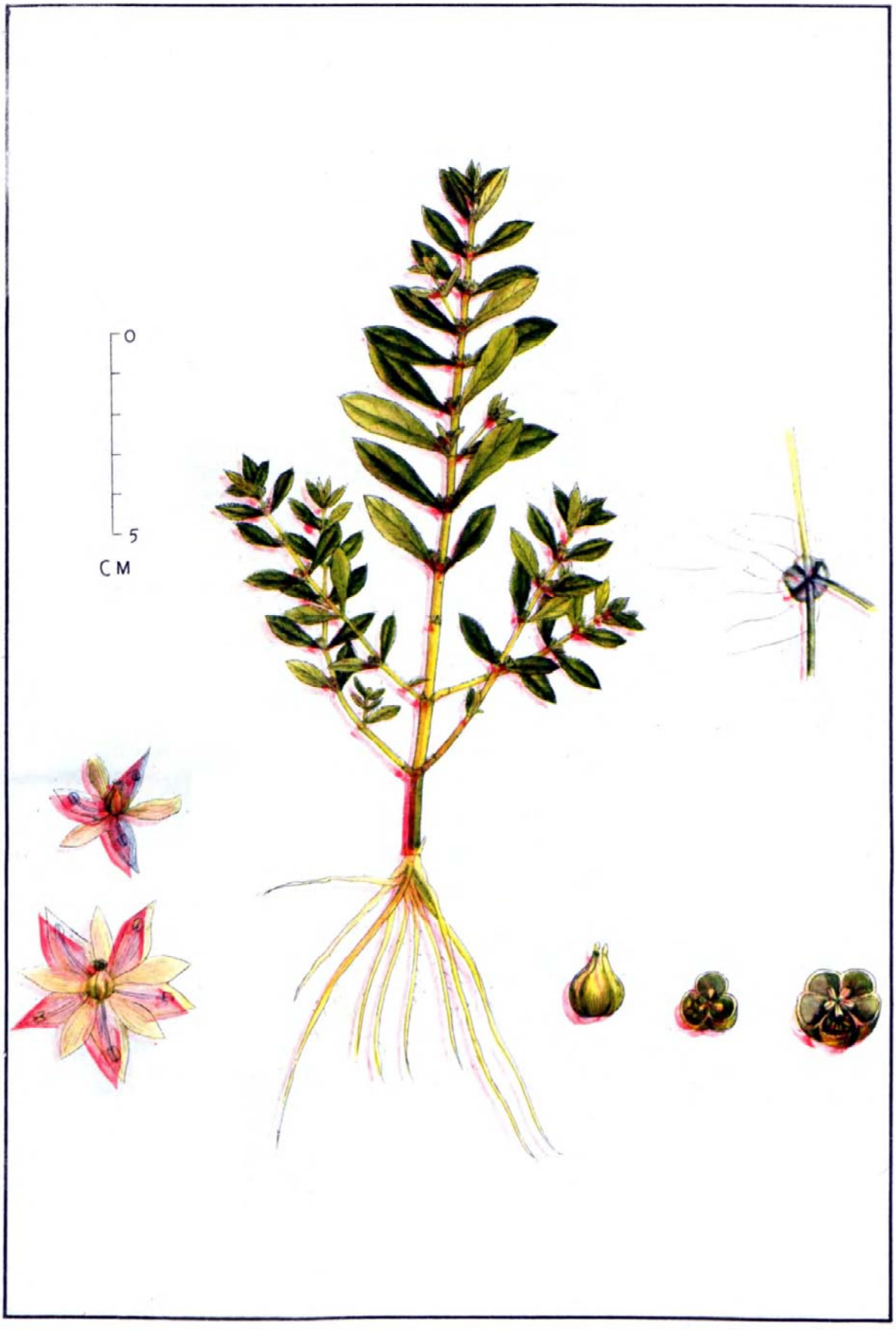
11. BERGIA AMMANIOIDES Roxb.

Annual, erect, ramous. *Flowers* axillary crowded with stamina, corresponding in number with the parts of the calyx and corol.

Lechea verticillata Willd. 1. *p.* 495.

A native of various parts of India; it appears and flowers during the rains and cool season.

(W. Roxburgh, ***Flora Indica* 2: 457, 1832)**



BERGIA AMMANIOIDES Roxb.

12. HYPERICUM CERNUUM Roxb.

Shrubby, branchlets drooping. *Leaves* sessile, broad-lanceolate. *Flowers* terminal, sub-solitary. *Styles* five.

A native of the mountains between Hurdwar and Shreenagur, from thence the seeds were sent by Captain Hardwicke, to the *Botanic Garden* in 1797, where it blossoms during the cold season. It resembles, in many respects, the species described under the name *H. monogynum*.

Stems, or rather *branches* numerous from the same root, rising in every direction, soon dividing into numerous long, slender, round, smooth, coloured, drooping twigs. *Bark* brown and smooth, height of the whole plant about three feet, and still more in diameter. *Leaves* opposite, sessile, decussate, broad-lanceolate, obtuse, somewhat nervous, entire, margins not revolute, smooth, of a lively green on both sides, from one to two inches long. *Flowers* terminal, at the ends of the long, pendulous branchlets, generally solitary, though sometimes two or even three-fold, large, of a pure yellow. *Peduncles* short with two small, brown, caducous bractes near the middle. *Calyx* five-leaved; *leaflets* lanceolate, acute. *Petals* obliquely oblong, four times longer than the calyx. *Filaments* numerous, from one to two hundred, coalesced into five bodies, just at the base only, and about half the length of the petals. *Germ* ovate. *Styles* five, the length of the stamens.

This is so nearly allied to the plant I have taken for *H. monogynum*, No. 977 that I could scarcely deem them distinct species, were it not for the difference in the number of stamina and styles. In *monogynum* there are about fifty of the former only and uniformly a single style with a five-cleft apex.

(W. Roxburgh, *Flora Indica* 3: 400, 1832)

HYPERICUM CERNUUM Roxb.

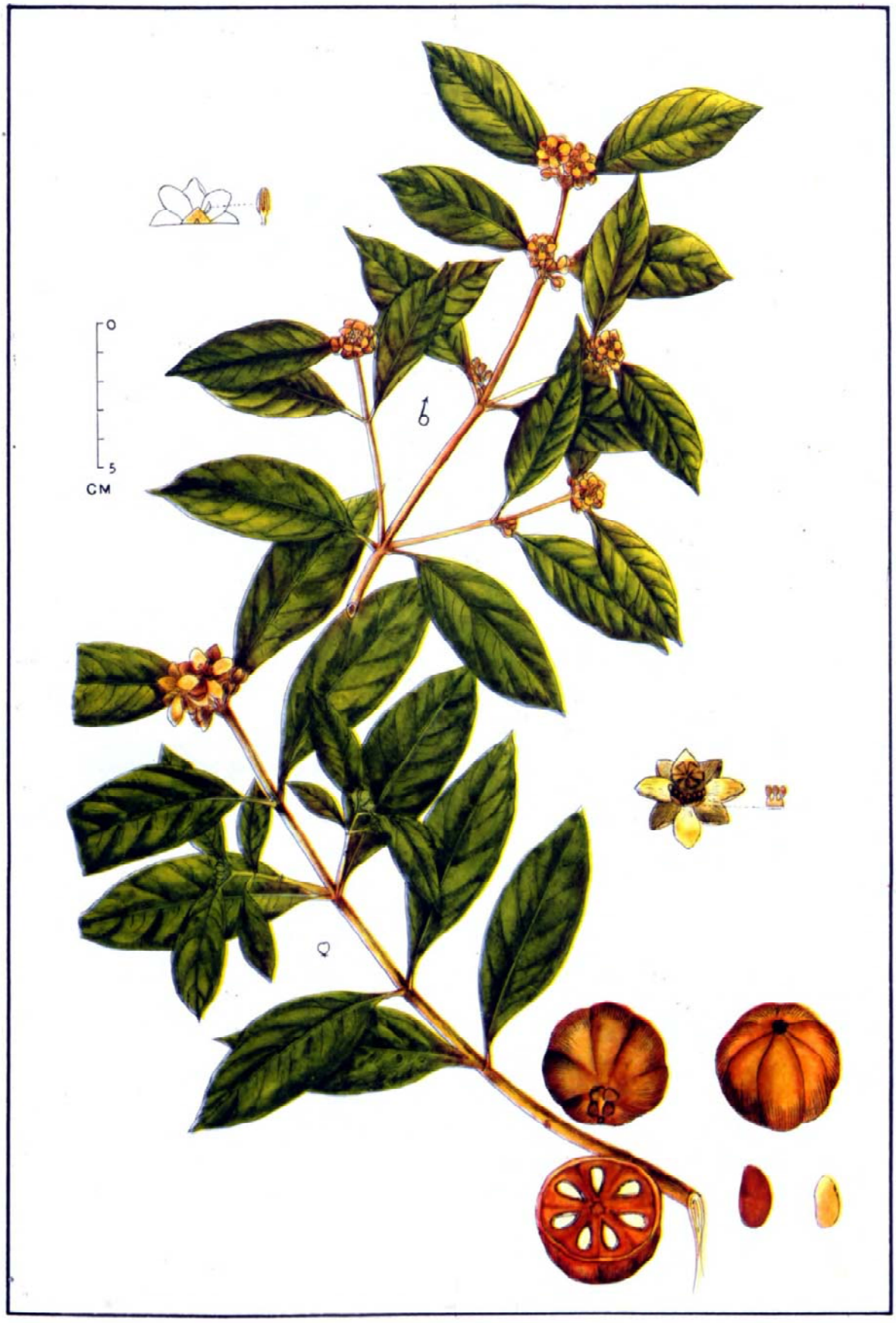
13. GARCINIA COWA Roxb.

Dioecious. *Leaves* broad-lanceolar. *Flowers* terminal, *male* sub-umbelled, the *female* has one, three or five flowers, with four, five or ten-cleft sets of abortive stamina. *Stigma* from six to eight-lobed. *Berry* torulose, from four to eight-seeded.

Hind. Cowa.

The tree is of a middle size and handsome; it yields an inferior sort of Gamboge, and the fruit edible, though not the most palatable. It is a native of Chittagong, and flowers in February; the fruit ripens in June.

(W. Roxburgh, *Flora Indica* 2: 622, 1832)



GARCINIA COWA Roxb.

14. GARCINIA KYDIA Roxb.

Dioecious. *Leaves* broad-lanceolar.

Male flowers in terminal and lateral umbellets; *female* also terminal and lateral, but solitary, and sessile, with four sets of unequal, abortive stamina, alternate with the petals. *Berry* from four to eight-seeded, apex depressed with an elevated nipple-like centre, crowned with the stigma.

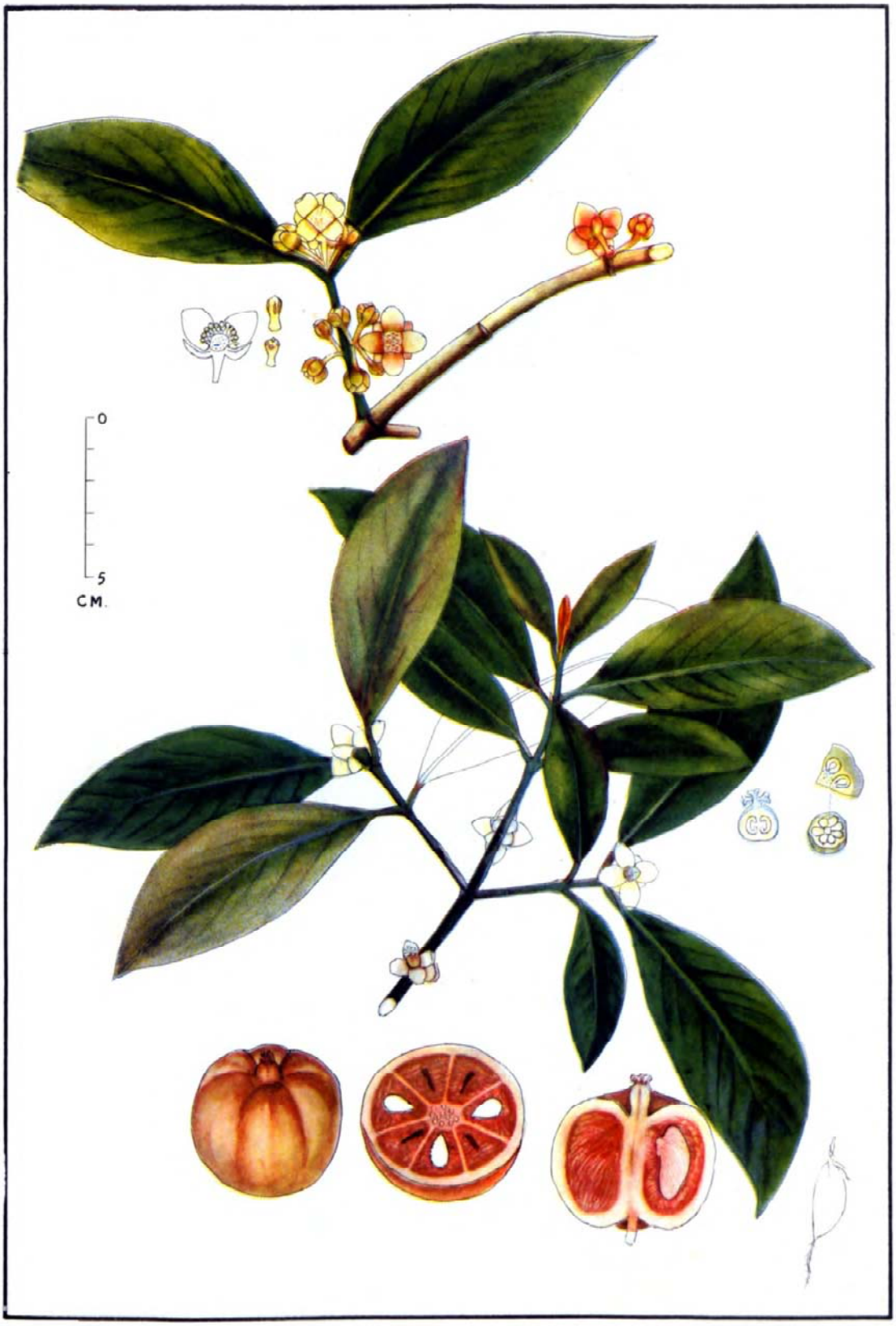
A native of the Andaman Islands, where it was discovered by Col. Alexander Kyd, and by him introduced into the Botanic Garden at Calcutta in 1794, where when about ten years old, it began to blossom in February, and the fruit to ripen in July. *Trunk* straight, to the top of the tree, as in the common fir, &c. and in trees sixteen years old twenty-seven inches in circumference at four feet from the ground. *Branches* numerous, spreading far and regularly. *Bark* pretty smooth, of greyish brown; if it be wounded, a yellow exudation frequently takes place, which hardens into an inferior kind of gamboge; the extreme height of young trees about thirty feet. *Leaves* opposite, short-petioled, broad-lanceolar, acute, entire, firm and polished, from four to six inches long, and from one to one and a half broad. *Stipules* no other than a little black or brown gland on each side of the petioles.

MALE. *Flowers* in little terminal umbellets, pretty large, yellow, and smooth in every part. *Peduncles* nearly as large as the petioles, clavate, one-flowered. *Calyx* four, equal, ovate, obtuse, fleshy, smooth leaves. *Stamina* numerous, inserted on a somewhat four-lobed, large, elevated, convex, fleshy receptacle, which occupies the whole centre of the flower. *Filaments* very short. *Anthers* four-sided, with a small polliniferous cell in each angle. *Germ*, no vestige of one.

FEMALE. *Flowers* terminal, and lateral, solitary, sessile. *Calyx* and *corol* as in the *Male*. *Stamina* four, small, unequally bifid, or trifid, filaments round the germ, alternate with the petals; *divisions* subequitant, and ending in a small gland something like an anther. *Germ* from six to eight-lobed, from six to eight-celled; that part which becomes the aril in the ripe fruit now forms the walls of the cells, and is of a paler colour than the rest. *Style* scarcely any. *Stigma* of from six to eight spreading, variously lobate, glandular lobes. *Berry* globular, torulose, of the size of a small orange, smooth, of a deep yellow when ripe, one-celled, with the *vertex* much depressed, in which rises the nipple-shapped apex, crowned with the from six to eight-lobed stigma, *seeds* as far as eight, semi-ovate, the inside being thin and straight. *Integument* single, tough and veined, the whole enveloped in a large, fleshy, acid aril. *Perisperm* conform to the seed, firm. *Embryo* simple, &c. as in the former species.

This elegant tree is so very like my *G. cowa*, as not to be distinguished except by the female inflorescence and shape of the fruit, which in size and quality are the same *viz.* an exceedingly sharp but pleasant acid, and like the rest of the genus, the aril is by far the more palatable part.

(W. Roxburgh, *Flora Indica* 2: 623, 1832)



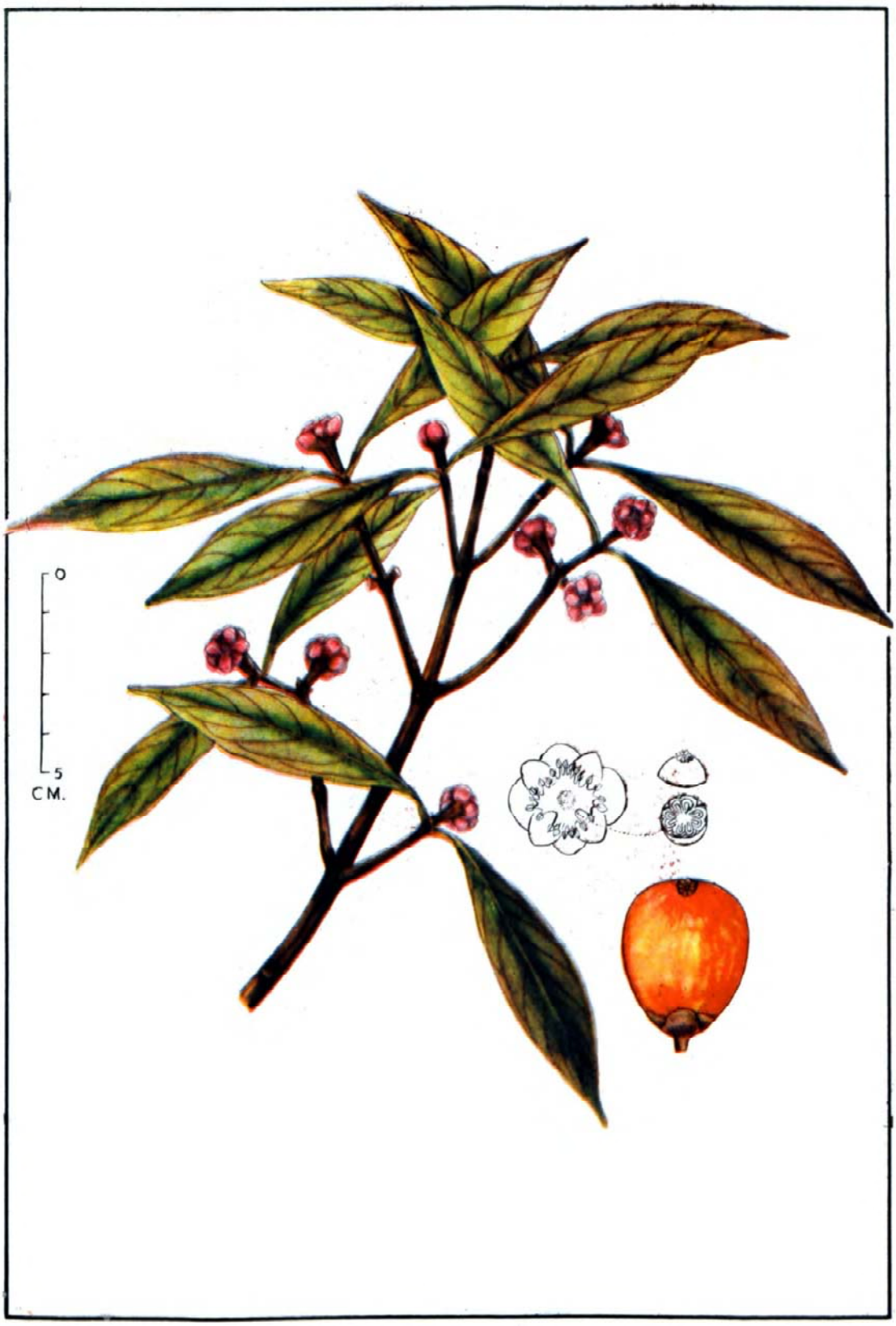
GARCINIA KYDIA Roxb.

15. GARCINIA LANCEOFOELIA Roxb.

Leaves narrow, lanceolar, acute. *Flowers* terminal, solitary. *Stigma* from six to eight-lobed. *Berry* turbinate, with as far as eight seeds.

A small tree, a native of Silhet, where it is known to the natives by the name Kirindur, and by them cultivated for the fruit, which they are fond of. Flowering time in February, its fruit ripens in July.

(W. Roxburgh, *Flora Indica* 2: 623, 1832)



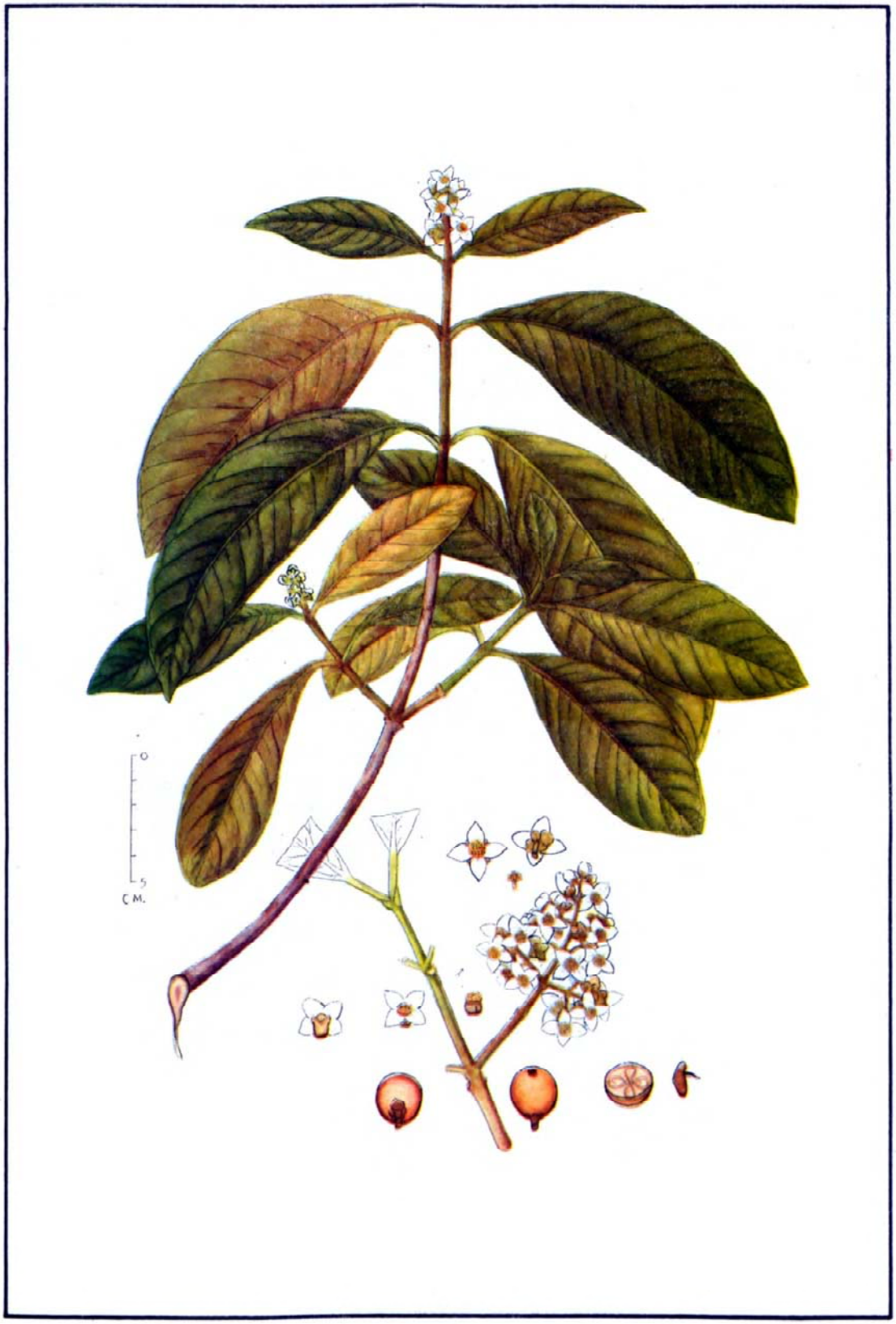
GARCINIA LANCEOFOELIA Roxb.

16. GARCINIA PANICULATA Roxb.

Dioecious. *Leaves* oblong. *Male flowers* panicled, *female* spiked, and without nectary. *Berry* spherical, four-seeded.

This tree, found in a few gardens about Calcutta, was originally from Silhet, where the tree is indigenous, and known to the natives by the name Boobee-kowa; about Calcutta, they are smaller than in their native soil. Flowering time the cold season; the fruit ripens in July. *Trunk* straight, *branches* numerous, erect, and ascending; *branchlets* cross-armed. *Bark* pretty smooth, of a dark-brownish colour. *Leaves* opposite, decussated, short petioled, oblong and oblong-lanceolate, entire, obtuse-pointed, or emarginate, smooth and shining on both sides; about six inches long and from two to three broad. *Male* flowers very numerous, white, collected on large brachiate panicles. *Calyx* and *corol* as in the genus. *Stamina* numerous, on an elevated, glandular, central receptacle. *Female* flowers on a distinct tree. *Spikes* terminal, short, rigid, supporting a few, generally five or seven rigidly sessile, decussate, small, pure white flowers. *Calyx* and *corol* as in the genus; no nectary. *Stamens,* rarely the rudiments of one or two may be present. *Germ* oval. *Style* none. *Stigma* large, convex, entire, dotted with glands. *Berry* round, of the size of a large cherry, when ripe yellow, succulent, and containing generally four reniform seeds, each immersed in a pulpy aril. This pulpy aril is palatable, its taste more like that of the mangosteen than anything else I can compare it to.

(W. Roxburgh, ***Flora Indica*** 2: 626, 1832)



GARCINIA PANICULATA Roxb.

17. GARCINIA PEDUNCULATA Roxb.

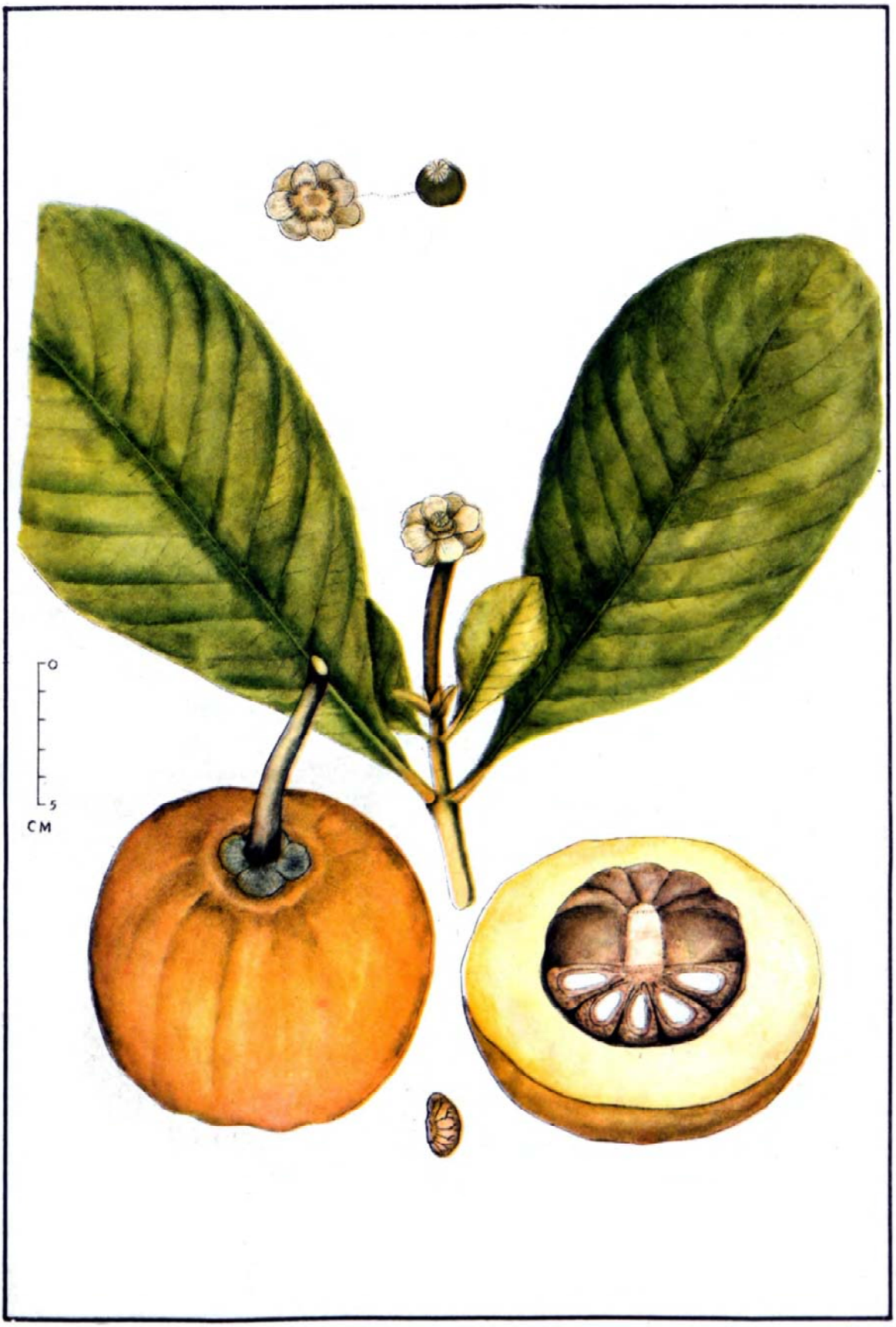
Dioecious. *Leaves* oblong with parallel veins. *Flowers* terminal, long-peduncled, *male* numerous, *female* sub-solitary, with nectarial filaments united into five bodies. *Berry* ten-seeded.

Tikul or Tikoor.

A native of Rungpoor, where the tree is indigenous. The following description was taken from fresh specimens, sent from thence by Mr. Todd, who writes that the trees are high, perhaps sixty feet, and of stately growth, some young ones planted in a garden there, were in seven years, twenty feet high with a trunk, twenty-five inches in circumference, covered with bark of a spongy texture and inwardly of a flesh colour. Flowering time from January till March. The fruit ripens in April, May and June. *Leaves* opposite, short-petioled, oblong and obovate-oblong, entire, obtuse, smooth on both sides, with large and parallel veins, from six to twelve inches long. Flowers terminal, peduncled; *male* numerous, forming small trichomous panicles; *female* solitary, and also long-peduncled. *Bractes* opposite, one or more pairs of the divisions of the male panicles, and also at the base at the long proper peduncles of both male and female flowers. The *male* flowers so far as I can see are always on a separate tree. *Calyx* of two opposite pairs of nearly equal cordate smooth, concave, fleshy leaflets. *Petals* four, oblong, alternate with the leaflets of the calyx, and nearly of the same length. *Filaments* numerous, short, collected on a large elevated four-sided, fleshy receptacle. *Anthers* twin. *Pistil* no other than an abortive gland immersed in the fleshy receptacle of the stamens. *Female calyx* and *corol* as in the male. *Nectary,* or abortive stamens, a membranous ring surrounding the base of the germ, which divides into twenty or thirty, compressed filaments. ending in enlarged, glandular heads, not unlike anthers. This ring is soon split into various portions by the growth of the germ and then appears like the phalanges of filaments in the class *Polyadelphia. Germ* superior, globular. *Style* none. *Stigma* peltate, about ten-lobed. *Berry* large, two pounds weight each, round, smooth, when ripe of a rich yellow colour, and exceedingly acid. Seeds about ten, reniform, each enclosed in its own, proper, fleshy, succulent envelope, or aril, within which I always find a quantity of soft yellow resin.

The fleshy part of the fruit which covers the seeds and their proper juicy envelope, or aril, is in large quantity, of a firm texture and of a very sharp, pleasant, acid taste. It is used by the natives in their curries, and for acidulating water. If cut into slices, and dried, it retains its qualities for years and might be most advantageously employed during long sea-voyages, as a succedaneum for lemons, or limes, to put into various messes, where salt meat is employed, &c.

(W. Roxburgh, *Flora Indica* 2: 625, 1832)

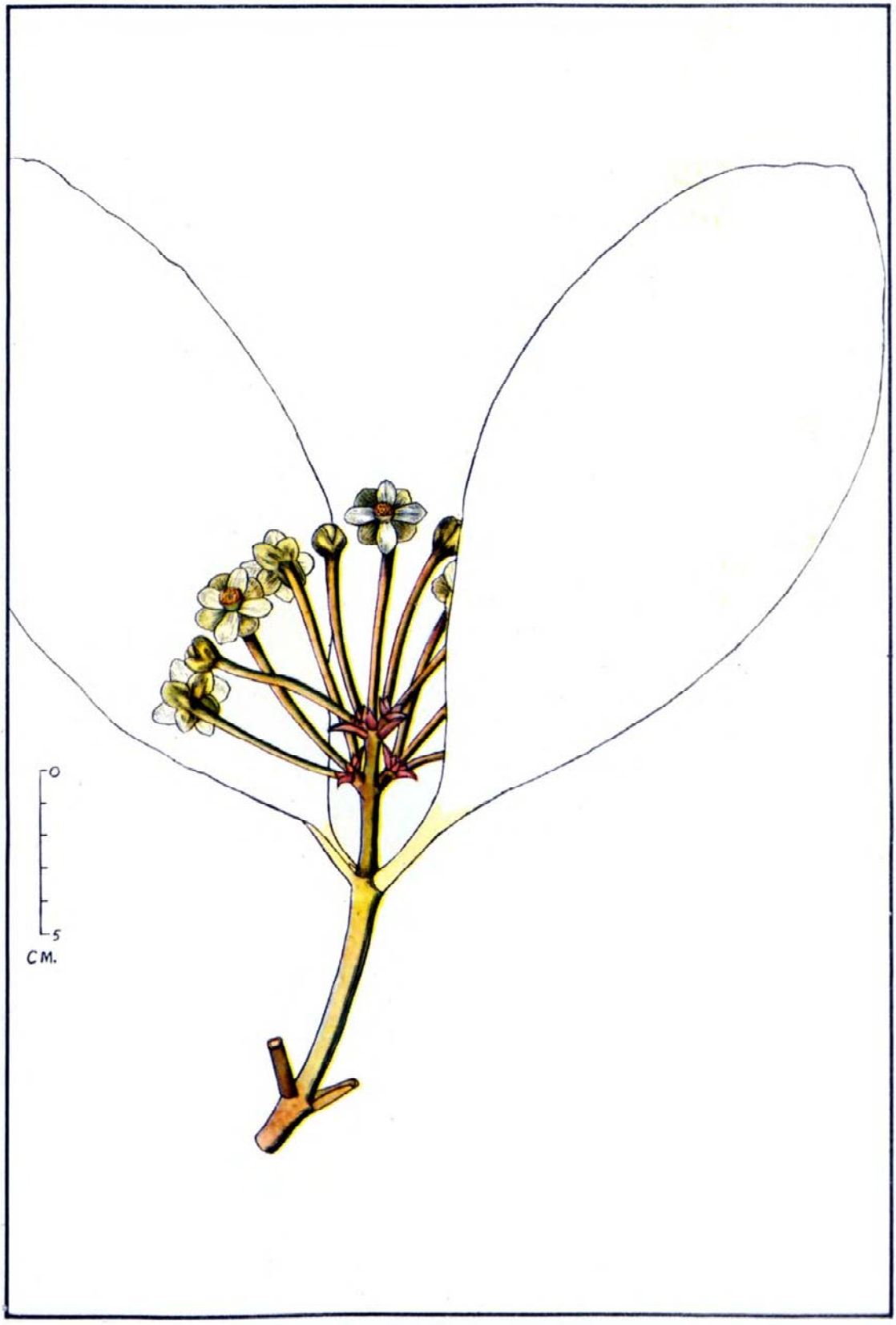


GARCINIA PEDUNCULATA Roxb.

18. GARCINIA PEDUNCULATA Roxb.

Male Plant.

(W. Roxburgh, *Flora Indica* 2: 625, 1832)



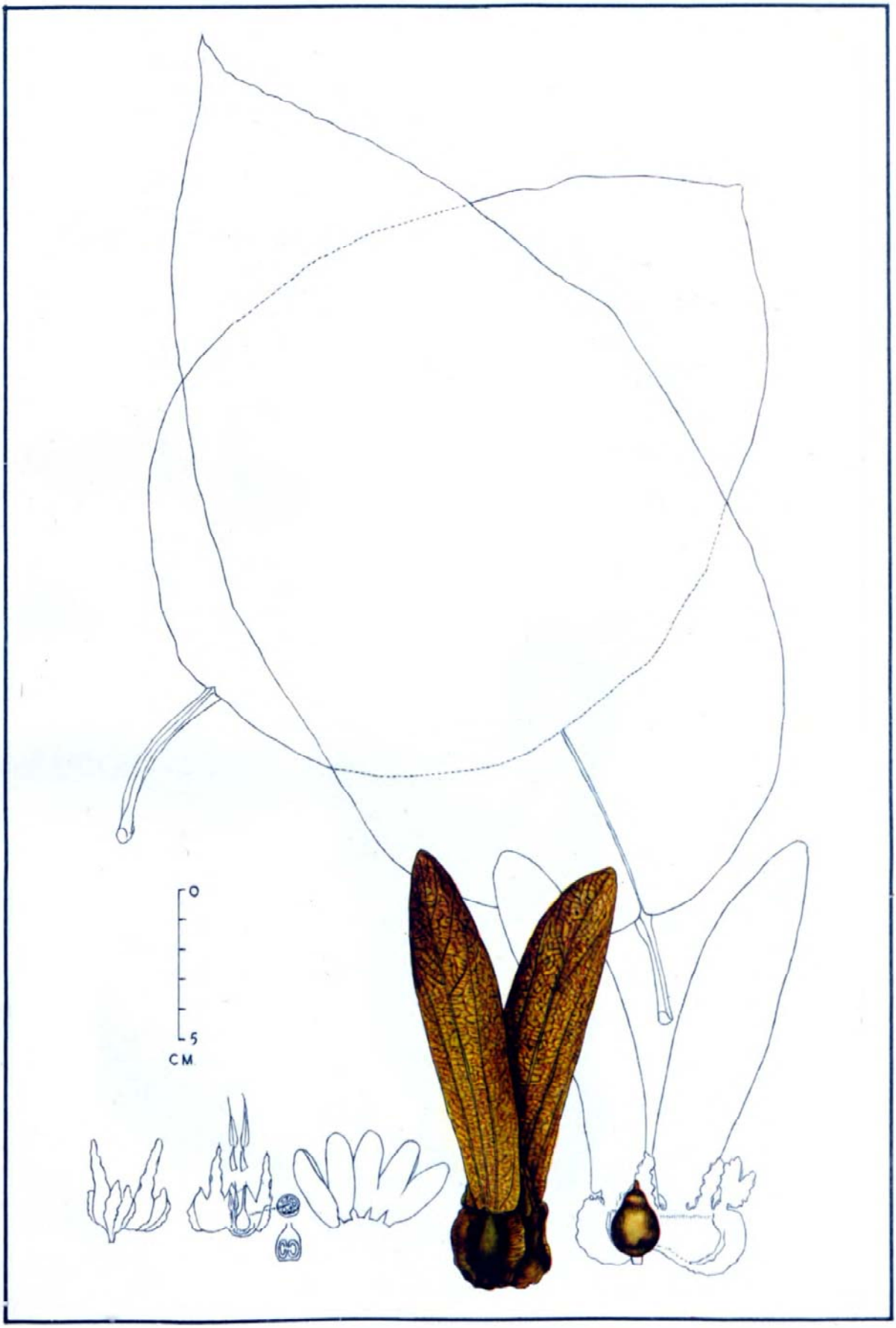
GARCINIA PEDUNCULATA Roxb.

19. DIPTEROCARPUS ALATUS Roxb.

Tender parts hairy. *Leaves* from ovate-oblong, to ovate-cordate, acuminate, smooth, and opaque above, harsh underneath margins ciliate. *Belly* of the calyx five-winged.

An immensely large tree, a native of Mascal Island, and the neighbouring coast, Pegue, &c. It is the wood oil tree of the latter country.

(W. Roxburgh, *Flora Indica* 2: 614, 1832)



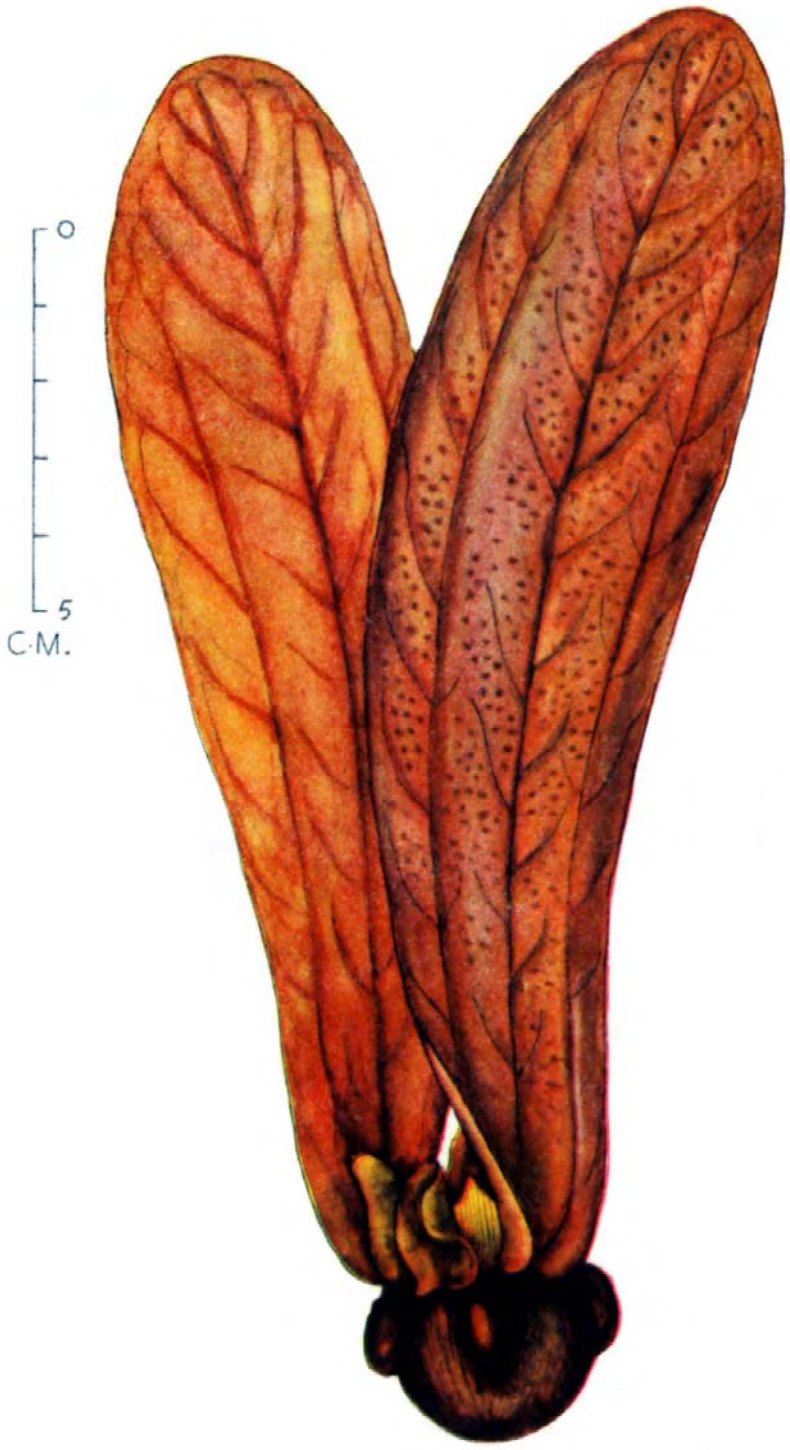
DIPTEROCARPUS ALATUS Roxb.

20. DIPTEROCARPUS TUBERCULATUS Roxb.

Body of the calyx spherical, with five knobs under its five fissures on the outside.

A native of Chittagong where it flowers about the beginning of the hot season, and the seed ripens in June.

(W. Roxburgh, *Flora Indica* 2: 614, 1832)



DIPTEROCARPUS TUBERCULATUS Roxb.

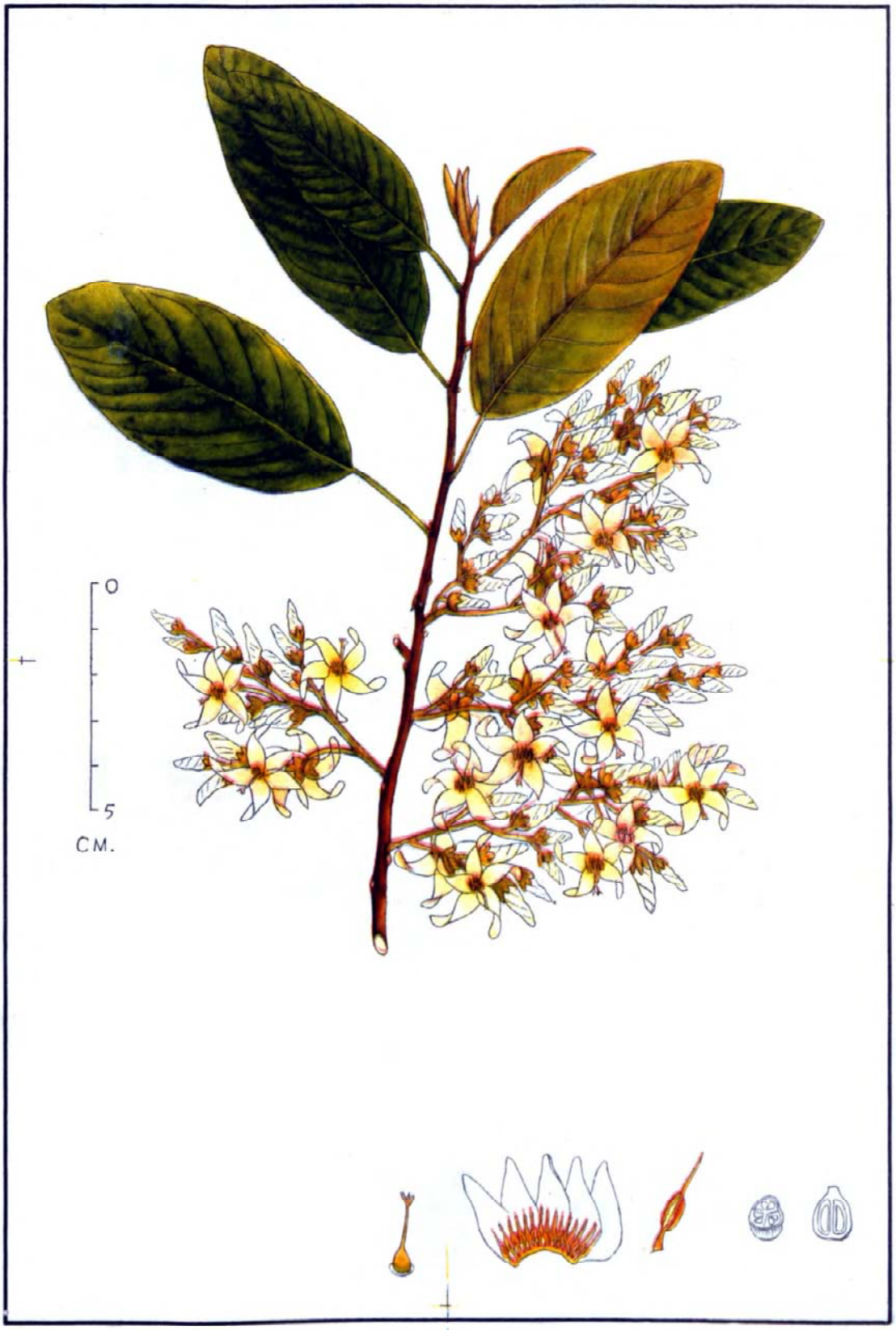
21. SHOREA TALURA Roxb.

Leaves oblong, obtuse. *Stipules* linear, falcate. *Panicles* axillary and lateral. *Stamina* fifteen.

Tam. Talura.

This is also a timber tree, a native of the Balaghat mountains, where it blossoms during the dry winds and ripens its seed in June. In *S. robusta* the germ is trilocular, with two ovula in each, attached to the top of the axis. Compare with *Vatica chinensis Smith. ic: incd.* 36. 36. t.

(W. Roxburgh, *Flora Indica* 2: 618, 1832)



SHOREA TALURA Roxb.

22. SHOREA TALURA Roxb.

Fruits.

(W. Roxburgh, *Flora Indica* 2: 618, 1832)

SHOREA TALURA Roxb.

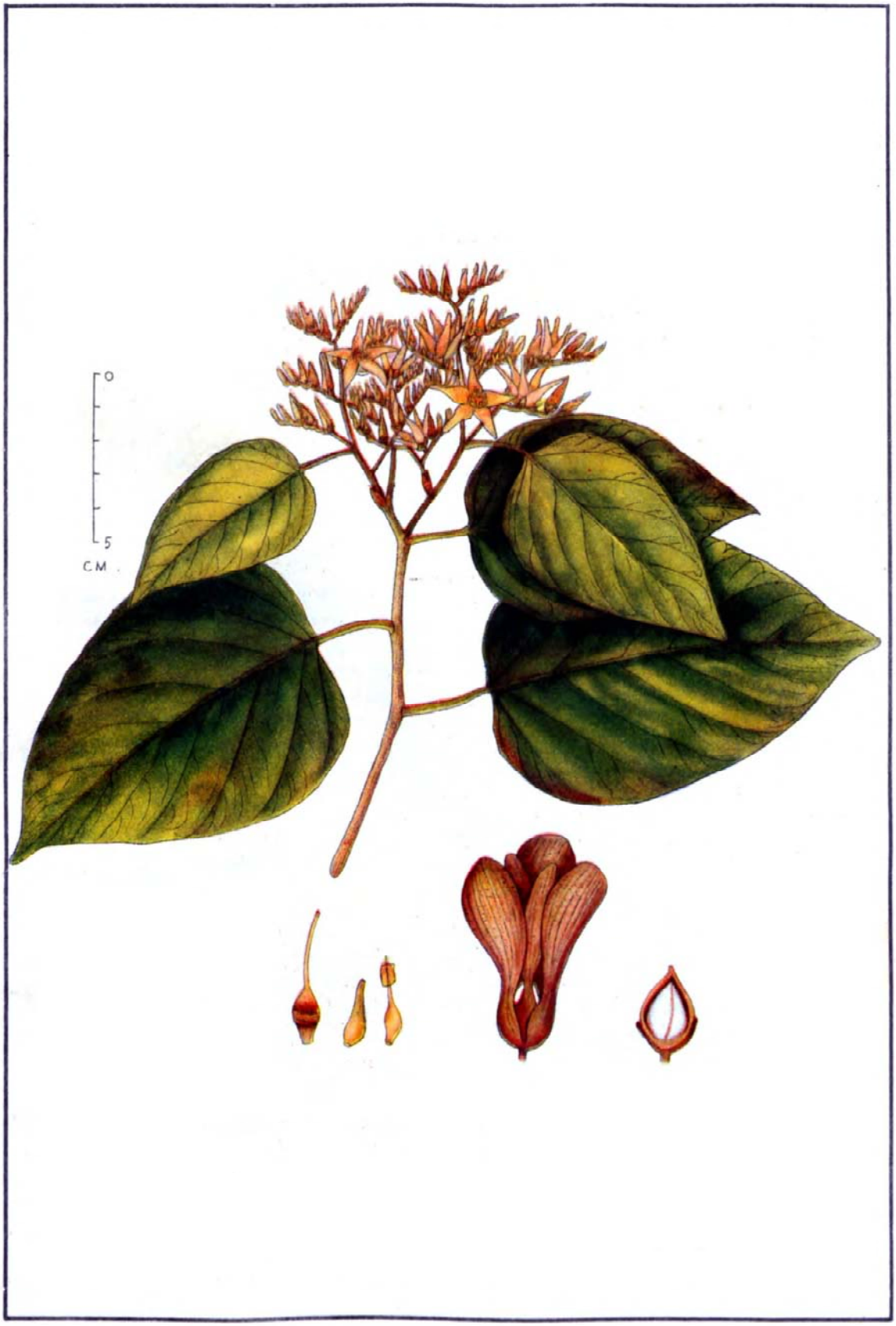
23. SHOREA TUMBUGGAIA Roxb.

Leaves ovate cordate, long-petioled. *Panicles* terminal. *Stamina* about one hundred, with bearded anthers.

Tam. Tumbugai.

A large timber tree, a native of the Balaghat mountains; it blossoms in the beginning of the hot season, and the *seed* ripens in June. Both these species yield a large quantity of the resin commonly called Dammar, in India, and very generally used as a substitute for pitch in the Marine yards. The best species are also frequently used instead of the common incense, Benzoin, in the temples of the natives. *Rumphius's Dammara Selanica. Herb. Amb.* 2. 173. t. 56. seems a species of this genus.

(W. Roxburgh, *Flora Indica* 2: 617, 1832)



SHOREA TUMBUGGAIA Roxb.

24. HOPEA ODORATA Roxb.

Leaves ovate-oblong, a hollow gland in the axils of the large veins.

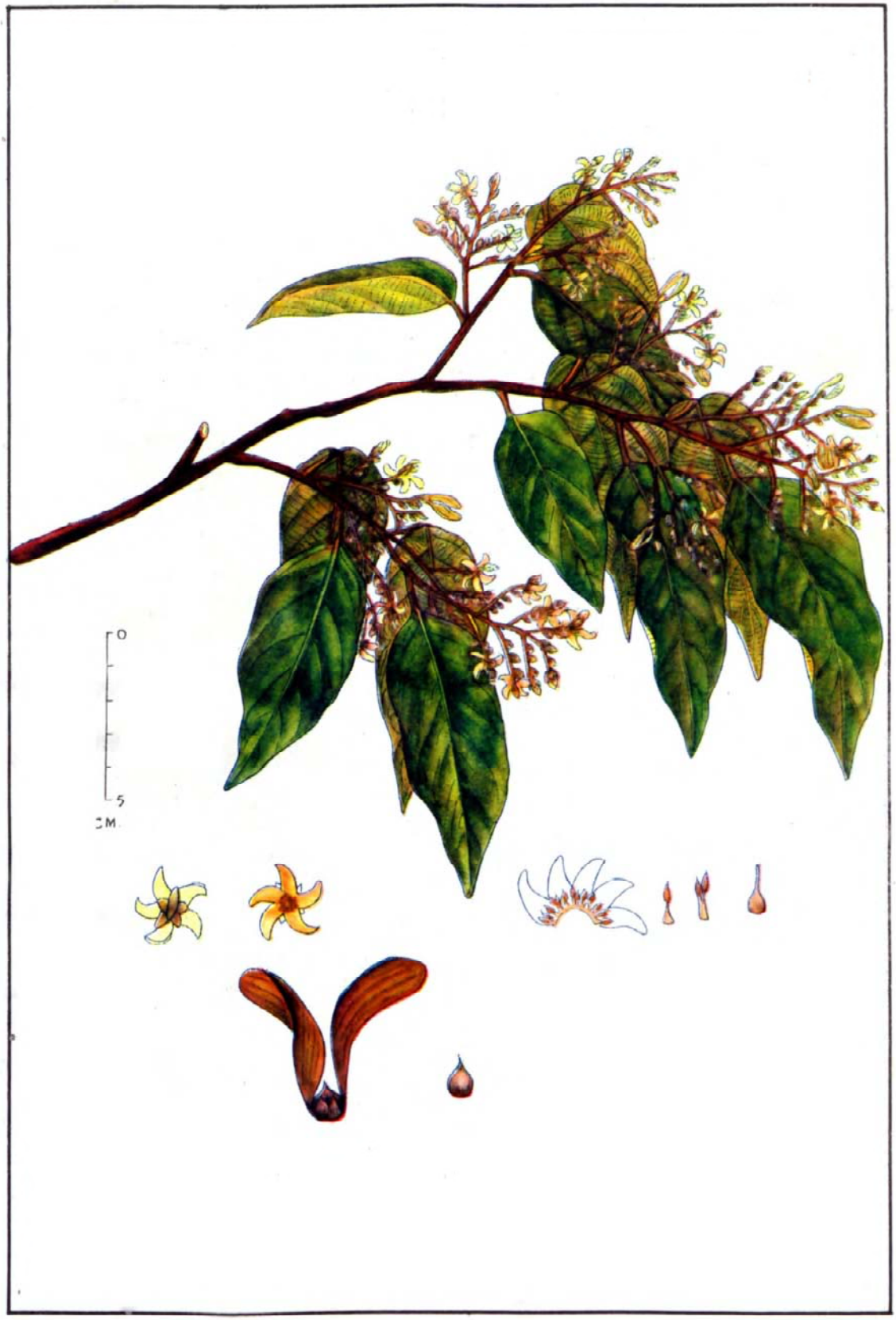
A single tree, and the only I have seen, grows in the garden of Mr. Dowdeswell near Calcutta. Its native place, the mountain to the eastward of Bengal. Flowering time the month of March. The seed ripens in May and June.

Trunk of the above mentioned single tree straight, four feet in circumference, and high in proportion. *Branches* numerous, spreading in every direction, and adorned with many long, slender, drooping, expanding, bifarious branchlets, covered with dark brown, smooth bark. *Leaves* alternate, short-petioled, bifarious, drooping, ovate-oblong, entire, waved, smooth, shining, of a deep green on both sides, having often on the under side a pretty large single gland in the axills of the large veins. *Stipules* subulate, falling off at a very early period. *Panicles* terminal, and from the exterior axills, drooping, composed of alternate, bifarious, secund recurved, villous remifications of numerous small, pale yellow, delightfully fragrant flowers. *Bractes* cordate, acute, villous, caducous. *Calyx* five-leaved, *leaflets* unequal, ovate, villous, permanent, the two largest increasing into two large oblong, obtuse, membranaceous wings, by the time the pericarpium is full grown. *Corol* one-petalled, contorted. *Tube* short, campanulate. *Border* of five oblique, sublinear, oblong, spreading divisions, with their margins revolute, curled, and somewhat villous. *Filaments* ten, about as long as the tube of the corol, and inserted by broad, conical, fleshy bases, into its bottom, alternately larger and bifid. *Anthers* fifteen, two-lobed, with a subulate point from the apex of each, or as in *Asarum* the anthers may be said to adhere to the filaments below their apices. *Germ* superior, ovate, three-celled, cells three-seeded, attached to the top of the axis. *Style* straight, the length of the stamens. *Stigma* simple. *Capsule* ovate, pointed, one-celled, evalvular, of a tender texture, closely enveloping a single seed of the same shape and size, outwardly covered with the permanent calyx, two of the leaflets of which are now enlarged into two linear oblong, obtuse, tough, membranaceous, nervous wings, many times longer than the seeds.

The above described tree is nearly allied to my *Shorea*, as well as to the wood oil tree, Dipterocarpus of the Malay Islands, Pegue and Chittagong. It differs from the first in having only two of the five leaflets of the calyx increasing into wings, in having a more petalous corol, and from *Shorea* in the stamina.

I am inclined to think *Dammara selanica* Rumph. Herber. Amb. *Vol.* 2. pp. 168. t. 56, is of the same natural order, particularly as in some parts of India, very large quantities of a resinous substance are also collected from the *Shoreas*, and used in the Marine yards, as a substitute for pitch.

(W. Roxburgh, *Flora Indica* 2: 609, 1832)



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