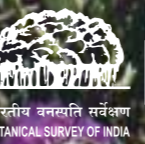




RHODODENDRONS OF SIKKIM AND DARJEELING HIMALAYA
An Illustrated Account

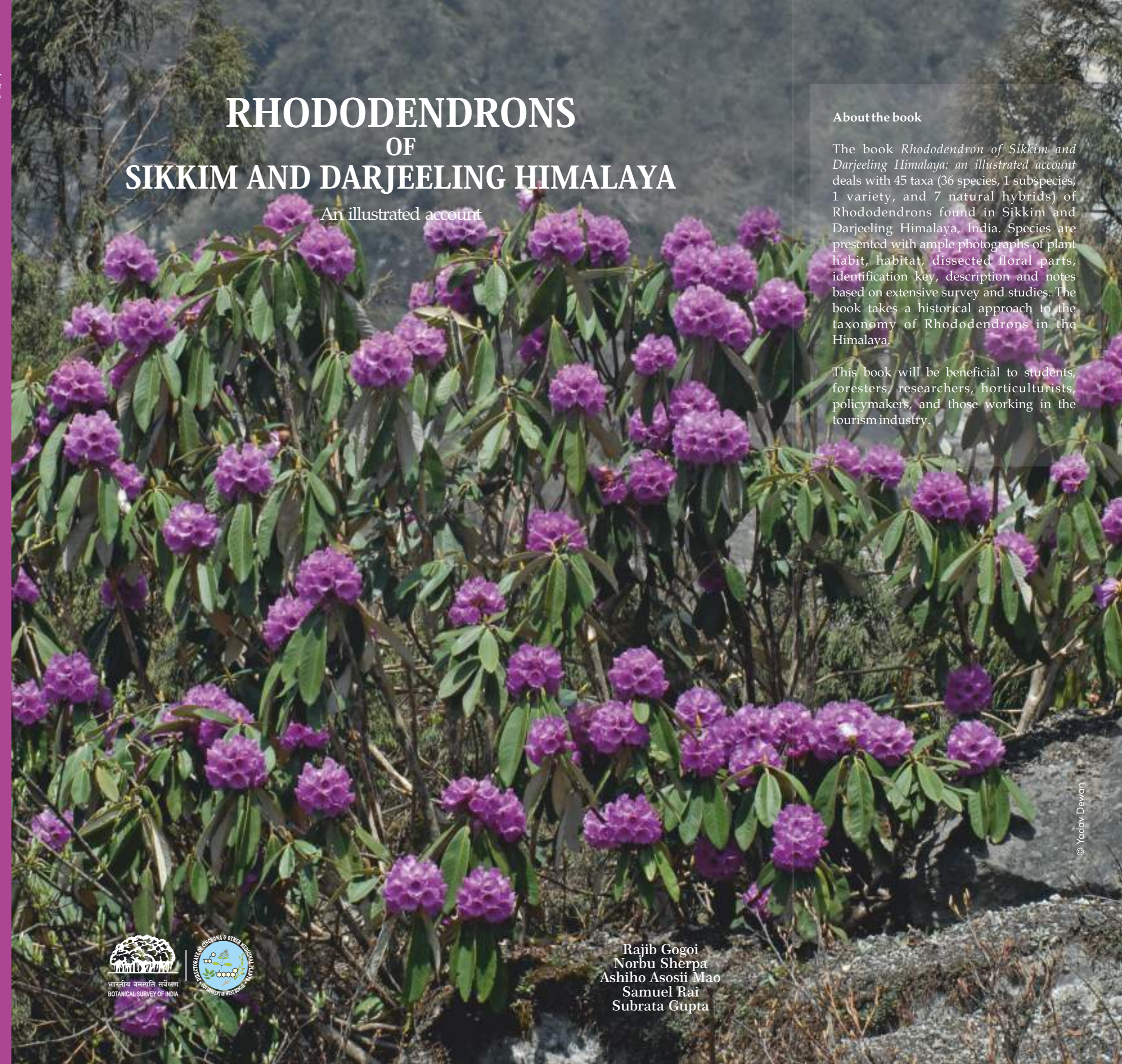


2022



RHODODENDRONS OF SIKKIM AND DARJEELING HIMALAYA

An illustrated account



About the book

The book *Rhododendron of Sikkim and Darjeeling Himalaya: an illustrated account* deals with 45 taxa (36 species, 1 subspecies, 1 variety, and 7 natural hybrids) of Rhododendrons found in Sikkim and Darjeeling Himalaya, India. Species are presented with ample photographs of plant habit, habitat, dissected floral parts, identification key, description and notes based on extensive survey and studies. The book takes a historical approach to the taxonomy of Rhododendrons in the Himalaya.

This book will be beneficial to students, foresters, researchers, horticulturists, policymakers, and those working in the tourism industry.

Rajib Gogoi
Norbu Sherpa
Ashiho Asosii Mao
Samuel Rai
Subrata Gupta

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RHODODENDRONS OF SIKKIM & DARJEELING HIMALAYA

An illustrated account

*Dedicated
to
the legendary plant collectors
Rhomoo Lepcha & Ribu Lepcha*



Rhomoo Lepcha acted as a head plant collector for the Western botanists, mainly Sir William Wright Smith, George H. Cave, and Roland Edgar Cooper. He took part in the botanical explorations of Sikkim during 1909–10, headed by Sir William Wright Smith and George H. Cave. He has made significant contributions to botany in order to gain a better understanding of oriental plants. Pictured here is Rhomoo Lepcha standing, photographed by Roland E. Cooper in June 1913 below Tsomgo Lake. (www.stories.rbge.org.uk/archives/4256), Image received from Leonie Paterson and Henry J. Noltie
© RBGE Library Archives, R.E.Cooper collection from GB235 REC/4/2/5



Ribu Lepcha along with Rhomoo collected plants for several botanists in the Botanical Survey of India and the Lloyd Botanical Garden, Darjeeling. He took part in the exploration of Sikkim with Sir William Wright Smith and George H. Cave. Pictured here is Ribu Lepcha (right) with George H. Cave (left) at Lhonak in North Sikkim.

Picture from *Handbook on Primulas of Sikkim Himalaya and North-East India* by K.C. Pradhan (2018), © Rowena Cave



In May, when seawinds pierced our solitudes,
I found the fresh Rhodora in the woods,
Spreading its leafless blooms in a damp nook,
To please the desert and the sluggish brook.
The purple petals, fallen in the pool,
Made the black water with their beauty gay;
Here might the red-bird come his plumes to cool,
And court the flower that cheapens his array.
Rhodora! If the sages ask thee why
This charm is wasted on the earth and sky,
Tell them, dear, that if eyes were made for seeing,
Then Beauty is its own excuse for being:
Why thou wert there, O rival of the rose!
I never thought to ask, I never knew:
But, in my simple ignorance, suppose
The selfsame Power that brought me there, brought you.

- Ralph Waldo Emerson (The Rhodora, 1939)



Rhododendron cinnabarinum Hook.f.

RHODODENDRONS
OF
SIKKIM & DARJEELING HIMALAYA
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Samuel Rai
Subrata Gupta



BOTANICAL SURVEY OF INDIA
Ministry of Environment, Forest & Climate Change
Government of India

Directorate of Cinchona and Other Medicinal Plants
P.O. Mungpoo - 734313
Government of West Bengal

2022

RHODODENDRONS OF SIKKIM & DARJEELING HIMALAYA

An illustrated account

December, 2022

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&
Directorate of Cinchona and Other Medicinal Plants,
Government of West Bengal

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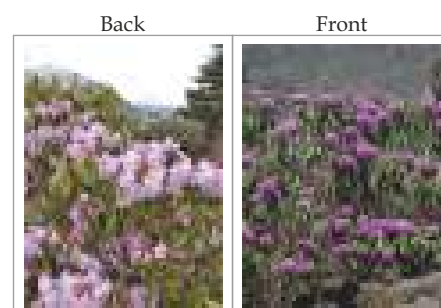
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Cover Photos



Front: *Rhododendron niveum* (© Yadav Dewan)
Back: *Rhododendron wallichii*



The accuracy of the material in this study about the usage of plant parts has been carefully ensured based on information from field observations and published reports. However, neither the authors nor the publishers can be held responsible for any repercussions that arise from the use of the materials presented in this publication.



সুব্রত সাহা
Subrata Saha



প্রতিমন্ত্রী
(স্বাধীন দায়িত্ব)
খাদ্য প্রক্রিয়াকরণ শিল্প ও উদ্যানতত্ত্ব বিভাগ
পশ্চিমবঙ্গের সরকার
Minister-of-State
(Independent Charge)
Food Processing Industries
& Horticulture Department
Govt. of West Bengal

Date: 21/11/2022



No: 283 /MOS(IC)/FPIH

Message

Darjeeling and Sikkim Himalaya is a center of diversity of unique flora and fauna in the Himalayas. The area spurred biodiversity studies during the British period and with the initiation by colonial explorers, these studies ignited the minds not only in India but globally also. In a sense, Darjeeling is a minor capital of taxonomic studies after Kolkata, Malabar coast in the oriental world. The Sikkim Himalaya including Darjeeling is the home to unique flora like *Wild Orchids*, *Wild Balsams*, *Wild Poppies*, *Primulas*, *Conifers*, wide variety of medicinal plants and the stunning *Rhododendrons*. These resources are not only important ecologically, they also have huge importance in economic generation and promotion of tourism in the region.

Rhododendrons imperiously possesses the most dazzling flowers in the entire Plant Kingdom. They have high horticultural value as well as socio-economic reverence locally. India could harness them for the economic upliftment of common people of the region. To do so, better understanding and documentation of the *Rhododendron* species with taxonomic intervention is a must to achieve the goal. As part of this, Botanical Survey of India, MoEF&CC, Govt. of India, along with Directorate of Cinchona & Other Medicinal Plants, Mungpoo (Department of Horticulture, Govt. of West Bengal) conducted the exploration and study of the Taxonomy & Diversity of *Rhododendrons* of the region (2019-2022). The outcome of the work is the wonderfully illustrative book titled "*Rhododendrons of Sikkim & Darjeeling Himalaya-an illustrated account*". This book details the *Rhododendrons* present in the region with exhaustive photographs and descriptions. The information in this book would be useful to the experts as well as the layman in identifying the splendid species of *Rhododendrons* and which would also dovetail to awareness on the conservation and economic potential of this flamboyant genus, and thereby benefitting the nature conservation, horticulture, tourism and society at large.

I congratulate both the departments and authors for bringing out this beautiful book.

Subrata Saha
(SUBRATA SAHA)



Rhododendron thomsonii Hook.f.



KARMA LODAY BHUTIA
MINISTER
Forest & Environment Department
Government of Sikkim
Sikkim



Message

Sikkim Himalaya is endowed with rich heritage of Biodiversity and Culture. The total geographic area of the state is less than 1% of the country's area but it contributes to 27% of India's floristic wealth. The gradation of altitude from tropical to alpine and the cold desert makes the region house varied ecosystem, which makes it a micro center of evolution and speciation, resulting in remarkable diversity of unique flora and fauna.

This phytogeographical distinction served to make Sikkim the *de jour* destination for plant explorers, triggered by the forays of Sir J. D. Hooker who explored Sikkim between 1848-49. Hooker's explorations led to discovery of significant flora and fauna that led to much more such explorations and these discoveries put Sikkim on the global map. Sir J. D. Hooker's botanical publication of "*The Rhododendrons of Sikkim Himalaya*", astounded the western botanical fraternity. The colored paintings of Rhododendrons showcased in the book invoked curiosity and soon enough, Sikkim became synonymous as the land of the most enchanting flowers.

Sikkim, a global leader in conservation, has declared two areas as Rhododendron sanctuaries viz., Barsey and Shingba, as part of its commitment for protection and conservation of biodiversity. The flowering season of Rhododendrons is much awaited and has gained enormous popularity amongst tourists who flock to enjoy the magnificent beauty of Rhododendron flowers.

To maximize the ecological and economic potentials of Rhododendrons, we must consistently make effort to conduct scientific study, conserve and propagate this flagship species of Sikkim. The present effort is a life long awaited worthy successor to Hooker's book on Sikkim Himalayan Rhododendrons.

Lastly, I congratulate the Botanical Survey of India and Directorate of Cinchona and Other medicinal Plants, Mungpoo on bringing out this book titled "*Rhododendrons of Sikkim & Darjeeling Himalaya-an illustrated account*". This book will help various stakeholders in conservation, awareness, and general identification of species.

I congratulate both the departments and the authors in this endeavor.

(Karma Loday Bhutia)
MINISTER
Forest & Env. Department, and Mines & Geology Department
Science & Technology Department
Government of Sikkim

अनित थापा
ANIT THAPA



प्रमुख कार्यपाल
गोर्खाल्याण्ड क्षेत्रीय प्रशासन
Chief Executive
Gorkhaland Territorial Administration

Message

Darjeeling and Sikkim region is the hub of biodiversity study and conservation in India. This region came into prominence with the foray of colonial plant collectors and explorers awed by its humongous biodiversity. This legacy of understanding biodiversity and their conservation is still continuing with exemplary evidences for the protection of the rare floral and faunal wealth. The wealth of biodiversity of the region is its totem, identity and instrumental in ecological and social harmony.

This biodiversity needs to be harnessed economically for the welfare of the society. This needs to take into account that harnessing of biodiversity is sustainable with an eye for future generations. Darjeeling and Sikkim Himalayas are endowed with unique floral diversity like Orchids, medicinal plants and other economically important plants etc. One such important group is the *Rhododendron*. The bewitching flowers of Rhododendrons with its dazzling array of colours from red, yellow, white, purple, orange to pink and every hue in between, have spellbound those fortunate to lay eyes upon it.

To have these plants, that sparked the interest of botanist, horticulturalists, gardeners, and people all over the world in our backyard is a blessing. This blessing comes with a responsibility to protect them. To conserve, we need understand them with rigorous scientific study and reconnoiter for their use in the field of horticulture and in tourism promotion of the region. It is a proud moment for us that "*Botanical Survey of India*" in collaboration with "*Directorate of Cinchona and Other Medicinal Plants*" is bringing out a pictorial book entitled "*Rhododendrons of Sikkim & Darjeeling Himalaya - An Illustrated Account*" which will immensely help different stake holders like foresters, nature lovers, students, plant growers and also in tourism promotion. I congratulate the authors and both the departments for bringing out such a valuable book.

Thanking you,

With regards,

(Anit Thapa)
Chief Executive

Gorkhaland Territorial Administration

Lalkothi Secretariat, Darjeeling - 734101 (Phone: 0354 2255022, e-mail: chiefexecutive@gmail.com)





DR. JOSEPH DALTON HOOKER IN THE RHODODENDRON AREA OF THE HIMALAYA

Depicted here in the 1854 monochrome is Hooker, seated, in native costume, and surrounded by the native plant collectors who are offering specimens to him. In the background, flowers of *Rhododendron dalhousieae* dangle while Gorkha soldiers stand guard.

Sir Joseph Dalton Hooker sailed off for India in the year 1847, at the age of 22, as an assistant surgeon and botanist. He reached Darjeeling in 1848 and then started his voyage to parts of eastern Nepal and the interiors of Sikkim. He was the first westerner to explore and botanize Sikkim. His contribution to Indian and Himalayan botany and to mankind is not unnoticed, whereas for the Sikkim and Darjeeling Himalaya, it was his works that shed light on the rich biodiversity and beautiful landscapes of this small Himalayan realm.

This time the authors have attempted to look back and illustrate the Himalayan heritage more vividly, which Sir Hooker initiated and brought to the attention of the global masses some 175 years ago.



a



c



b



d

Plate 11.3. *Rhododendron ciliatum* Hook.f., a. inflorescence with flowers and flower bud, b. twigs bearing withered corolla, and showing calyx lobes clasping after anthesis, c. densely ciliate young twig, d. close view of calyx lobes enclosing pistil with apically notched ovary.



Clematis montana Buch.-Ham. ex DC., and *Rhododendron ciliatum* compliment each other in the temperate zone.



Rhododendron cinnabarinum Hook.f. subsp. *cinnabarinum*
in full bloom near Tonglu, Darjeeling.



Rhododendron cinnabarinum Hook.f., Rhododendr. Sikkim-Himalaya t. 8 (1849)
subsp. **cinnabarinum**

R. roylei Hook.f., *R. blandfordii* Hook.

Scarlet-flowered Rhododendron; *Kechung*, *Kema* (Lepcha); *Sano Chimal* (Nepali).

Shrub, up to 3 m high; bark reddish or purplish-brown, peeling; young shoots and leaves scaly. Petiole green to reddish-green, 0.8–1.5 cm long, glabrous or sparsely scaly; leaf blade lanceolate to elliptic, 3.5–8.0 cm long, 1.5–4.0 cm broad, coriaceous, apex acute to apiculate, margins entire, base obtuse to rounded; adaxial surface dark green, glabrous, abaxially densely scaly, veins finely anastomosing. Inflorescence 3–8 flowered; flowers pendent; rachis scaly; bracts ovate to oblong, 0.8–1.5 cm long, 0.6–1.0 cm broad, scaly, hairy along margins; bracteoles lanceolate, 0.5–1.0 cm long, 0.1–0.2 cm broad, hairy. Pedicel 0.5–1.0 cm long, scaly. Calyx 5-lobed, lobes triangular to oblong, 0.1–0.4 cm long, 0.1–0.3 cm broad, unequal, much reduced sometimes, scaly. Corolla tubular to narrowly campanulate, 3–4 cm long, 2.0–2.5 cm across, 5-lobed, brick red to scarlet or orange, sometimes flushed with yellow, glabrous, waxy outside. Stamens 10, sub-equal, 2–3 cm long, included; filaments hairy at the base; anthers light-brown. Style 2.5–3.5 cm long, hairy at the base, exerted; stigma capitate; ovary ovoid, 0.4–0.5 cm long, scaly. Capsule ovoid-oblong, 0.8–1.2 cm long, scaly.

Flowering: April to May, fruiting in October.

Distribution: Darjeeling (Gairibans, Kaiyakatta, Tonglu, Tumling), Sikkim (Dzongu, Kyongnosla Alpine Sanctuary, Shingba Rhododendron Sanctuary, Yumthang, Zuluk), Arunachal Pradesh; Bhutan, China and Nepal.

Altitude: 2900 to 4000m.

Habitat: Temperate to sub-alpine zone, rocky hillsides in coniferous forest, and edges of Rhododendron thickets.

Etymology: From the Greek word *cinnabar* (*kinnabari*)- brick-red coloured Mercury Sulphide, the species name refers to its brick-red or scarlet flowers.

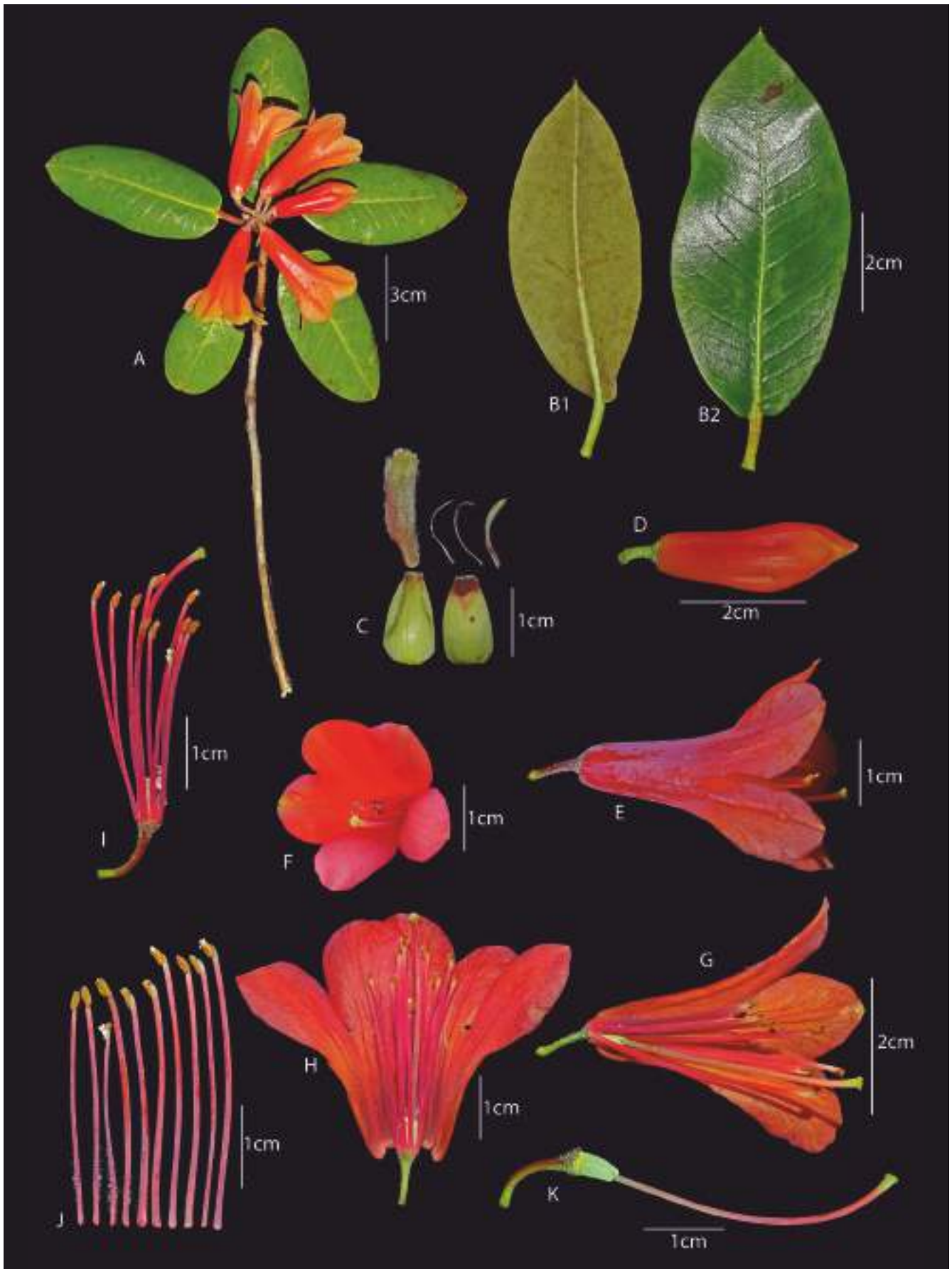


Plate 12.1. *Rhododendron cinnabarinum* Hook.f. subsp. *cinnabarinum* (red colored form), A. flowering twig, B. leaves (B1. abaxial, B2. adaxial), C. bracts and bracteoles, D. flower bud, E. flower (lateral view), F. flower (front view), G. flower (split open half), H. calyx lobes, I. stamens surrounding pistil, J. stamens, K. pistil.



Plate 12.2. *Rhododendron cinnabarinum* Hook.f. subsp. *cinnabarinum* (red colored form) trusses with tubular-bell shaped flowers emerging along with new shoots. The red flowered form is common along the Singalila ridge.

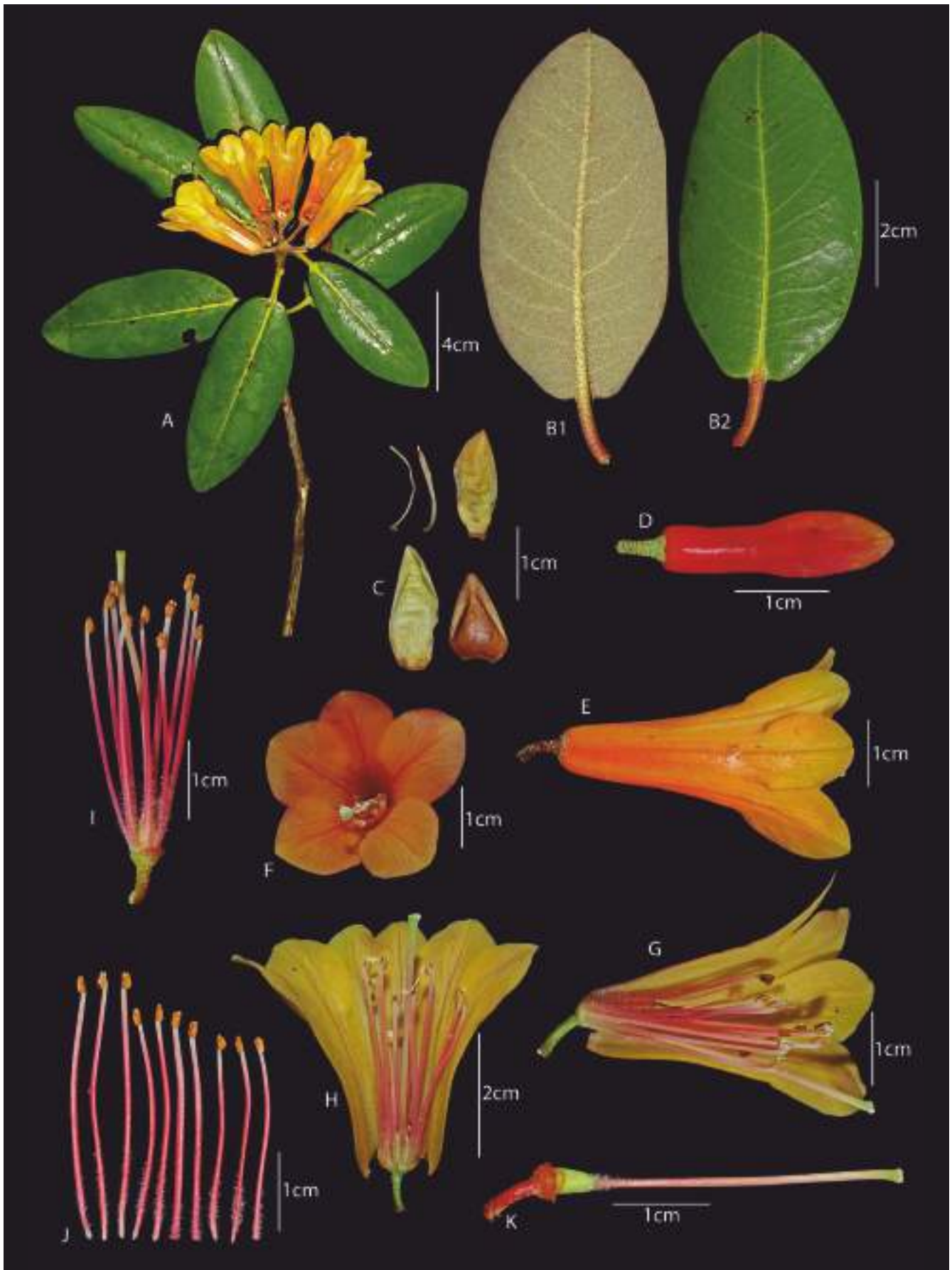


Plate 12.3. *Rhododendron cinnabarinum* Hook.f. subsp. *cinnabarinum* (orange-yellow colored form), A. flowering twig, B. leaves (B1. abaxial, B2. adaxial), C. bracts and bracteoles, D. flower bud, E. flower (lateral view), F. flower (front view), G. flower (split open half), H. calyx lobes, I. stamens surrounding pistil, J. stamens, K. pistil.



a



b

Plate 12.4. a. *Rhododendron cinnabarinum* Hook.f. subsp. *cinnabarinum* (orange-yellow colored form) in its natural habitat in coniferous forest form much branched scattered bushes, b. trusses bearing scarlet-orange flowers.



a



b



c



d

Plate 12.5. (a-c) Different colored forms of *Rhododendron cinnabarinum* subsp. *cinnabarinum* flowers, a. scarlet-orange flower flushed with yellow bearing distinctly lobed calyx, b. scarlet-orange flower flushed with yellow bearing only a single prominent calyx lobe, c. plain red flowers, d. mature trunk with its bark peeling.



Stauntonia latifolia (Wall.) R.Br. ex Wall.
blooms in April and May, and shares the higher reaches
of temperate broad-leaved woods
with *Rhododendron cinnabarinum* subsp. *cinnabarinum*.



A truss of *Rhododendron dalhousieae* var. *dalhousieae*



Rhododendron dalhousieae Hook.f., Rhododendr. Sikkim-Himalaya t. 1-2 (1849)
var. **dalhousieae**

R. dalhousieae Hook.f. subsp. *tashii* Pradhan & Lachungpa
Lady Dalhousie's Rhododendron; *Lahare Chimal* (Nepali).

Shrub, up to 4 m high; bark reddish-brown, peeling; young shoots and leaves scaly. Petiole green to reddish-green, 0.8–1.2 cm long, bristly; leaf blade oblong-elliptic to oblanceolate, 5–12 cm long, 2.5–5.5 cm broad, coriaceous, apex obtuse to sub-acute or apiculate, margins entire, base cuneate, sparsely hairy; adaxial surface dark green, sparsely scaly, abaxially light green, densely scaly, veins prominent beneath. Inflorescence 3–7 flowered umbel; rachis reduced, with scars of bracts, glabrous; bracts broadly ovate to oblong, 0.8–1.5 cm long, 0.6–2.0 cm broad, scaly, membranous along margins; bracteoles lanceolate, 0.5–1.0 cm long, 0.1–0.2 cm broad, hairy along margins. Pedicel 0.8–1.5 cm long, glabrous or minutely hairy. Calyx deeply 5-lobed, persistent, lobes ovate to oblong, 0.6–1.2 cm long, 0.4–0.6 cm broad, apex obtuse, glabrous. Corolla tubular-campanulate, 5–9 cm long, 6–8 cm across, 5-lobed, creamy white to light green, flushed with pink or pale lemon green inside, tube depressed at the base, glabrous. Stamens 10, sub-equal, 4–7 cm long, included; filaments densely hairy on the lower half; anthers brown. Style 5–9 cm long, scaly at the base, exerted; stigma capitate; ovary ovoid, 0.5–1.0 cm long, densely scaly. Capsule oblong, 4–5 cm long, densely scaly.

Flowering: April to May, fruiting in July to October.

Distribution: Darjeeling (Manebhanjyang, Sinchel Wildlife Sanctuary), Kalimpong (Neora Valley National Park), Sikkim (Barsey Rhododendron Sanctuary, Barapathing, Chungthang, Lachung, Maenam, Pangthang), Arunachal Pradesh; Bhutan and Nepal.

Altitude: 1700 to 2700m.

Habitat: Temperate zone, epiphytic or lithophyte in broad-leaved forest, rocky cliffs and hillsides.

Etymology: This species was named in the honour of **Marchioness of Dalhousieae, Susan Hay** (1817–1853), wife of **Lord James Broun Ramsay** (1812–1860) popularly known as the **Lord Dalhousieae**, the then Governor General of India.

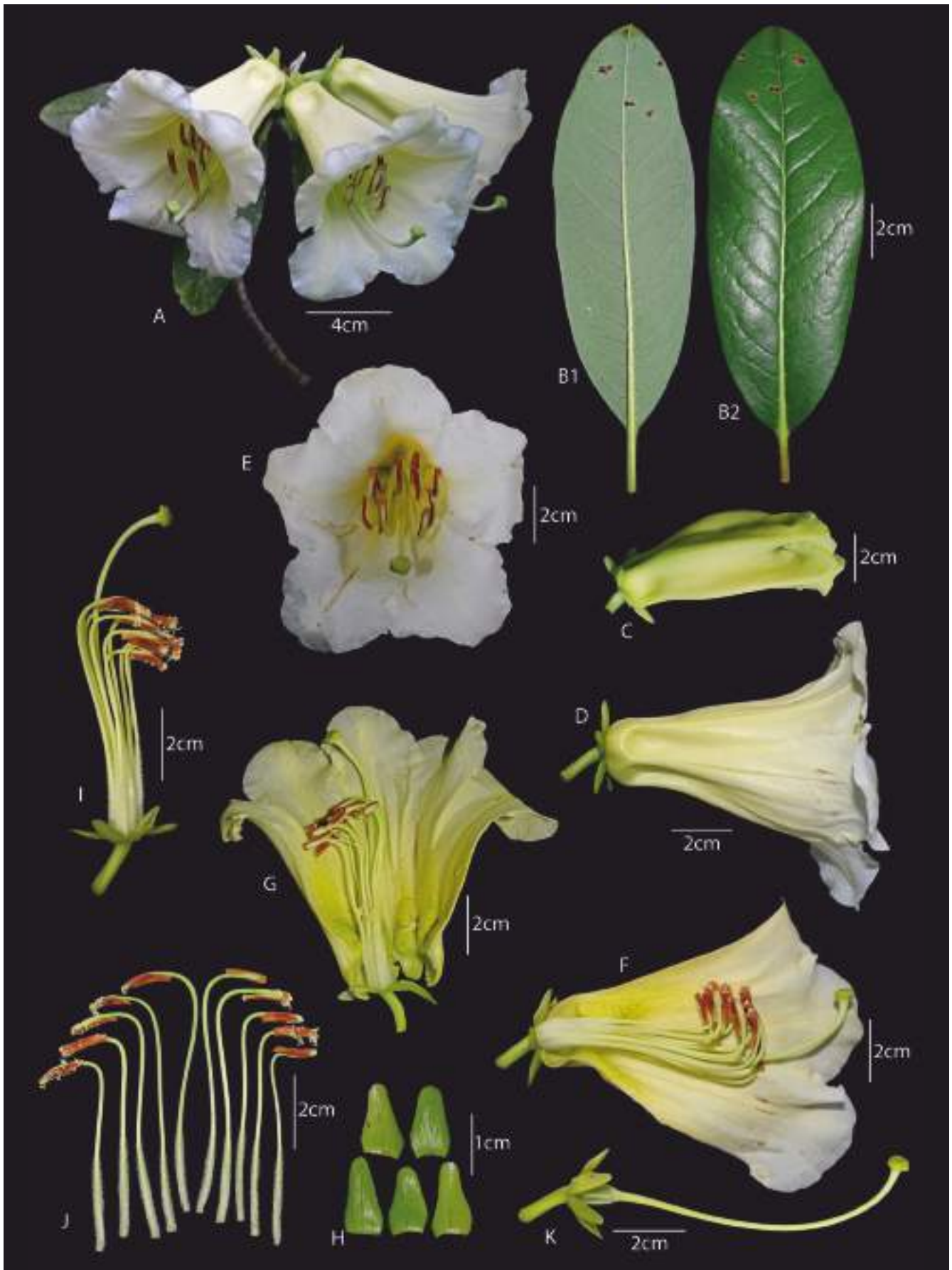


Plate 13.1. *Rhododendron dalhousieae* Hook.f. var. *dalhousieae*, A. flowering twig, B. leaves (B1. abaxial, B2. adaxial), C. flower bud, D. flower (lateral view), E. flower (front view), F. flower (split open half), G. flower split open, H. calyx lobes, I. stamens surrounding pistil, J. stamens, K. pistil.



a



b



c



d

Plate 46. a & c. *Rhododendron aeruginosum* × *R. wightii* - natural hybrid between *R. aeruginosum* and *R. wightii* in Yumesamdong; it occurs in open alpine slopes where habitat of the two parents overlap, a. plant in habitat showing branching pattern and inflorescences, b. inflorescence and flowers of *R. aeruginosum*, c. inflorescence and close view of flowers of the natural hybrid, d. inflorescence and flowers of *R. wightii*.



Inflorescence of natural hybrid between *R. aeruginosum* and *R. wightii*.



Plant of natural hybrid between *R. aeruginosum* and *R. wightii* in habitat, Thickets of one of the parents, *R. wightii* can be seen on the background, whereas *R. aeruginosum* occupies the slope to the right of the frame.

Seed morphology of a few notable species

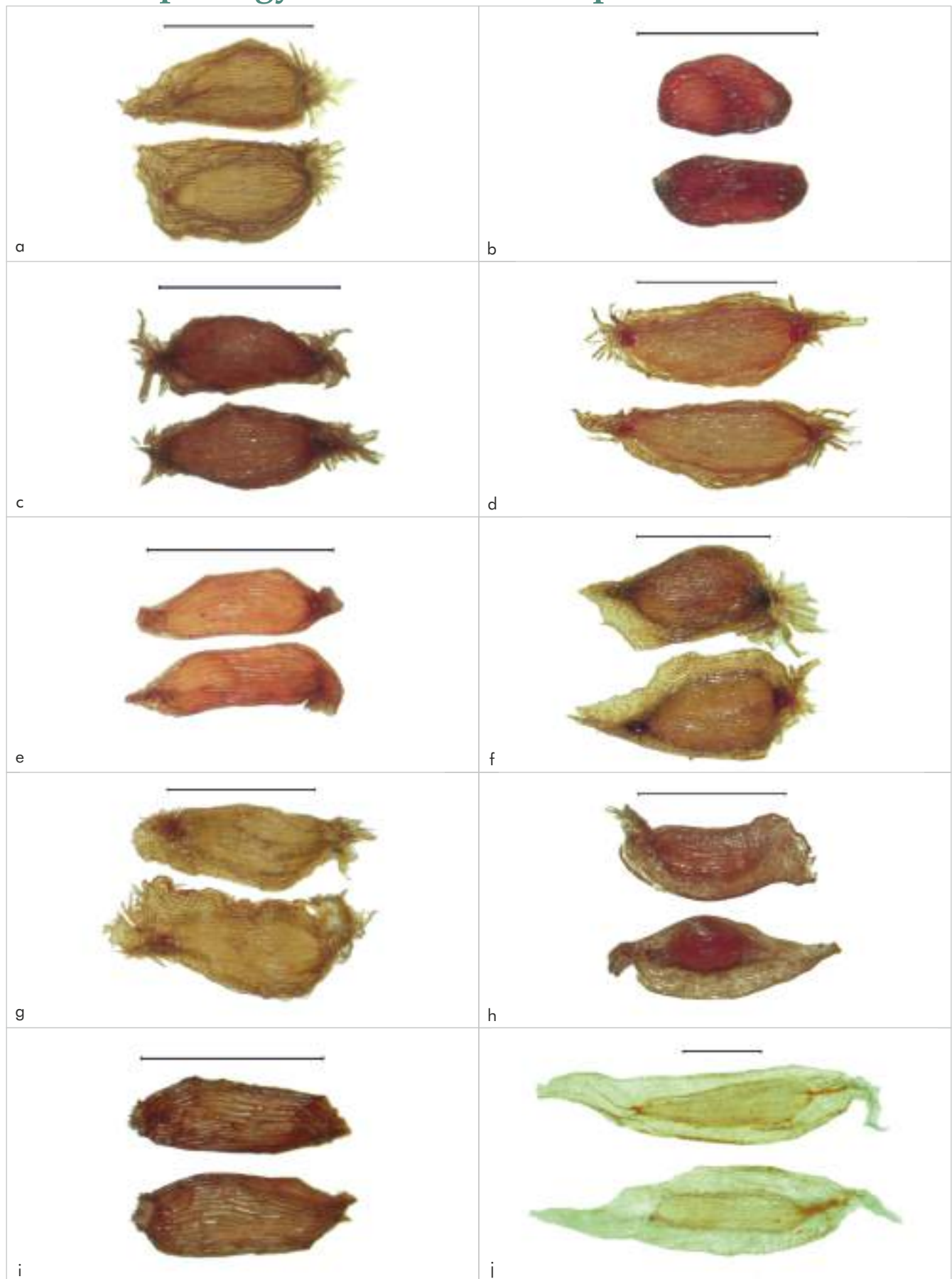


Plate 47.1. Seed morphology of few Sikkim-Darjeeling Himalayan Rhododendrons. a. *R. aeruginosum*, b. *R. anthopogon*, c. *R. arboreum* subsp. *arboreum*, d. *R. arboreum* subsp. *cinnamomeum* var. *cinnamomeum*, e. *R. baileyi*, f. *R. barbatum*, g. *R. campanulatum*, h. *R. ciliatum*, i. *R. cinnabarinum* subsp. *cinnabarinum*, j. *R. dalhousieae* var. *dalhousieae*.

Bar indicates 1 mm



Plate 47.2. Seed morphology of few Sikkim-Darjeeling Himalayan Rhododendrons. a. *R. edgeworthii*, b. *R. falconeri* subsp. *falconeri*, c. *R. griffithianum*, d. *R. lepidotum*, e. *R. maddenii* subsp. *maddenii*, f. *R. niveum*, g. *R. × sikkimense*, h. *R. thomsonii* subsp. *thomsonii*, i. *R. vaccinioides*, j. *R. wightii*.

Bar indicates 1 mm

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