

Records

of the

Botanical Survey of India.

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VOLUME IV.—No. I.

AN EPITOME OF THE BRITISH INDIAN SPECIES
OF IMPATIENS.

BY

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PART I.

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AN EPITOME OF THE BRITISH INDIAN SPECIES OF *IMPATIENS*.

—◆—
By J. D. HOOKER.
—◆—

INTRODUCTION.

The following classified list of Indian Balsams, followed by some synonymy and habitats, is offered to the "Records of the Botanical Survey of India" in the hope that it may induce the resident botanists and forest officers of that country to take up the collecting, if not the study, of this, which is the second largest genus* of Indian flowering plants and that which has hitherto been the most neglected by collectors.

The classification of species here attempted is a wide departure from that adopted in the *Flora of British India*. For this there are two principal reasons,—firstly, the number of new species discovered since the publication (in 1874) of that work † and the communication of better materials of others has demanded a re-examination of the old sections, resulting in the revision of some, the abandonment of others, and the construction of additional ones. Secondly, the restriction of the vast majority of the species of *Impatiens* each to its

* In number of Indian species (about 200) *Impatiens* is exceeded by *dendrobium* alone. It abounds most in countries a very few places in which have been explored; as the Eastern Himalaya, for about 300 miles of which the small district of Sikkim alone has been explored, yielding upward of 60 species; Nepal, 500 miles long, from which about 15 species, from the Khatmandu Valley, were brought by Wallich in 1822; and Burma, which is said to swarm with species in its hilly districts, but has as yet yielded only 52, which is however double the number from that country recorded in the *Flora of British India*.

† The number of species described in the *Flora of British India* (1874) is only 124, whereas now, in 1894, about 200 are known, together with a large contingent of indeterminables. During the same interval the Western Himalayan species have risen from 15 to 24; the Eastern Himalayan from 26 to 63; and the Burmese from 22 to 52 (all above numbers approximate only).

own region of distribution, (Eastern Himalayan, Western Himalayan, Burmese, Malabarian, Ceylonese and Malayan Peninsular) and the great difference between the species of any two of these regions, necessitates the adoption to a great extent of different sections in each area.

As evidence of this segregation (which has no parallel in the Indian Flora) it is sufficient to point out that only about 8 species are common to the Himalaya east and west of Nepal respectively; that of upwards of 100 species, only 7 are common to the East Himalaya and Burma, that of nearly 60 Malabar species only 2 are found in the Himalaya or Burma; and what is most remarkable is, that of the two primary sections or series under which all the Indian species are ranged, namely A, species with a short capsule turgid in the middle, and B, species with a slender linear or clavate capsule, only one species of A is found in the Western Himalaya, and not a single species of B in Malabar, Ceylon or the Malay Peninsula; in the Eastern Himalaya and Burma, both A and B are represented. I shall therefore in this communication treat the species primarily phytogeographically.

The points upon which most information, as not being obtainable from Herbarium specimens of *Impatiens*, is wanted, are the duration and habit of the species, annual, biennial or perennial, the number and position of the stipular glands, the presence or absence of raphides in the leaves and floral organs. The colours of the flowers, with drawings if procurable, the nature and function of a dilatation on the opposing margins of the wings which occurs nearly opposite the sinus between the lobes of the wings; this, which is often absent, may be produced into an ear-shaped lobule or into a thread descending into the spur; I have called it the dorsal auricle of the wings. The anther varies greatly in the genus and can rarely be described from Herbarium specimens. The fruits and seeds of many species are unknown, and, owing to the testa of the latter shrinking in drying, these should be described from fresh specimens. Pollination by insects is a very interesting process, which should be watched and described.

In forming Herbarium specimens these should be laid in the sheets of a portfolio in the field, with spare flowers and with separate floral organs laid beside them. It is not recommended to preserve flowers in alcohol, which renders them very brittle.

The flowers of *Impatiens* are so anomalous in structure that it may be useful to inform beginners of the real nature of their parts, and of the terms which, for the sake of brevity, I have adopted in de-

scribing them. There are 3 or 5 *sepals*, usually 3 only, of which 2 are lateral, one on each side of the flower, they are often very small and green, but sometimes coloured; the third, the *lip*, is always coloured, is very much the largest, almost uniformly saccate or funnel-shaped and spurred; when there are 5 sepals the 2 additional, always small and often slender, are inserted within and above the two lateral. There are 5 petals, 4 confluent in pairs, the *wings*; the fifth petal, the *standard*, is usually more or less orbicular and often spurred at the back. Viewing the flower in front, the standard is at the back of the flower, the lip in front, the wings appear to come out of the lip and the two or four lateral sepals are more or less out of sight. The term *standard* is adopted from that of the pea-flower, the dorsal petal of which it resembles or represents, as the *wings* do the lateral wing-petals of the same plants; the term *lip* is taken from its resemblance in position, and more or less in form and function, to that organ as it occurs amongst Orchids. I need not remind botanists that the flower of an *Impatiens*, as seen in front, is really upside-down (resupinate); in early bud the position of the parts is reversed.



I.—Species of the Western Himalaya from the Nepal Frontier to Chitral.

The chief materials from which the following list is drawn up were procured by Dr. Royle, Lady Dalhousie, Captain Strachey and Mr. Winterbottom, Dr. Thomson, Mr. M. P. Edgeworth, Dr. Fleming, Mr. C. B. Clarke, and Mr. J. F. Duthie. To the latter botanist I am especially indebted for having despatched from the Botanical Department, Saharanpore, a very able collector, Mr. Inayat, into Kumaon, Kashmir and Hazara to collect and preserve specimen of Balsams with dis severed floral organs, as well as leaves and inflorescences and fruit. The results have been of very great service.

In the following key I have introduced a section that does not appear in the *Flora of British India*; it is section 5, distinguished by the position of the bracts on the raceme. It will reappear in the keys of the East Himalayan and Burmese species. The European and North American species of *Impatiens* belong to it, as do many Chinese.

The salient character of the East Himalayan group of species is that series A is represented by a single one only, *I. Balsamina* L., which is the only one common to 6 Indian regions of the genus. It

is represented by 39 species in Burma, by 10 in the East Himalaya ; and all those of Malabar, Ceylon and the Malayan Archipelago belong to it. Of the Western Himalayan species the most notable is *I. tingens* Edgew., the dorsal auricle of the wings of which is produced into a slender thread descending deep into the spur of the lip. The same structure appears in a few other in no way related Indian species. Its function is no doubt related to fertilization by insects, and should be studied in the living plant. *I. amplexicaulis* Edgew., is remarkable in its foliage ; *I. Edgeworthii* Hk. f., is the only species of the genus in India with a remarkably protruded basal lobe of the wings. *I. glauca* H. f. & T., is the only Indian species that approaches the European *I. Nolitangere* L., which extends over North Asia into China. This it does in habit, in the broad shallow crenation of the leaf, in the inflorescence, and in the disposition of the bracts.

Key to the species.

SERIES A.—Capsule short, turgid in the middle, contracted at both ends.—Of this series there are many species in Sikkim and Burma, and all those of Malabar, Ceylon, and the Malay Peninsula belong to it.

§ 1. *Inflorescence of solitary or fascicled pedicelled flowers in the axils of the leaves ; pedicels rarely fascicled on a very short peduncle, minutely bracteate at the base.*—There are many species of this section in all the other Indian regions of the genus.

Leaves alternate lanceolate serrate,
capsule oblong tomentose 1. *I. Balsamina* L.

SERIES B.—Capsule elongate, linear or clavate.—Of this series there are no species in Malabar, Ceylon or the Malay Peninsula, but many in the Eastern Himalaya and Burma.

I. Pedicels bracteate at the base only ; (never on the pedicel above the base) or ebracteate.

§ 2. *Inflorescence of many long-peduncled erect subcorymbosely disposed racemes from the axils of the upper often crowded leaves, usually many-flowered ; pedicels often paniced or whorled ; flowers large or medium-sized.*—In small specimens the inflorescence is reduced to a single peduncled few-flowered raceme. After flowering the rachis of the raceme often elongates between the flowers.

* Wings 2-lobed, basal lobe not produced in front into a decurved lobule :—

† Basal lobe of wings acute, upper margin cuspidate or spurred, capsules deflexed :—

Lip saccate :—

Leaves serrate, capsule broadly

clavate 2. *I. Roylei* Wall.

Leaves crenate, capsule elongate

narrowly clavate 3. *I. sulcata* Wall.

Lip infundibular or subsaccate :—

Leaves petioled, bracts very

slender 4. *I. Thomsoni* Hk. f.

Leaves sessile amplexicaul, bracts

lanceolate 5. *I. amplexicaulis*
Edgew.

†† Basal lobe of wings rounded, the upper margin not spurred or cuspidate :—

Leaves crenate crenulate or crenate-serrate :—

Capsules erect, racemes elongate many-flowered interrupted :—

Bracts and sepals with long

gland-tipped awns 6. *I. bicornuta* Wall.

Bracts and sepals broadly

ovate 7. *I. bicolor* Royle.

Capsules deflexed, racemes short or umbelliform few-flowered :—

Leaves ovate, bracts ovate or cordate :—

Lip infundibular, narrow-

ed into the spur 8. *I. Lemanni* Hk. f.

Lip cymbiform, spur 0. 9. *I. violoides* Edgew.

Leaves lanceolate, bracts

very slender 10. *I. Aitchisoni*
Hk. f.

Leaves serrate or serrulate, capsules erect :—

Lip with spur 1-1½ in., capsule

1-1½ in. 11. *I. Balfourii* Hk. f.

Lip with spur ½ ¾ in., capsule

½ in. 12. *I. Flemingii* Hk. f.

** Basal lobe of wing produced upwards anteriorly into a decurved lobule, flowers golden yellow, capsules erect :—

Sepals ½ in., midrib thick 13. *I. Edgeworthii*
Hk. f.

§ 3. *Inflorescence of § 2, but pedicels very rarely fascicled or whorled and flowers small, sometimes minute. Capsules erect, except in I. laxiflora.*—There are many species of this section in the Eastern Himalaya and Burma, but none in Malabar, Ceylon or the Malay Peninsula.

Leaves crenate or crenate-serrate, or serrulate in *I. brachycentra*:—

Dorsal auricle of wings filiform
descending into the spur, flowers
white or pink 14. *I. tingens* Edgew.

Dorsal auricle of wings very short or 0:—

Flowers yellow, bracts very slender, sepals uniglandular on one margin, spur long short or 0 . 15. *I. racemosa* DC.

Flowers white and rose, bracts ovate, spur long 16. *I. laxiflora* Edgew.

Flower very minute white, spur 0
or very short 17. *I. brachycentra*
K. & K.

Leaves serrate or serrulate : see also *I. brachycentra* :—

Flowers pink or white, bracts ovate 18. *I. parviflora* DC.

§ 4 *Inflorescence a very long-peduncled axillary spreading few-flowered raceme ; pedicels sub-equidistant, bracteate at the base, bracts and sepals various ; flowers large.*—There are many species of this section in the East Himalaya and Burma, but none in Malabar, Ceylon or the Malay Peninsula.

Lip saccate with a stout short incurved spur, bracts large 19. *I. Inayatii* Hk. f.

II. § 5. *Inflorescence lateral, of solitary axillary short simple or forked 1-5-flowered peduncles ; branches (pedicels) bracteate above the middle, rarely at the fork, or ebracteate sometimes beneath the flower ; flowers small or medium-sized ; capsules usually long slender terete decurved or pendulous.*—In the irregular forking or branching of the peduncle and disposition of the bracts, this section differs from all others. When the peduncle is 1-flowered, a minute bract often occurs at the middle. There are species of this section in the Eastern Himalaya and Burma, but none in Malabar, Ceylon or the Malay Peninsula.

Lip spurred, bracts narrow :—

Sepals orbicular, lip more or less

saccate, spur $\frac{1}{2}$ in. 20. *I. cristata* Wall.

Sepals ovate, lip infundibular, spur

$\frac{1}{2}$ - $1\frac{1}{2}$ in. 21. *I. scabrida* DC.

Lip spurred, bracts ovate, stem and

leaves glaucous 22. *I. glauca* Hk. f.
T.

Lip spurless :—

Leaves 2-3 in., deeply serrate or

toothed 23. *I. serrata* Benth.

Leaves 1- $1\frac{1}{2}$ in., serrulate 24. *I. serrulata* Hk. f.

OBSERVATIONS AND LOCALITIES.

§ 1.

1. *I. Balsamina*, Linn. : *Fl. Brit. Ind.* i. 453.

Tropical Himalaya, alt. 1-5,000 ft., from Kumaon to Marri.—Also in Southern and Eastern India. Besides the garden form with large double flowers, three with marked characters occur in the Western Himalaya; they will be found to be united by intermediates.

1. Basal lobe of wings short, as broad as long, cuneiform with rounded angles, spur $\frac{3}{4}$ in. long.—Murree.
2. Basal lobe of wings as broad as long, abruptly narrowed into a short stipes, spur very short. *I. rosea*, Lindl
3. Basal lobe of wings longer than broad, narrowed into a broad stipes, spur $\frac{1}{2}$ - $\frac{3}{4}$ in. long.

§ 2.

2. *I. Roylei*, Walp. : *Fl. Brit. Ind.* i. 468. *I. sulcata*, Wall. *Cat.* 4,764 in part. *I. glanduligera*, *I. candida* and *I. macrochila*, Lindl. *I. glandulifera*, Royle. *I. moschata*, Edgew.

Kumaon to Kashmir and Hazara, alt. 4,000-11,000 ft.—Extends eastwards to Central Nepal?

3. *I. sulcata*, Wall. : *Fl. Brit. Ind.* i. 469.

Kumaon to Chamba, alt. 9,000-14,000 ft.—Extends eastwards to Sikkim.

VAR. *minor*, *Fl. Brit. Ind.* l. c.

Smaller in all its parts, leaves 2-3 in. long, lip more infundibular, capsule $\frac{3}{4}$ in.

Kumaon, alt. 8,000 ft.

4. *I. Thomsoni*, *Hk. f.* : *Fl. Brit. Ind.* i. 469.

Kumaon to Kashmir and Hazara, alt. 5,000-12,000 ft.—Extends eastward to Sikkim.

VAR. *ecalcarata*.

Dhurmsala, Laka, alt. 11,000 ft.

5. *I. amplexicaulis*, *Edgew.* : *Fl. Brit. Ind.* i. 469.

Kumaon to Sirmore, alt. 6,000-12,000 ft.

6. *I. bicornuta*, *Wall.* : *Fl. Brit. Ind.* i. 475.

Kumaon and Garhwal, alt. 9,000-10,000 ft.—Extends eastwards to Sikkim.

7. *I. bicolor*, *Royle*. *I. amphorata*, *I. umbrosa* and *I. pallens*, *Edgew.* : *Fl. Brit. Ind.* i. 475.

Kumaon to Kashmir and Hazara, alt. 4,000-60,000 ft.—Extends eastward to Central Nepal.

This and *I. Thomsoni* are perhaps the most common Balsams in the Western Himalaya. The lip varies greatly in form, from saccate with a short incurved spur, to infundibular with a very slender much longer spur.

8. *I. Lemanni*, *Hk. f. & T.* in *Journ. Linn. Soc. Bot.* iv. (1860) 154; *Aitch.* l.c. xix (1882) 155 (Lehmanni).

Kurram valley, margins of stoney streams, alt. 6,000-8,000 ft. First described from specimens collected by Griffith at Otipore in Affghanistan. The plant collected by Aitchison in the Kurram valley is, I think, the same, but more and better specimens are wanted for comparison. Aitchison describes two species as inhabiting the Kurram valley; one he refers to *I. Lemanni*, which ascends to the lower limit of the other, which he refers to *I. amphorata*, *Edgew.* (*I. bicolor* *Royle*): the latter however differs greatly from *I. amphorata*, and approaches very closely to *I. Thomsoni*; it is my *I. Aitchisoni*, see below. The trans-Indus species of *Impatiens* are very imperfectly known.

9. *I. violoides*, *Edgew. MS. in Herb. Oxon.*

Between Pikha and Janglig (Kumaon?), October, 1834.

The only specimens which I have seen are very imperfect. One in the Bentham Herbarium has a ticket inscribed '*Impatiens candida*, Lindl., near Junglung, alt. 8-9,000 ft.' I cannot find the localities named. *I. candida*, Lindl., is a very different plant, a white flowered state of *I. Roylei*, Walp. The caphiform lip and absence of spur render *I. violoides* easy of recognition.

10. *I. Aitchisoni*, *Hk. f.* n. sp. *I. amphorata*, *Aitch.*, non *Edgew.* in *Journ. Linn. Soc.* xix (1880) 155.

Kurram valley, alt. 8,000-9,000 ft.

11. *I. Balfourii*, *Hk. f.*: *Bot. Mag.* t. 7,878.

Kashmir, in the Jhelum valley, Garki, *Inayat*.

12. *I. Flemingii*, *Hk. f.* n. sp.

Murree; Kashmir, alt. 6,500-8,000 ft.; and Hazara.

13. *I. Edgeworthii*, *Hk. f.*: *Fl. Brit. Ind.* i. 476. *I. chrysantha*, *Hk. f.*, *Bot. Mag.* t. 7786.

Kulu; Beas valley, alt. 4,000-6,000 ft. Chamba. Kashmir, alt. 5,000-8,000 ft. Hazara; Kagan valley.

§ 3.

14. *I. tingens*, *Edgew.* *I. racemosa*, *Wall. Cat.* 4,730 *partim*, non *DC.*; *Fl. Brit. Ind.* i. 479. *I. laxiflora*, *var. Stracheyi*, *Fl. Brit. Ind.* l. c. 480.

Kumaon to Sirmore, alt. 5,000-10,000 ft.—Extends eastwards to Central Nepal.

15. *I. racemosa*, *DC.* *I. laxiflora*, *var. khasiana*, *Fl. Brit. Ind.* i. 480.

Kumaon to Kashmir, alt. 4,000-8,000 ft.—Extends eastward to Sikkim.

VAR. *ecalcarata*; spur very short or 0.

Kumaon to Garwhal, alt. 4,000-7,000 ft.

16. *I. laxiflora*, *Edgew.*: *Fl. Brit. Ind.* i. 479, excl. vars. 2, 3, 4. *I. micranthemum*, *Edgew.*: *Fl. Brit. Ind.* l. c. 481, excl. var. 2.

Kumaon to Kashmir, alt. 6,000-11,000 ft.—Extends eastward to Sikkim. This species may be recognized by the two minute (black when dry) corpuscles, one on each side of the base of the standard; these are representatives of a second pair of sepals

Cleistogamous and spurless states occur at high elevations ; these all have the black corpuscles.

17. *I. brachycentra*, *Kar. & Kir. : Fl. Brit. Ind. i. 481.*

Kumaon to Kashmir and Chitral, alt. 6-12,400 ft. ; Garhwal, to 13,000-14,000 ft.—The minute flowers are mostly cleistogamous. The leaves vary from serrulate to crenate.

18. *I. parviflora*, *DC. Prodr. i. 687.*

Kashmir, Kishtwar and Hazara, alt. 3,500 to 8,000 ft.—Extends northward to Siberia.

§ 4.

19. *I. Inayatii*, *Hk. f. n. sp.*

Kumaon ; Kali valley, Sosa forest, *Inayat*.—A remarkable large-leaved and -flowered species, only once found.

§ 5.

20. *I. cristata*, *Wall. in Roxb. Fl. Ind. ed. Carey ii. 456. I. tricornis, Lindl. I. scabrida, Fl. Brit. Ind. i. 472 partim, non D.C. ; Wight, Ic. t. 323 ; Collett, Flor. Simlens. 74. I. Hamiltoniana, D. Don, Prodr. Fl. Nep. 204.*

Kumaon to Kunawur, alt. 6,000-10,000 ft.—Extends eastward to Bhotan.

21. *I. scabrida*, *DC. Prodr. i. 687, non Wall. Cat. 4,769. I. scabrida, partim, Fl. Brit. Ind. i. 472. ?I. calycina, Wall. in Roxb. Fl. Ind. ed. Carey ii. 463.*

Kumaon, alt. 5,000-9,000 ft. Extends eastward to Central Nepal.—Difficult to distinguish by herbarium specimens from *I. cristata*, the flowers are smaller, the lip never saccate, the basal lobe of the wings rounded at the base, the spur very variable in length.

22. *I. glauca*, *Hk. f. & T. ; Fl. Brit. Ind. i. 482.*

Kumaon and Garhwal, alt. 7,000-10,000 ft. ; Kangra valley Surram, alt. 9,500 ft.—The only Indian species allied to the European and Siberian *I. Nolintangere*, in habit and in the broad crenatures of the leaf-margins.

23. *I. serrata*, *Benth. : non Fl. Brit. Ind. i. 473.*

Kumaon ; Gori valley, at Ritkott.—The *I. serrata* of F. B. I. from Sikkim is *I. falcifer*, *Hk. f.*

24. *I. serrulata*, *Hk. f. n. sp.*

Kumaon ; Ralam valley, at Saba Udiyar.

(*To be continued.*)

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AN EPITOME OF THE BRITISH INDIAN SPECIES OF *IMPATIENS*.

By *J. D. HOOKER*.

Part II.

Additional Western Himalayan Species.

Impatiens Duthiei, Hk. f. nov. sp.

This apparently distinct undescribed species from the Western Himalaya has been received by me from Mr. Duthie since the publication of Part I of the Epitome. It is closely allied to *I. bicolor*, Royle, but the raceme is not interrupted by the pedicels of the flowers being fascicled or umbellate, the bracts are larger and ovate-lanceolate, the sepals orbicular and aristate, and the leaves are of a remarkably membranous consistence.

II.—Species of the Eastern Himalaya, from the Valley of Khatmandu in Central Nepal to the Mishmi Hills in Upper Assam, including the Tibetan Valley of Chumbi (between Sikkim and Bhotan).

The chief materials procured from this region are, firstly, the collection made by Wallich in the Khatmandu Valley (Central Nepal) in 1826. It comprises about 15 species, of which 5 have not hitherto been collected elsewhere. Secondly, my own Sikkim collections, made in 1848 and 1849, followed by those of Mr. C. B. Clarke (with very valuable notes), Dr. Treutler, Dr. King's collections (for the Royal Botanical Gardens, Calcutta), Mr. Gamble and more recently those of Messrs. Pantling and G. A. Gammie, made with special care. Mr. Pantling's are accompanied with coloured drawings and analyses of about 20 species, made by himself, that have proved invaluable aids to me.

A very few species were collected in Bhotan by Dr. Griffith during Captain Bogle's mission to that country in 1837-38 which took place in the winter months; and a few in the Mishmi Hills, also by Dr. Griffith, during his adventurous journey in that region in 1836.

The Balsam Flora of Sikkim is far from exhausted. The Kew Herbarium contains specimens in too imperfect a condition to be determined, and the smaller species of the sub-alpine region, have never been well collected. I have little doubt that when the flora of the Western Himalaya becomes better known it will prove one of the richest in the world in Balsams.

Key to the principal sections.

SERIES A.—Capsule short, turgid in the middle.

I.—Inflorescence truly terminal, § 1.

II.—Inflorescence axillary, § 2, 3, 4.

SERIES B.—Capsule elongate, linear or clavate.

I.—Bracts at the base of the pedicels, or 0.

Inflorescence racemose, § 5, 6, 7.

Inflorescence of solitary or fascicled axillary pedicelled flowers, § 8.

II.—Bracts in the pedicels of a short few-fl., raceme, rarely at the base or 0, § 9.

Key to the species.

SERIES A.—Capsule short, turgid in the middle, contracted at both ends.

I.—Inflorescence truly terminal.

§ 1. *Raceme spiciform; bracts fimbriate persistent; seeds with basal spiral hairs* 1. *l. bracteata* Coleb.

II.—Inflorescence axillary.

§ 2. *Stem stout; leaves alternate; peduncles 1-5-fl.; flowers large; sepals broad, membranous; seeds with basal spiral hairs.*

Sepals 2, cuspidate—

Lip infundibular, spur slender, tip annular 2. *l. pulchra*

Hk. f. & T.

Lip scaphiform, spur very long, slender 3. *l. latiflora*

Hk. f. & T.

Sepals 4, two outer apiculate, two inner much longer.

Lip subsaccate, spur incurved 4. *l. mishmiensis*

Hk. f.

§ 3. *Leaves alternate; flowers solitary or fascicled, pedicelled in the axils of the leaves (peduncle 0); seeds smooth glabrous.*

Leaves linear-lanceolate, capsule tomentose . . . 5. *I. Balsamina* L.

§ 4. *Leaves opposite alternate and pseudo-verticillate; inflorescence of long or short axillary peduncles bearing solitary binate or fascicled pedicelled flowers; capsule and seeds glabrous—Peduncle sometimes 0 in *I. exilis*.*

Lip saccate, shortly abruptly spurred:—

Peduncle long, tips of sepals thickened . . . 6. *I. trilobata* Coleb.

Peduncle short, sepals acuminate . . . 7. *I. tripetala* Roxb.

Lip saccate, base narrowed into a short upcurved spur . . . 8. *I. florigera* C. B. Clarke,

Lip infundibular, tapering into a long slender spur . . . 9. *I. infundibularis* Hk. f.

Lip scaphiform, spur very long, slender . . . 10. *I. exilis* Hk. f.

SERIES B.—Capsule elongate linear or clavate, rarely oblong.

1.—Bracts at the base of the pedicels or 0.

* Inflorescence racemose.

§ 5. *Leaves opposite alternate or pseudo-verticillate, upper often largest and crowded towards the ends of the stem or branches; inflorescence of erect long-peduncled racemes from the upper leaf-axils, subcorymbosely disposed; pedicels often fascicled or whorled, bracteate at the base; flowers usually large or medium-sized, rose-purple; seeds glabrous.—Differs from § 7 chiefly in the larger flowers.*

Basal lobe of wings spurred or cuspidate on the upper outer margin:—

Bracts broad, lip saccate 11. *I. sulcata* Wall.

Bracts narrow, lip infundibular . . . 12. *I. Thomsoni* Hk. f.

Basal lobe of wing rounded, mucicous on the outer margin, lip saccate, shortly abruptly spurred or infundibular :—

Distal lobes of wings caudate :—

Sepals minute, orbicular,
long-awned, gland-
tipped, lip sigmoidly

incurved 13. *I. bicornuta* Wall.

Sepals ovate acumi-
nate 14. *I. Kingii* Hk. f.

Distal lobe of wings dolabriform :—

Leaves ovate crenate 15. *I. bicolor* Royle.

Leaves ovate serrulate 16. *I. nepalensis*
Hk. f.

Leaves lanceolate ser-
rate 17. *I. insignis* Wall.

§ 6. *Leaves all alternate; inflorescence of spreading peduncled few-flowered racemes, from the upper or middle leaf-axils, not sub-corymbosely disposed, rachis often bracteate below or between the flowers; pedicels bracteate at the base; capsules linear-oblong or narrowly clavate; seeds glabrous.*

Sepals entire, margins eglandular :—

Distal lobes of wings dolabriform :—

Anthers mucicous :—

Lip saccate :—

Sepals small, ovate or oblong 18. *I. Furpia* Ham.

Sepals large, orbicular 19. *I. Cathcartii*
Hk. f. & T.

Lip cymbiform, sepals broadly ob-
long 20. *I. cymbifera*

Hk. f. & T.

Anthers cuspidate 21. *I. discolor* DC.

Distal lobe of wings loriform :—

Leaves linear lanceolate, sepals 2 22. *I. Prainii* Hk. f.

Leaves ovate or orbicular, sepals 4 :—

Outer sepals oblong, winged on one

margin 23. *I. nummularifo-*
lia Hk. f.

Outer sepals ovate acute 24. *I. scitula* Hk. f.

Sepals glandular on one or both margins,
usually dimidiate-ovate:—

Distal lobe of wings with a long lori-
form tail:—

Leaves 3-8 in. long, mostly sessile . 25. *I. urticifolia*
Wall.

Leaves 1-3 in. long, mostly petioled 26. *I. Gamblei* Hk. f.

Distal lobe of wings dolabriform:—

Leaves petioled, membranous, lip
saccate 27. *I. Wallichii* Hk. f.

Leaves subsessile, thick, lip obconic . 28. *I. Hobsoni* Hk. f.

§7. *Leaves alternate, rarely subverticillate at the top of the stem, crenate, rarely serrate; inflorescence of slender axillary spreading, rarely erect, long peduncled racemes, pedicels rarely binate or whorled, bracteate at the base; flowers small or minute, yellow, rarely rose-purple or white, filaments often contracted at the tip, with free didymous anthers.*—The pedicels are whorled in *I. radiata* and *graciliflora*.

† Flower-buds, exclusive of the spur, globose or sub-globose, plane of mouth of lip horizontal:—

Bracts persistent:—

Lip spurred except in var. of *I. racemosa*.

Pedicels more or less fascicled or
whorled:—

Lip with spur $\frac{1}{4}$ - $\frac{1}{2}$ in. long . 29. *I. radiata*
Hk. f. & T.

Lip with spur 1-1 $\frac{1}{2}$ in. long . 30. *I. graciliflora*
Hk. f.

Pedicels of flowers regularly seriate:—

Dorsal auricle of wings descending into the spur of
the lip:—

Spur of lip slender, auricle
filiform 31. *I. tingens* Edgew.

Spur of lip broad, auricle
linear 32. *I. Scullyi* Hk. f.

Dorsal auricle of wings short or 0:—

Sepals $\frac{1}{4}$ in. long, ovate 3-
nerved 33. *I. laxiflora*
Edgew

- Sepals $\frac{1}{10}$ in. long, falcate
aristate, margin uniglan-
dular on one side . 34. *I. racemosa* DC.
- Sepals minute, awn long
stout erect 35. *I. microsciadia*
Hk. f.
- Lip scaphiform, spurless, flowers very small :—
Stem 6 in. high, simple, pedun-
cles capillary 36. *I. minimiflora*
Hk. f.
- Stem 6-10 in., much-branched . 37. *I. Gammiei* Hk. f.
- Bracts deciduous :—
Leaves ovate, lip scaphiform, spur a boss, capsule
clavate :—
Leaves 2-3 in., sepals $\frac{1}{4}$ in., ovate
acuminate 38. *I. tuberculata*
Hk. f. & T.
- Leaves 1-1 $\frac{1}{2}$ in., sepals $\frac{1}{10}$ in.,
oblong aristate 39. *I. aganantha*
Hk. f.
- Leaves linear-lanceolate :—
Leaves 3-5 in., lip with spur 1 in. 40. *I. leptoceras* DC.
- Leaves 2-3 in., lip with spur
 $\frac{1}{2}$ in. 41. *I. odorata* D. Don.
- †† Flower-buds, exclusive of the spur, ovoid or oblong, plane
of mouth of expanded flower ascending at an acute angle :—
Mouth of lip apiculate or muticous :—
Stem more or less hirsute, sepals 4,
outer linear-oblong, inner very
slender 42. *I. trichocladon*
Hk. f.
- Stem glabrous :—
Distal lobe of wings loriform :
Sepals $\frac{1}{7}$ in. ovate acuminate,
base incurved 43. *I. longipes*
Hk. f. & T.
- Sepals $\frac{1}{4}$ in. ovate aristate . 44. *I. Pantlingii*
Hk. f.
- Sepal $\frac{1}{10}$ in. ovate obtuse, base
unilaterally lobulate 45. *I. bivittata* Hk. f.

Distal lobe of wings linear oblong:—

Sepals $\frac{1}{7}$ in., falcate, with a stiff

clubbed awn 46. *I. leptocarpa*

Hk. f.

Mouth of lip cuspidate or awned:—

Capsule linear, distal lobe of wings loriform:—

Sepals $\frac{1}{7}$ in. sides complicate,

base incurved 47. *I. stenantha*

Hk. f.

Capsule clavate:—

Sepals $\frac{1}{10}$ in., uncinata, long-awn-

ed 48. *I. drepanop-*

hora Hk. f.

Sepals $\frac{1}{10}$ in., obliquely ovate

subacute 49. *I. citrina* Hk. f.

** Inflorescence of solitary or fascicled pedicelled flowers in the axils of the leaves, peduncle 0 or very short; bracts at the base of the pedicel or 0.

§ 8 *Leaves all alternate, flowers large or medium sized except I. occultans.*

Stem erect, lip spurred:—

Anthers cuspidate, sepals 2, orbicular membranous awned:—

Leaves crenate:—

Glabrous, tip of spur spirally

coiled 50. *I. spirifer*

Hk. f. & T.

Pubescent, tip of spur incurved 51. *I. puberula* DC.

Leaves sub-entire or serrulate 52. *I. acmanthera*

Hk. f.

Anthers muticous:—

Leaves serrate, sepals 4, outer di-

midiate-ovate 53. *I. arguta*

Hk. f. & T.

Leaves crenate, sepals 2, orbicular

aristate 54. *I. decipiens* Hk. f.

Stem prostrate, leaves small, flowers

minute, lip spurless 55. *I. occultans* Hk. f.

II.—Inflorescence a peduncled 1-few flowered simple or forked raceme, bracts on the pedicels above their base, rarely at the forks, persistent.

§ 9. *Leaves all alternate ; inflorescence much shorter than the leaves ; flowers yellow or white, rarely rose-coloured,*

large or small; capsule slender often pendulous; seeds glabrous.

Leaves crenate, or serrate in *I. cristata* :—

Basal lobe of wing mucous :—

Sepals large orbicular or broadly ovate :—

Leaves green on both surfaces 56 *I. cristata* Wall.

Leaves white beneath . . . 57. *I. tropæoliflora*
Griff.

Sepals small cymbiform . . . 58. *I. lutea* Hk. f.

Basal lobe of wing spurred in the

sinus 59. *I. uncipectala* C.
B. Clarke

Leaves serrate or toothed :—

Basal lobe of wings large rounded, distal longer than
broad :—

Sepals orbicular membranous

cuspidate 60. *I. prætermissa*
Hk. f.

Sepals ovate acuminate.

Lip broadly infundibular,

spur incurved 61. *I. serratifolia*
Hk. f.

Lip scaphiform, spur o. 62. *I. serrata*
Benth.

Basal lobe of wings very small, distal much broader
than long, bilobulate, lobules

divaricate 63. *I. falcifer* Hk. f.

OBSERVATIONS AND LOCALITIES.

§ 1.

1. *I. bracteata* Coleb. ; *I. fimbriata*, Hook. f. ; *Fl. Brit. Ind.* i. 461.

Sikkim ; Mungpoo, alt. 2,000-4,000 ft. ; probably introduced by
seed amongst orchids from the Khasia Hills.

§ 2.

2. *I. pulchra* Hk. f. & T. ; *Fl. Brit. Ind.* i. 459.

E. Nepal and Sikkim ; alt. 2,500-5,000 ft.—Also a native of the
Khasia Hills.

3. *I. latiflora* *Hk. f. & T.*; *Fl. Brit. Ind.* i. 459.
Bhotan; the Duphla Hills.—Also a native of the Khasia Hills.
4. *I. mishmiensis* *Hk. f.*; *Fl. Brit. Ind.* i. 476.
Mishmi Hills, at Brahma Kund, *Griffith*, 1836.

§ 3.

5. *I. Balsamina* *Linn.*; *Fl. Brit. Ind.* i. 453.
Sikkim Terai, alt. 1,000 ft.—Tropical and subtropical India. A short spurred form approaching var. *rosea* (*I. rosea* *Lindl.*) of the Western Himalaya.

§ 4.

6. *I. trilobata* *Coleb.*; *Fl. Brit. Ind.* i. 451 and *I. flavida*, *Hk. f. & Thoms. l.c.* 452.
Sikkim, alt. 1,000-4,000 ft.—Also a native of Assam and Silhet.
7. *I. tripetala* *Roxb.*; *Fl. Brit. Ind.* i. 470.
Sikkim and Bhotan, alt. 2,000-5,000 ft.—Also a native of Assam and Silhet.
8. *I. florigera* *C. B. Clarke.*
Sikkim, alt. 1,000-5,000 ft.
9. *I. infundibularis* *Hk. f.*; nov. sp.
Sikkim, alt. 1,000-4,000 ft.
10. *I. exilis* *Hk. f.*; *I. filicornu*, *C. B. Clarke* *Mss. non. Hk. f.*
Sikkim, alt. 2,000-5,000 ft.

§ 5.

11. *I. sulcata* *Wall.*; *Fl. Brit. Ind.* i. 469.
Nepal and Sikkim, alt. 9,000-13,000 ft.—Also a native of the Western Himalaya.
12. *I. Thomsoni* *Hk. f.*; *Fl. Brit. Ind.* i. 469.
Sikkim, alt. 12,000 ft.—Also a native of the Western Himalaya.
13. *I. bicornuta* *Wall.*; *Fl. Brit. Ind.* i. 475.
Nepal and Sikkim, alt. 8,500-10,000 ft.—Also a native of the Western Himalaya.
14. *I. Kingii* *Hk. f.*; nov. sp.
Sikkim, alt?
Possibly referable to § 6. A very handsome species, but specimens in bad condition for analysis.

15. *I. bicolor* Royle.; *I. amphorata*, *umbrosa* and *pallens*, Edgew.,
Fl. Brit. Ind. i. 475.
 Central Nepal.—Also a native of the Western Himalaya.
16. *I. nepalensi* Hk. f.; nov. sp.
 Central Nepal.
17. *I. insignis* Wall.; *Fl. Brit. Ind.* i. 477.
 Central Nepal.

§ 6.

18. *I. Jurpia* Ham.; *Fl. Brit. Ind.* i. 471.
 Central Nepal and Sikkim; alt. 2,000 to 6,000 ft.—Also a native
 of the Khasia Hills.
19. *I. Cathcartii* Hk. f. & Thoms.; *Fl. Brit. Ind.* i. 473.
 Sikkim, alt. 2,000-5,000 ft.
20. *I. cymbifera* Hk. f. & Thoms.; *Fl. Brit. Ind.* i. 474.
 Sikkim; alt. 6,000-11,000 ft.
21. *I. discolor* DC.; *Fl. Brit. Ind.* i. 471.
 Central Nepal and Sikkim, alt. 4,500-9,000 ft.
22. *I. Prainii* Hk. f.; nov. sp.
 Sikkim, alt. 10,000 ft. ?
23. *I. nummularifolia* Hk. f.; nov. sp.
 Sikkim, alt. 10,000-12,000 ft. ?
24. *I. scitula* Hk. f.; nov. sp.
 Chumbi; alt ?
25. *I. urticifolia* Wall.; *Fl. Brit. Ind.* i. 474.
 Central Nepal and Sikkim, alt. 10,000-11,000 ft.
26. *I. Gamblei* Hk. f.; nov. sp.
 Sikkim and Chumbi, alt. 8,000-12,000 ft.
27. *I. Wallichii* Hk. f.; nov. sp.
 Central Nepal and Sikkim, alt. 10,000-11,000 ft.
28. *I. Hobsoni* Hk. f.; nov. sp.
 Sikkim, Yatung, alt ?

§ 7.

29. *I. radiata* Hk. f.; & T.; *Fl. Brit. Ind.* i. 476.
 Sikkim, alt. 7,000-12,000 ft.—Also a native of the Khasia Hills.

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30. *I. graciliflora* *Hk. f.*; nov. sp.
Sikkim, alt. 6,000-7,000 ft.
31. *I. tingens* *Edgew.* *I. racemosa*; *Fl. Brit. Ind.* i. 479; non *DC.*
Central Nepal.—Also a native of the Western Himalaya.
32. *I. Scullyi* *Hk. f.*; nov. sp.
Central Nepal.
33. *I. laxiflora* *Edgew.*; *Fl. Brit. Ind.* i. 479 (*excl.* var. 2, 4).
Sikkim, alt. 9,000-12,000 ft.—Also a native of the Western Himalaya.
34. *I. racemosa* *DC.*, *I. laxiflora*, var. 4; *Fl. Brit. Ind.* i. 479.
E. Nepal, Sikkim and Chumbi, alt. 7,000-10,000 ft.—Also a native of the Western Himalaya and the Khasia Hills.
35. *I. microsciadia* *Hk. f.*; nov. sp.
Sikkim, alt. 6,000 ft.
36. *I. minimiflora* *Hk. f.*; nov. sp.
Sikkim, alt. 10,000 ft.
37. *I. Gammiei* *Hk. f.*; nov. sp.
Sikkim, alt. 10,000 ft.
38. *I. tuberculata* *Hk. f. & T.*; *Fl. Brit. Ind.* i. 478.
Sikkim, alt. 12,000 ft.
39. *I. aganantha* *Hk. f.*; nov. sp.
Chumbi, alt. ?
40. *I. leptoceras* *DC.*; *Fl. Brit. Ind.* i. 477. *Excl. syn.* *I. odorata.*
Central Nepal, alt. ?
41. *I. odorata* *D. Don.*
Central Nepal, alt. ?
42. *I. trichocladon* *Hk. f.*; nov. sp.
Sikkim, alt. 10,000 ft.
43. *I. longipes* *Hk. f. & Thoms.*; *Fl. Brit. Ind.* i. 473.
Sikkim, alt. 6,500-10,000 ft.
44. *I. Pantlingii* *Hk. f.*; nov. sp.
Sikkim, alt. 10,000 ft.
45. *I. bivittata* *Hk. f.*; nov. sp.
Sikkim, alt. 10,000 ft.

46. *I. leptocarpa* Hk. f.

Sikkim, alt. ?

47. *I. stenantha* Hk. f. ; *Fl. Brit. Ind.* i. 478.

Central Nepal and Sikkim, alt. 6,000-11,000 ft.—Also a native of the Khasia and Manipur Hills and China.

48. *I. drepanophora* Hk. f. ; nov. sp.

E. Nepal and Sikkim.—Also a native of the Khasia and Manipur Hills.

49. *I. citrina*, Hk. f.

Mishmi Hills.

§ 8

50. *I. spirifer* Hk. f. & Thoms. ; *Fl. Brit. Ind.* i. 471.

E. Nepal, Sikkim and Chumbi, alt. 4,000-7,000 ft.

51. *I. puberula* DC. ; *Fl. Brit. Ind.* i. 470.

Central Nepal and Sikkim, alt. 2,500-8,000 ft.

52. *I. acmanthera* Hk. f. ; nov. sp.

Sikkim, alt. 6,000 ft.

53. *I. arguta* Hk. f. & Thoms. ; *Fl. Brit. Ind.* i. 470.

Sikkim and Chumbi, alt. 5,000-7,000 ft.—Also in the Khasia Hills, Burma and China.

54. *I. decipiens* Hk. f. ; nov. sp.

Sikkim and Chumbi, alt. 5,000-9,000 ft. ?

§ 55. *I. occultans* Hk. f. ; nov. sp.

Sikkim, alt. 12,000-13,000 ft.

A diminutive species of doubtful affinity.

§ 9.

56. *I. cristata* Wall., *vide supra*, pp. 7, 10.

Central Nepal, Sikkim, Bhotan.—Also in the Western Himalaya.

57. *I. tropæoliflora* Griff. ; *Fl. Brit. Ind.* i. 472 (*tropæolifolia*).

Mishmi Hills.

58. *I. lutea* Hk. f. ; nov. sp.

Sikkim, alt. 5,000 ft.

59. *I. uncipetala* C. B. Clarke Mss., *I. scabrida*, *partim* ; *Fl. Brit. Ind.* i. 472.

Sikkim, alt. 6,500-8,500 ft.

60. *I. praetermissa* *Hk. f.*; nov. sp.
Central Nepal.
61. *I. serratifolia* *Hk. f.*, *I. serrata*, *partim*; *Fl. Brit. Ind.* i. 473.
62. *I. serrata* *Benth*; non *Fl. Brit. Ind.*
Central Nepal.—Also in Western Himalaya.
63. *I. falcifer* *Hk. f.*, *I. serrata*, *Fl. Brit. Ind.* i. 473 *in part.*
Sikkim, alt. 7,000-10,000 ft.

III.—Species of the Burmese Region, from Assam to Tenasserim.

The Balsams of this region are very imperfectly known. Except in the Khasia and adjacent Hills no satisfactory collections have been made over the vast area limited as above. Sixteen species were obtained by Wallich and his collectors between 1820 and 1830 from various localities between Assam and Tenasserim, to which a considerable number were added by Griffith in the Khasia Hills in 1835 and 1837. Twenty species were collected by Dr. Thomson and myself also in the Khasia and neighbouring hills in 1850; since which period Mr. C. B. Clarke going over the same ground, and extending his travels to the Naga and Manipur Hills, has added considerably to this number. Other contributors have been the Revd. C. Parish in the Maulmain mountains, and collectors employed by the Royal Botanic Gardens of Calcutta in the Shan and other Hills east of the Irawaddi, but discoveries of the latter have been for the most part unimportant. Mr. C. B. Clarke is the only one who has made notes of many species on the spot where found, and these are of great value.

Judging from the reports of Forest Officers and travellers and having regard to the nature of the hill and mountain ranges of Burma it cannot be doubted that this country is exceedingly rich in Balsams, and when it is considered how few species have been obtained from the 1,500 miles of complicated lofty ranges on the east of the Salwin river, and that not a single species has as yet been obtained from the 500 miles of lofty coast range extending from Chittagong to Cape Negrais, it seems to be impossible to regard the 52 species here enumerated below as giving even a remote idea of the richness of the Balsam Flora of Burma, which is further emphasised by the heterogeneous character of its components. In evidence of the truth of this last observation it is sufficient to point out, that in my attempt to group the species under natural sections I have had to adopt 16 of these; which is 7 more than were required for the 63

East Himalayan species and 8 more than for the 57 Western Peninsular. It cannot well be doubted that ampler materials will increase or reduce or abolish some of these.

Of the 52 Burmese species, 39 are endemic. Of the remainder one, *I. Balsamina*, is not confined to any of the Indian regions: *I. bracteata*, *pulchra*, *latiflora*, *trilobata*, *tripetala*, *arguta*, *Furpia*, *radiata*, *drepanophora* and *racemosa* are Himalayan, of which *I. arguta* is also Chinese; *I. oppositifolia* and *I. chinensis* are Western Peninsular. None are Malayan Peninsular, but one, *I. Parishii* which has no Burmese ally, is nearly related, both in geographical position and character, to one of that region. A small group § 10, and a few species of other groups inhabit the sea level in Arracan, Lower Burma and Tenasserim. They are inconspicuous and small flowered, and have been for the most part very carelessly collected.

Hitherto the only link that has been discovered between the *Impatiens* of Eastern Burma and those of the coterminous provinces of Western China, is the presence in both of *I. arguta*, and what is more surprising is that the Chinese species belong for the most part to sections of the genus of which there are few or no Indian representatives.

Key to the sections.

SERIES A.—Capsule turgid in the middle, narrowed at both ends.

I.—Inflorescence truly terminal. Seeds arillate with spiral hairs § 1.

II.—Inflorescence axillary

* Seeds arillate with spiral hairs § 2, 3.

** Seeds exarillate—

Annuals § 4-10.

Perennial § 11, 12.

SERIES B.—Capsule elongated, linear or clavate.

* Bracts at the base of the pedicels:—

Inflorescence of axillary pedicelled flowers § 13.

Inflorescence racemose § 14.

* Bracts on the pedicels or 0, rarely at the base § 15.

Key to the species.

SERIES A.—Capsule turgid in the middle, narrowed at both ends.

I.—Inflorescence truly terminal racemose.

§ 1. *Bracts fimbriate, seeds arillate with spiral hairs.*

1. *I. bracteata* Coleb.

II.—Inflorescence axillary.

* Seeds arillate with spiral hairs:—

§2. *Glabrous herbs; leaves alternate narrow; stipulary glands 0; peduncle 1-6-fld.; flowers large; sepals 2, broad; dorsal auricle of wings large.*

Bracts lanceolate, spur of lip short incurved.

2. *I. pulchra* Hk. f. & T.

Bracts linear and lanceolate, spur of lip very long straight.

3. *I. latiflora* Hf. & T.

Bracts large orbicular, spur of lip short incurved.

4. *I. acuminata* Benth.

§ 3. *A glabrous annual; leaves alternate; stipulary glands 0; racemes 3-8-fld.; sepals 2, ovate; dorsal auricle of wings 0*

5. *I. racemulosa* Wall

** Seeds ex-arillate, naked or papillose, very rarely slightly hairy:—

§ 4. *Annual; leaves alternate lanceolate; flowers solitary or fascicled, pedicelled in the leaf-axils; sepals 2, very small; dorsal auricle of wings large; capsule tomentose*

6. *I. Balsamina* L.

§ 5. *Annuals; leaves alternate, mostly crowded towards the top of the stem or branches; stipulary glands minute or 0; flowers small, pedicelled in the upper leaf-axils; sepals 2; standard winged; spur very slender:—*

Sepals ovate-lanceolate, fruiting pedicels spreading, capsule glabrous

7. *I. florulenta* Hk. f.

Sepals very minute, fruiting pedicels decurved from the middle, capsules hairy pendulous

8. *I. curvipes* Hk. f.

§ 6. *Annuals; leaves alternate, stipulary glands 0; flowers solitary on axillary pedicels, rotate; sepals 2; standard and distal lobes of wings subequal obcordate; spur of lip very slender:—*

Flowers 1-1½ in. diam.,

sepals ovate lanceolate . 9. *I. violæfloræ*
Hk. f. & T.

Flowers ½ in. diam.,

sepals minute . . 10. *I. Mokimi*. Hk. f.

7. *Very slender flaccid diffusely branched annuals; leaves alternate; stipular glands 0; flowers very small on axillary pedicels; sepals 2 or 4; standard oblong. The two species of this section are not allied:—*

Leaves lanceolate, sepals 2,

wings bicuspidate, lip

tubiform, spur very short 11. *I. capillipes*

Hk. f. & T.

Leaves ovate, sepals 4, outer

ovate, basal wing-lobe very

small, lip infundibular,

spur slender . . . 12. *I. micromeris*

Hk. f.

§ 8. *Glabrous or hairy annuals; leaves alternate, ovate or oblong; inflorescence of 1-4-fld. axillary peduncles, if 1-fld. bracteate about the middle, if 2-4-fld. bracts at the base of or on the pedicels; flowers large or medium sized; sepals 2, rather large, dorsal auricle of wings usually large; lip broadly infundibular, narrowed into an incurved or involute slender spur; filaments slender.—A natural group of which the species are rather difficult of diagnosis.*

Basal lobe of wings rounded in front (not cuspidate or spurred); leaves crenate-serrate:—

Stem petioles and peduncles more or less hairy:—

Leaves 1-3 in.

membranous crenate,

sparsely pubescent; sepals

½ in. long, ovate-

lanceolate . . .

13. *I. porrecta* Wall.

- Leaves 3-5 in. and
stout stems tomen-
tose, sepals $\frac{1}{2}$ in.
long obliquely
ovate hairy . 14. *I. khasiana* Hk. f.
- Stem thick stout,
tomentose, leaves
2-4 in. broad,
sepals $\frac{1}{3}$ in. ovate
lanceolate aristate 15. *I. Marianæ*
Reich. f.
- Stem very short
creeping below,
tomentose, sepals
 $\frac{1}{5}$ -in. broadly
oblong cuspidate
hairy . . . 16. *I. Mannii* C.B.C.
- Stem petioles and peduncles glabrous or
nearly so:—
- Stem much branched,
sepals $\frac{1}{3}$ in. orbi-
cular or broadly
ovate, tip of spur
annular . . . 17. *I. annulifer* Hk. f.
- Stem sub-simple
stout, leaves 3-5 in.
long, sepals orbi-
cular mucronate,
spur simply in-
curved . . . 18. *I. burmanica*
Hk. f.
- Stem short simple
leaves $1\frac{1}{2}$ -2 in. long,
sepals $\frac{1}{3}$ in. ovate
falcate, spur simply
incurved . . . 19. *I. Andersoni*
Hk. f.
- Basal lobe of wings spurred or cuspidate on
the upper outer margin; leaves serrulate:—
- Glabrous, creeping,
sepals $\frac{1}{3}$ in. long,
basal wing-lobes
spurred . . . 20. *I. cuspidifera*
Hk. f.

Glabrous, erect,
 sepals $\frac{1}{7}$ in. long,
 basal wing-lobes
 cuspidate . . . 21. *I. striolata* Hk. f.

Stem tomentose
 above, leaves black
 when dry, basal
 wing-lobes cuspi-
 date . . . 22. *I. nigrescens*

Hk. f.

§ 9. *Annuals; leaves opposite alternate rarely subverticillate, stipular glands often many, subulate clavate or digitiform; infl. of 1-few-fl'd. peduncles or solitary or fascicled pedicelled flowers; sepals 2; dorsal auricle of wings large; spur of lip long or short, filaments usually slender:—*

Seeds tubercled or granulate:—

Leaves opposite alternate or whorled:—

Peduncle long, 3-5-fl'd.

Leaves all petioled,
 standard muticous or
 dorsally gibbous . . . 23. *I. trilobata* Coleb.

Leaves upper or all ses-
 sile, standard dorsally
 spurred . . . 24. *I. formosa* Hk. f.

Peduncle very short
 or o. 25. *I. trifetala* Roxb.

Leaves all opposite or
 whorled, sessile or
 subsessile, peduncle
 long or short, stem stout 26. *I. radicans* Benth.

Leaves all alternate
 petioled, ovate lanceo-
 late, peduncle short or o,
 stem very slender . . . 27. *I. stricta* C. B.

Clarke.

Seeds globose, smooth black shining, leaves all
 opposite:—

Leaves sessile or subsessile linear coriaceous:—

Leaf-base truncate or cordate, sepals long
 linear:—

Flower large . . . 28. *I. chinensis* L.

Flower small . . . 29. *I. Helferi* Hk. f.

Leaf-base narrow, flowers large:—

Sepals ovate 29. *I. Masoni* Hk. f.

Sepals lanceolate 30. *I. Craddockii*.
Hk. f.

Leaves ovate or oblong, upper sessile lower
petioled membranous:—

Flowers small,
sepals linear 32. *I. oppositifolia*
Linn.

§ 10. *Small glabrous annuals; leaves opposite or alternate, stipulary glands 0; infl. of long-peduncled many-fl'd. racemes; flowers very small; dorsal auricle of wings 0; capsule very small.*—Of most of the species of this group the specimens are in a very unsatisfactory state. A careful collector in Burma would probably add to their number. All are low-country weedy plants. *I. racemulosa* is the only other conspicuously racemose species of Series A.

Leaves alternate:—

Sepals ovate, wings long-stipitate, basal lobe 0, spur of lip inflated 33. *I. tavoyana* Wall.

Sepals linear, wings long-stipitate, basal lobe?, spur of lip short incurved 34. *I. circaeoides* Wall.

Leaves opposite or subopposite and alternate:—

Sepals orbicular, wings stipitate, basal lobe minute, spur of lip 0, leaves glaucous beneath 35. *I. peguana* Hk. f.

Sepals oblong, wings stipitate, basal lobe?, spur of lip short strict acute, pedicels short, leaves glaucous beneath 36. *I. rangoonensis*
Hk. f.

Sepals linear, wings?, spur of lip short incurved tubiform, pedicels long capillary, leaves colorous 37. *I. Brandisii*
Hk. f.

§ 11. *A glabrous shrub ; leaves opposite and alternate ; infl. a short few fld. peduncle ; flowers large shortly pedicelled ; bracts large herbaceous ; sepals 4, outer orbicular, inner linear ; seeds large, broad, smooth, glabrous* 38. *I. lævigata* Wall.

§ 12. *A stout fleshy biennial or perennial ; leaves few, large, alternate, long-petioled serrulate ; flowers solitary, long-pedicelled ; sepals 2, large, orbicular ; lip scaphiform with a very short bicrural spur, adnate to the middle of the base.—A remarkable species allied to *I. macrochila* of the Malay Peninsula* 39. *I. Parishii*
Hk. f. & T.

SERIES B.—Capsule narrow, linear or clavate. Seeds glabrous.

* Bracts at the base of the pedicels:—

§ 13. *Glabrous annuals ; leaves alternate ; flowers large, pedicels solitary or fascicled to the axils of the leaves, rarely on a very short peduncle ; sepals 2 or 4 ; dorsal auricle of wings large. A considerable section in the Himalaya, unknown in the Western and Malaya Peninsulas.*

Sepals 4, outer dimidiate-ovate:—

Leaves ovate or ovate-lanceolate 40. *I. arguta*
Hk. f. & T.

Leaves linear-lanceolate 41. *I. Wattii* Hk. f.

Sepals 2 suborbicular, leaves
ovate 42. *I. psittacina*
Hk. f.

§ 14. *Leaves alternate ; infl. a long peduncled axillary raceme of large flowers ; sepals 2 ; standard dorsally spurred ; dorsal auricle of wings large.—A large section in the Himalaya, absent in the Eastern and Western Peninsulas:—*

Perennial?, leaves large, glabrous

or puberulous 43. *I. Furpia* Ham.

§ 15. *Annual glabrous herbs ; leaves alternate, often crowded towards the tips of the stem and branches ; infl. of long-peduncled racemes of small flowers ; sepals 2, small or*

minute; lip scaphiform, infundibular or tubiform; often long-spurred.—This section which abounds in the Himalaya is absent in the Western and Malayan Peninsulas.

† Flower-buds, excluding the spurs, globose, mouth of lip of expanded flowers horizontal or nearly so:—

Pedicels and bracts mostly

whorled or fascicled . 44. *I. radiata*

Hk. f. & T.

Pedicels seriate:—

Leaves crenate, sepals

ovate falcate . . . 45. *I. racemosa* DC.

Leaves crenate-serrate,

sepals broadly ovate . 46. *I. paludosa*

Hk. f. & T.

†† Flower-buds, excluding the spur, ovoid or ellipsoid, mouth of lip of expanded flowers ascending at an acute angle:—

Bracts persistent, sepals obliquely ovate:—

Stem stout, leaves lanceo-

late 47. *I. angustiflora*

Hk. f.

Stem slender, leaves

ovate 48. *I. bracteolata*

Hk. f.

Bracts caducous:—

Lip spurred:—

Stem erect, sepals uncinatè

long-awned . . . 49. *I. drepanophora*

Hk. f.

Stem prostrate creeping,

sepals obtuse . . . 50. *I. prostrata*

Hk. f.

Lip spurless, flowers

minute 51. *I. depauperata*

Hk. f.

** Bracts on the pedicels of a few-fl'd. raceme, rarely at the forks or o.

§ 16. *Glabrous or pubescent annuals; leaves alternate, stipular glands 0; sepals 2 or 4; dorsal auricle of wings large; capsule slender:—*

Sepals 4, outer orbicular, inner shorter . 52. *I. manipurensis*

Hk. f.

OBSERVATIONS AND LOCALITIES.

§ 1.

1. *I. bracteata* *Coleb.*, vide ante, p. 18.

Khasia Hills alt. 2,500-5,000 ft.—Also in Sikkim, naturalized?

§ 2.

2. *I. pulchra* *Hk. f. & T.*, vide ante, p. 18.

Khasia Hills, alt. 4,000-5,000 ft.—Also in Sikkim.

3. *I. latiflora* *Hk. f. & T.*, vide ante, p. 19.

Khasia and Naga Hills, alt. 2,500-4,000 ft.—Also in the Eastern Himalaya.

4. *I. acuminata* *Benth.*; *Fl. Brit. Ind.* i. 462.

Khasia and Jyntea Hills, alt. 3,500-5,000 ft.

§ 3.

5. *I. racemulosa* *Wall.*; *Fl. Brit. Ind.* i. 468.

Khasia Hills, alt. 4,000-5,000 ft.

§ 4.

6. *I. Balsamina* *Linn.*; vide ante, p. 7.

Silhet, Cachar, Upper and Lower Burma, at low elevations.—Also most parts of warm Asia.

§ 5.

7. *I. florulenta* *Hk. f.*; nov. sp.

Southern Shan States.

8. *I. curvipes* *Hk. f.*; nov. sp.

Southern Shan States, all 4,000 ft.

§ 6.

9. *I. violæflora* *Hk. f.*; *Fl. Brit. Ind.* i. 457.

Tenasserim; Maulmain Hills.

10. *I. Mokimi* *Hk. f.*; nov. sp.

Upper Burma; Kachin Hills.

§ 7.

11. *I. capillipes* *Hk. f. & T.*

Tenasserim; Maulmain Hills.

12. *I. micromeris* *Hk. f.*; nov. sp.

Tenasserim.

§ 8.

13. *I. porrecta* Wall.; *Fl. Brit. Ind.* i. 472. *I. bella*, *Hk. f. & Thoms.* l. c. 458.
Khasia, Naga and Manipur Hills, alt. 2,000-5,000 ft.
14. *I. khasiana* *Hk. f.*; nov. sp. *I. bella*, VAR. major, *Fl. Brit. Ind.* i. 459.
Khasia Hills, alt. 5,000-6,000 ft.
15. *I. Marianæ* *Reichb. f.*; nov. sp.
Assam.
16. *I. Mannii* *C. B. Clarke*; nov. sp.
Assam.
17. *I. annulifer* *Hk. f.*; nov. sp.
Naga and Manipur Hills, alt. 3,000-5,500 ft.
18. *I. burmanica* *Hk. f.*; nov. sp.
Upper Burma, Bhamo and Kachin Hills.
19. *I. Andersoni* *Hk. f.*; nov. sp.
Shan States; Hætone.
20. *I. cuspidifera* *Hk. f.*; nov. sp.
Naga Hills, alt. 6,000 ft.
21. *I. striolata* *Hk. f.*; nov. sp.
Khasia Hills, alt. 4,000-5,000 ft.
22. *I. nigrescens* *Hk. f.*; nov. sp.
Assam.

§ 9.

23. *I. trilobata* *Coleb.*, see ante, p. 19.
Assam, Silhet and Cachar, at low elevations.—Also in Sikkim.
24. *I. formosa* *Hk. f.*; nov. sp. *I. trilobata*, *partim* *Fl. Brit. Ind.* i. 451.
Khasia Hills, alt. 4,000-5,500 ft.
25. *I. tripetala* *Roxb.*, see ante, p. 19.
Assam, Silhet and Cachar, at low elevations.—Also in Sikkim and N. E. Bengal.
26. *I. radicans* *Benth.*; *Fl. Brit. Ind.* i. 451. *I. salicifolia*, *Hk. f. & T.* l. c. 450.
Khasia, Jyntea and Manipur Hills, alt. 2,000-5,000 ft.

27. *I. stricta* C. B. Clarke ; nov. sp.
Khasia and Manipur? Hills, alt. 750-2,500 ft.
28. *I. chinensis* Linn. ; *Fl. Brit. Ind.* i. 444.
Assam, Silhet, Khasia and Manipur, Mandalay and Shan Hills,
alt. 3,000-5,500 ft.—Also in the Malabar Ghats.
29. *I. Helferi* Hk. f. ; nov. sp.
Tenasserim.
30. *I. Masoni* Hk. f. ; nov. sp.
Upper Burma, Mandalay district.
31. *I. Craddockii* Hk. f. ; nov. sp.
Upper Burma ; Nahi.
32. *I. oppositifolia* Linn. ; *Fl. Brit. Ind.* i. 448.
Rangoon and Maulmain.—Also in the Western Peninsula and
Ceylon.

§ 10.

33. *I. tavoyana* Benth. ; *Fl. Brit. Ind.* i. 468.
Tavoy.
34. *I. circæoides* Wall. ; *Fl. Brit. Ind.* i. 453.
Pegu and Maulmain.
35. *I. peguana* Hk. f. ; nov. sp. *I. circæoides*, in part, *Fl. Brit.*
Ind. l. c.
Pegu.
36. *I. rangoonensis* Hk. f. ; nov. sp.
Pegu ; Rangoon.
37. *I. Brandisii* Hk. f. ; nov. sp.
Tenasserim ; at Thoungyeen.

§ 11.

38. *I. lævigata* Wall. ; *Fl. Brit. Ind.* i. 473.
Khasia, Naga and Manipur Hills, alt. 2,000-5,000 ft.

§ 12.

39. *I. Parishii* Hk. f. ; *Fl. Brit. Ind.* i. 456.
Maulmain.

§ 13.

40. *I. arguta* Hk. f. & T. ; vide ante, p. 22.
Khasia, Naga and Shan Hills.—Also in Sikkim and China.

41. *I. Wattii* *Hk. f.*; nov. sp.
Manipur Hills, alt. 3,000-5,000 ft.

42. *I. psittacina* *Hk. f.*; *Bot. Mag.* t. 7809.
Shan States.

§ 14.

43. *I. Jurpia* *Ham.*, see ante, p. 20.
Khasia Hills, alt. 4,000-5,000 ft.—Also in Nepal and Sikkim.

§ 15.

44. *I. radiata* *Hk. f. & T.*, vide ante, p. 20.
Khasia Hills, alt. 4,000-5,000 ft.—Also in Sikkim.

45. *I. racemosa* *DC.*, vide ante, p. 21.
Khasia Hills, alt. 4,000-5,000 ft.—Also in the Eastern and Western Himalaya.

46. *I. paludosa* *Hk. f. & T.*; *Fl. Brit. Ind.* i. 480.
Khasia Hills, alt. 4,000-6,000 ft.

47. *I. angustiflora* *Hk. f.*; *Fl. Brit. Ind.* i. 481 *in part.*
Khasia Hills, alt. 5,000 ft.

48. *I. bracteolata* *Hk. f.*; nov. sp. *I. angustiflora, in part, Fl. Brit. Ind.* i. 481.
Khasia Hills, alt. 5,000 ft.

49. *I. drepanophora* *Hk. f.*, vide ante, p. 22.
Khasia, Jyntea, Naga and Kachin Hills, alt. 5,000-5,500 ft.—
Also in Sikkim.

50. *I. prostrata* *Hk. f.*; nov. sp.
Manipur, alt. 5,500 ft.

51. *I. depauperata* *Hk. f.*; nov. sp.
Khasia Hills, alt. 4,000-5,000 ft.

§ 16.

52. *I. manipurensis* *Hk. f.*; nov. sp.
Manipur.

Undeterminable species *I. assamensis*, *Griff. Notul.* iv, 459; *Ic. Pl. Asiat* t. 529.—Assam, on sandy banks of the Brahmaputra, near Dibong Mooka, *Griffith*, 1836. The description and plate are at variance and irreconcilable.