

A REVISION OF CHIRITA (GESNERIACEAE)

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ABSTRACT. *Chirita* (Cyrtandroideae-Didymocarpeae) is an Indo-malaysian genus of at least 77 species divided into three sections. The species are herbaceous or slightly shrubby and usually grow in the ground layer of forest. Features of interest include the foliar glands, the vascular supply to the stigma and (in Section *Microchirita*) the epiphyllous inflorescence. Keys are provided to Sections and species. For each species there is full synonymy, a description and citation of specimens.

INTRODUCTION

The genus *Chirita* D. Don at present consists of 77 species in three sections. These species are predominantly herbs of rocky places, cliffs, and of the ground vegetation in forest. The genus ranges from the Western Himalayas, through N Burma, Western and Southern China to Indo-China, Thailand, the Malay peninsula, Sumatra, Java and Sarawak.

Chirita belongs to the Cyrtandroideae-Didymocarpeae Endl. and is closely related to the large Indo-Malaysian genus *Didymocarpus*. The last revision to include all known species was that of C. B. Clarke (1883), with 34 species. The most important recent account is by Pellegrin (1930) of the 18 species then known from Indo-China.

No firm conclusion can be drawn about evolution within the genus. The arrangement Sect. *Gibbosaccus*-*Chirita*-*Microchirita* is not meant to indicate that Section *Gibbosaccus* is the most primitive section: rather that Sect. *Chirita* is a link (and not necessarily an evolutionary link) between the perennial, acaulescent species of Sect. *Gibbosaccus* and the caulescent, monocarpic species of Sect. *Microchirita*.

MORPHOLOGY

Habit. The range of form encompassed by *Chirita* is high: of particular note is the range of habit. The species of Sect. *Gibbosaccus* are rosulate and strongly perennial; in contrast, Sect. *Microchirita* consists of caulescent species which are usually monocarpic: flowers are produced at a very early stage (exceptionally, in *Chirita hamosa*, when only one leaf is present) and flowering continues until the plant dies. In cultivated *C. lavandulacea* the fleshy stem may die back in the winter, flowering offshoots being produced from the base the following summer. I have not detected this in herbarium specimens of wild material but it is the kind of feature that would be overlooked by a collector. The stem base in species of Section *Microchirita* and in annual species of Section *Chirita* (for example, *C. dimidiata*) curves and narrows rapidly and bears adventitious roots. A stout vertical rhizome is usual in Section *Gibbosaccus*; perennial species of Section *Chirita* have horizontal rhizomes or stolons, and in *C. tibetica*, root tubers.

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Leaves. Leaf arrangement is varied. In the annual species of Section *Microchirita* the lowest leaf is often solitary, having been opposed during growth by a much smaller leaf that soon withers. Leaves may be paired, ternate (as in *C. walkeri*), in 4's (*C. moonii*), in a rosette (as in most species of Section *Gibbosaccus*) or alternate. Unusual arrangements are found in *C. monophylla*, which, from the poor material available, appears to have only one leaf and in *C. bifolia*, which has one large and one small leaf.

Leaves may be glabrous to densely hairy, entire to doubly serrate.

Both surfaces of the leaf always have short-stalked capitate glands. These may have 2-celled caps, the cap cells being hemispherical in *C. zeylanica*, *C. lacunosa* and *C. oblongifolia*, 2-celled with the cap cells as ellipsoids with the long axis in the plane of the leaf (*C. sinensis* and *C. urticifolia*), a spherical 4-celled cap as in *C. adenocalyx*, a 4-celled cap with laterally elongated cells (also in *C. urticifolia*), or a 5 to 6-celled cap as in *C. asperifolia*. Such glands are general in the Gesneriaceae and the form taken by the glands gives some indication of the Subfamily. In a survey of species of 32 genera in the family, glands with 4-celled heads predominated in the Gesnerioideae and with 2-celled heads in the Cyrtandroideae. An interesting feature of some of the glands was the presence of pores. When the leaf was placed in water material was extruded from the pore to form a vesicle. In *Chirita* this was seen in *C. urticifolia*. The function of these glands can only be conjectured but they seem to be a feature of the herbaceous habit. Metcalfe & Chalk (1965, p. 1328) list families having short-stalked capitate glands. This list is predominantly of herbaceous families. A case can be made out for considering these glands to be absorptive. Their frequent occurrence among the wettable patent hairs so commonly found in the Gesneriaceae may represent an absorptive syndrome—the hairs holding water and the glands being absorptive. Such an adaptation would serve to increase the water available to the plant and also any nutrients dissolved in the water. Tropical forest soils are often oligotrophic: the supply of nutrients available to plants from the soil is therefore limited. When rain passes through the canopy foliar leaching takes place. The throughfall contains more nutrients than the incident rainfall. To be able to absorb nutrients from the leaf surface could be an advantage to plants of the ground layer in forest. Several families typical of the lower layer of tropical forest possess short-stalked capitate glands, for example, Melastomataceae, Acanthaceae, Begoniaceae, Gesneriaceae and Piperaceae. Such glands readily stain with dilute aqueous Neutral Red solution (which acts as a vital stain) indicating the ability of the glands to take in from the leaf surface relatively large molecules.

Although there is no certain evidence that these glands are absorptive, to consider the wettable hair/gland system as an absorptive syndrome does help to explain a puzzling observation. As a generalization, hairy leaves in tropical forest are found mainly in the moist, equable conditions of the ground layer (see the very many notes on hairy leaved *Chirita* species growing in moist places) and not, as might be expected from the classical explanation of hair function, in the relatively exposed upper story, where hairs might act to reduce transpirational water loss. Hairs that hold water on the leaf surface would be a disadvantage to an upper story tree, as this would tend to increase foliar leaching. A contrasting state of affairs is found at ground level. Leaves have hairs that serve to hold the leachate from the canopy on the leaf surface

and there is a possibility that any nutrients may be absorbed through the glands into the leaf surface.

Another interesting leaf character is shown by *C. speciosa*. The lower surface of the leaf is dark purple-red in many specimens. This must have some adaptive significance as the same colour is found in the lower epidermis of other plants of the lower stories of tropical forest, for example, in the Melastomataceae, Begoniaceae and Commelinaceae. One possibility is that the red pigment in the leaf acts as a filter to reduce the light passing through the leaf, thereby raising the leaf temperature and promoting transpiration.

INFLORESCENCE AND FLOWER

Many of the species of Section *Microchirita* have an epiphyllous inflorescence. The peduncle of the inflorescence appears fused to the short petiole and the proximal part of the midrib. The pedicels are usually in pairs. Each flower, before opening, is held down towards the midrib by the curved pedicel. The pedicels gradually straighten as the flowers open. After anthesis the pedicels curve towards the axis, moving the ripe fruit away from the leaf. In appearance the inflorescence is a crest of flowers, the young ones towards the leaf, the older ones towards the stem. An important feature of this type of inflorescence is that the open flowers are always in the same position with respect to the leaf. Young flowers are always below this position and old flowers above it, towards the axis. Species with this type of crested inflorescence have a corolla that is orange, yellow or cream, often with dark blue or brown spots in the mouth or tube of the corolla. The blue flowered species of Section *Microchirita* tend not to have a crested inflorescence (an exception is *C. barbata*), so that the open flowers do not have a definite position in relation to the leaf blade. The adaptive significance of the relation between flower colour and a crested, epiphyllous inflorescence is unclear: presumably it is related to the pollination mechanism, about which nothing is known. The contrast of flower colours in this section is similar to that found in *Thunbergia* (Acanthaceae).

The pollination mechanism most characteristic of *Chirita* is to be seen in species of Section *Chirita*. The corolla has a broad tube, sufficient to admit a large insect. The filaments are strongly geniculate and the anthers cohere face to face. As the insect pushes into the flower the knees of the filaments are pushed apart. This outward movement of the mid-point of the filaments causes the anthers to twist apart to give two pollen producing surfaces above the mouth of the corolla. On entering the corolla tube an insect would pass below the stigma and then have its back dusted with pollen in two broad lines from the anthers; visiting another flower the back of the insect would brush against the divided lamella of the stigma. Another property of the stigma is its downward curvature at the tip. The upper surface is receptive. When an insect pushes into the flower the terminal part of the stigma lobes must move inward, exposing the receptive upper surface to the insect's back. When the insect leaves the corolla, having been dusted by pollen, the receptive upper surface of the stigma is pressed against the roof of the corolla by the insect pressing against the non-receptive lower surface

and the chance of self-pollination is reduced. In many species the style is held in position by longitudinal ridges on the inner dorsal surface of the corolla tube.

In Section *Microchirita* the anthers are not fused face to face but are joined by an apical ligature. This difference in the arrangement of the anthers, together with the possibility that the syndrome of bilobed stigma and geniculate filaments has originated several times independently, suggests that *Chirita* may be polyphyletic. When one part of the syndrome of bilobed stigma, geniculate filaments and divergent anther thecae is absent the other parts may not conform to the pattern. For example, in *C. integra* and *C. lacei* the stigma is entire, the filaments not geniculate and the thecae more or less parallel. Such species may represent an early stage in the evolution of *Chirita* or an advanced loss of the characteristic *Chirita* stigma.

Robert Brown (1840) was the first to recognize the true nature of the stigma in *Chirita*: "the abortion, or great reduction in size, of the upper lip, while the lower is proportionally dilated, and, in some cases, deeply divided. Thus in *Chirita*, in which the stigma is described as bilamellar, both lamellae belong to the lower lip."

The vascular supply to the stigma can be readily seen by clearing the gynoeceium, preferably of fresh material, in chlorolactophenol. There is always a dorsal (adaxial) strand and a ventral strand in the gynoeceium. These may or may not branch towards the tip of the style. No branches were seen in *C. obtusa*, *C. oblongifolia*, *C. lacei* and *C. caliginosa*. Various degrees of branching were found in *C. zeylanica*, *C. sinensis*, *C. dimidiata*, *C. micromusa*, *C. asperifolia*, *C. speciosa*, *C. pumila*, *C. lavandulacea* (up to 18 terminal strands) and *C. bifolia* (up to 20 strands).

One feature of the vascular supply to the stigma is that both the dorsal and ventral vascular strands of the gynoeceium play an important part. The dorsal strand may take two forms: either unbranched, in which case it terminates on the dorsal surface of the style, or dichotomously branched, in which case all branches supply the lateral parts of the usually divided stigma lamella. The stigma, although physically a ventral structure, receives a large part of its vascular supply from the dorsal gynoeceial strand (if this branches).

The adaptive syndrome of geniculate filaments, divergent anther-thecae and the stigma with a thin, divided lower lip is probably the best group of characters that can be used in defining the limits of *Chirita*. The inclusion of several species that have an undivided lower lobe to the stigma will emphasize that these characters are not absolute ones. Some of the species with an entire lip to the stigma, for example, *C. lacei* and *C. obtusa*, are doubtfully placed in *Chirita*; others, for example, *C. integra* and *C. elata*, are obviously similar to species with the stigma lobe bifid and can be included in *Chirita* without question. Even if a species has a bifid stigma there may be some question as to its inclusion in *Chirita*: *C. bifolia* and *C. asperifolia* are rather distinct from other species of *Chirita*.

Burtt (1954) has pointed out that the terminology of the stigma as entire or divided is imprecise. The significant contrast should not be between the bilobed stigma of *Chirita* and the entire one of *Didymocarpus*, but between the thin lamella of the lower lip (usually divided) in *Chirita* and the capitate stigma of *Didymocarpus*.

CHROMOSOME NUMBERS

These were reported by Ratter (1962), Ratter & Prentice (1964, 1967) and Ratter & Milne (1970).

Section <i>Gibbosaccus</i>		
<i>C. sinensis</i>		$2n=36$
Section <i>Chirita</i>		
<i>C. pumila</i>	$n=4$	
<i>C. anachoreta</i>		$2n=18$
<i>C. macrophylla</i>	$n=9$	
<i>C. speciosa</i>		$2n=18$
<i>C. zeylanica</i>	$n=10$	
<i>C. asperifolia</i>	$n=16$	
<i>C. urticifolia</i>		$2n=34$
Section <i>Microchirita</i>		
<i>C. caliginosa</i>	$n=9$	
<i>C. sericea</i>		$2n=18$
<i>C. bimaculata</i>	$n=17$	
<i>C. lavandulacea</i>		$2n=34$

At the moment no distinction between the sections of *Chirita* or between *Chirita* and *Didymocarpus* is possible on the basis of chromosome numbers. Neither can the basic number or level of ploidy be related to the distribution or habitat preferences of the species.

DISTRIBUTION

The genus is Indo-Malaysian with an extension through Indo-China into southern China. There are three main centres of distribution: these most probably represent the original centres of speciation.

A major centre is the region of the eastern Himalayas, N Burma and western China. Section *Chirita* has its greatest concentration here. Another centre is in southern China and N Vietnam, where Section *Gibbosaccus* predominates. Most of the species of Section *Microchirita* are found in a third, rather diffuse, centre in Vietnam and Thailand, mainly to the south and west of the range of Section *Gibbosaccus*.

Of the sub-centres, one is found in Malaya and Thailand, with species 24-28 (Sect. *Chirita*) and 60-64 (Sect. *Microchirita*). Henderson (1939) has described the limestone habitats favoured by species of *Chirita* in Malaya. Another, smaller, sub-centre is found in Ceylon, with three endemic species of Section *Chirita*.

The taxonomically isolated species, *C. asperifolia*, is restricted to western Indonesia.

ALTITUDINAL RANGE OF SECTIONS

Fig. 1 shows the number of species in each section found at various altitudes. For example, 16 species of Section *Chirita* have been collected at 1500 m, while only two species of Section *Microchirita* have been collected at this altitude. There are too few records available for Section *Gibbosaccus* and the altitudinal range is not clear. However, it is apparent that species of Section *Chirita* are found, in general, at greater altitudes than species of Section *Microchirita*.

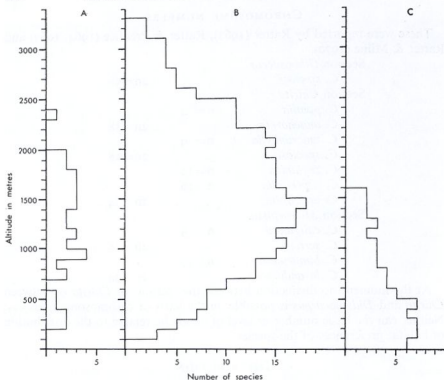


FIG. 1. Altitudinal distribution of species of *Chirita*: A, section *Gibbosaccus*; B, section *Chirita*; C, section *Microchirita*.

NOTES ON THE KEYS AND DESCRIPTIONS

When two or more character states are given in a lead of the keys the first of these is the more reliable. Measurements refer to herbarium material: for example, the width of the corolla tube was measured after the corolla had been flattened. Measurement of fresh material will be about two thirds of this. The measurement across the anthers is applied to anthers with divergent thecae and is the distance between the divergent tips of the thecae. The width of the stigma is of the widest part of the expanded lamella of the lower lobe.

A major shortcoming of the descriptions is the lack of any detailed treatment of the corolla. Corolla characters are difficult to see from dried material and even more difficult to describe in a way that would permit a rational comparison between species.

SUGGESTIONS FOR FURTHER WORK

The high number of species known from only one or two collections indicates that there are still species of *Chirita* yet undiscovered: this is particularly so for Section *Gibbosaccus* in Southern China.

The function and the taxonomic value of the leaf glands is of interest. Details of the vascular supply to the various types of stigma found in the family would be of taxonomic value.

Several problems would repay field study:

1. The variation of the anther form in *C. hamosa*.
2. Observation of pollination in Section *Microchirita*, especially in Thailand.
3. The variation and growth pattern of the taxonomically confusing *C. asperifolia* in Java and Sumatra.
4. The variation in the corolla colour and form in species of Section *Microchirita* in Vietnam. Good data on the corolla will probably permit further species to be recognized.

TAXONOMIC ENUMERATION

Chirita [Buch. Ham. ex] D. Don in Edinb. Phil. Journ. 7:83 (1822); D. Don, Prodr. Fl. Nepal. 89 (1825); R. Br., Pl. Jav. Rar. 113 (v 1840); C.B.Cl. in A.DC., Monogr. Phan. 5:109 (ix 1883); Pellegrin in Lecomte, Fl. Gén. Indo-Chine 4:525 (viii 1930).

Lectotype: *Chirita urticifolia* D. Don chosen by B. L. Burtt in Notes R. B. G. Edinb. 21:195 (28 i 1954).

Syn.: *Roettlera* subgen. *Chirita* (D. Don) K. Fritsch in Pflanzenfam. IV(3B):148 (1895).

Didymocarpus subgen. *Chirita* (D. Don) Chun in Sunyatsenia 6:290 (1946).

Herbaceous or slightly woody annuals or perennials. Indumentum of glandular or hooked or more commonly simple, red or white hairs. Acaulescent, rosulate or caulescent, creeping or erect to 2 m. Leaves whorled or paired, rarely alternate or ternate, narrowly elliptical to orbicular, entire to doubly serrate, rarely sub-peltate; petioles winged or rounded. Inflorescence always axillary; scapiform or cymose, sometimes epiphyllous; one to many on a stem; bracteate or ebracteate, bracts free or connate; flowers one to many on each peduncle. Calyx tubular or divided to the base, lobes entire or rarely fimbriate, rounded to acuminate, 5, rarely 3 or 2. Corolla narrowly tubular to broadly funnel-shaped; lobes 5, with 2 adaxial, 3 abaxial. Fertile stamens 2, fused apically or face to face or joined by a ligature, rarely free; anther-thecae divergent, rarely parallel. Staminodes 2 or very rarely 3. Disc entire, cleft or lobed. Gynoecium very rarely stipitate, rarely part-sterile; stigma usually with the upper lobe absent and the lower lobe expanded into a shortly bifid lamina. Seeds without appendages; testa reticulate.

Ecology: Wet rocks and shady places in forest; limestone cliffs.

Distribution: Western Himalayas to Eastern and Southern China, peninsular India, Ceylon, Malay peninsula, Indo-China, Sumatra, Java, Sarawak. From sea-level to 3200 m.

Species 1-77.

KEY TO SECTIONS

- 1 Calyx divided to the base; plant acaulescent, if caulescent then all leaves alternate Section *Gibbosaccus* (p. 130)
- + Calyx with a tube, or, if divided to the base, plant caulescent with at least the upper leaves opposite 2

- 2 Calyx tubular, or, if divided to the base, lobes divergent and calyx caducous Section *Chirita* (p. 131)
 + Calyx divided to the base, lobes appressed to the corolla tube, or, if diverging, calyx persistent in fruit Section *Microchirita* (p. 134)

Notes. Sect. *Gibbosaccus*: *C. cortusifolia*, with a tubular calyx, keys out with species of Sect. *Chirita*; *C. heterotricha*, with a short stem and whorled leaves, keys out with Sect. *Microchirita*.

Sect. *Chirita*: *C. fulva* and *C. lacunosa*, with divided calyces, key out with species of Sect. *Gibbosaccus*; *C. obtusa*, with a divided calyx, keys out with species of Sect. *Microchirita*.

Sect. *Microchirita*: *C. mollissima*, with alternate leaves, keys out with Sect. *Gibbosaccus*.

Sect. *Gibbosaccus* C.B.Cl. in A.DC., Monogr. Phan. 5:130 (1883).

Holotype: *Chirita sinensis* Lindley.

Syn.: *Roettlera* sect. *Gibbosaccus* (C.B. Cl.) K. Fritsch in Pflanzenfam. IV(3B):148 (1895).

Perennial herbs. Leaves often somewhat fleshy. Inflorescence scapiform; flowers usually several to many. Calyx divided to the base, very rarely shortly tubular. Anthers fused face to face.

Distribution. Vietnam. West and South China. Moist shady places, usually on rocks, 300–2300 m. Species 1–23.

KEY TO SPECIES OF SECTION GIBBOSACCUS

- | | | |
|----|---|--------------------------|
| 1 | Calyx teeth fimbriate or slightly toothed | 2 |
| + | Calyx teeth entire | 4 |
| 2 | Leaves narrowly elliptical, margin sinuate | 14. <i>quercifolia</i> |
| + | Leaves broadly elliptical to orbicular, margin crenate or doubly serrate | 3 |
| 3 | Leaf venation pinnate; corolla more than 3.5 cm long | 15. <i>fimbrisepala</i> |
| + | Leaf venation palmate; corolla up to 3 cm long | 16. <i>heucherifolia</i> |
| 4 | Pedicels with small hooked hairs | 5 |
| + | Pedicels with glandular or eglandular hairs only | 7 |
| 5 | Corolla less than 2 cm long; leaves up to 2 cm long | 21. <i>cynostyla</i> |
| + | Corolla more than 2 cm long; leaves more than 2 cm long | 6 |
| 6 | Petiole inserted up to 5 mm from the leaf margin; calyx teeth less than 8 mm long | 22. <i>eberhardtii</i> |
| + | Petiole inserted at the leaf margin; calyx teeth more than 10 mm long | 23. <i>minutihakata</i> |
| 7 | Leaves alternate | 8 |
| + | Leaves whorled or opposite | 9 |
| 8 | Leaves subglabrous; bracts present | 20. <i>semicontorta</i> |
| + | Leaves densely hairy; bracts absent | 62. <i>mollissima</i> |
| 9 | Bracts more than 6 mm wide or absent | 10 |
| + | Bracts less than 6 mm wide | 12 |
| 10 | Leaves shallowly crenate; calyx teeth rounded | 1. <i>sinensis</i> |
| + | Leaves entire; calyx teeth acute | 11 |

- 11 Calyx teeth more than 6 mm long; bracts with parallel veins 5. *eburnea*
- + Calyx teeth less than 5 mm long; bracts with palmate veins 6. *drakei*
- 12 Leaves densely hairy on margins and veins of lower surface, otherwise subglabrous 19. *poilanei*
- + Leaf surfaces evenly hairy or glabrous 13
- 13 Leaf base subcordate to cordate 14
- + Leaf base decurrent to rounded 15
- 14 Corolla more than 3 cm long; petiole rounded 7. *annamensis*
- + Corolla less than 3 cm long; petiole winged 4. *rotundifolia*
- 15 Mature leaves less than 4 cm long; calyx up to 4 mm long 16
- + Mature leaves more than 5 cm long; calyx usually longer than 4.5 mm 18
- 16 Corolla campanulate, more than 1.3 cm wide at the mouth; peduncle more than 4 cm long 8. *gemella*
- + Corolla narrowly tubular, less than 1 cm wide at the mouth; peduncle up to 3.5 cm 17
- 17 Corolla tube less than 1.5 mm wide; corolla less than 1.5 cm long 9. *speluncae*
- + Corolla tube more than 2 mm wide; corolla more than 2 cm long 10. *vestita*
- 18 Leaf margins revolute 18. *balansae*
- + Leaf margins not revolute 19
- 19 Leaf indumentum of white hairs; petioles winged or flattened 20
- + Leaf indumentum of red-brown hairs; petioles rounded 24
- 20 Calyx teeth more than 9 mm long; anthers less than 2.5 mm across 3. *heterotricha*
- + Calyx teeth less than 9 mm long; anthers more than 2.5 mm 21
- 21 Corolla up to 3 cm long 22
- + Corolla more than 3.5 cm long 23
- 22 Bracts paired; anthers hairy 11. *fordii*
- + Bracts in 3's; anthers glabrous 12. *pellegriniana*
- 23 Leaves subglabrous; anthers hairy 2. *colaniae*
- + Leaves hairy; anthers glabrous 13. *juliae*
- 24 Corolla 1.5 cm long; fruit 7.5 cm \times 2 mm 24. *fulva*
- + Corolla 3-3.5 cm long; fruit 3 cm \times 1.4 mm 25. *lacunosa*

Sect. *Chirita*

Lectotype: *Chirita urticifolia* D. Don chosen by B. L. Burtt in Notes R. B. G. Edinb. 21:195 (28 i 1954).

Syn.: *Tromsdorffia* Bl. Bijdr. 14:762 (1826), non *Tromsdorffia* Bernh. (1800).

Babactes DC. in Meisn., Pl. Vasc. Gen. Comm. 21 (x 1840).

Liebigia Endl., Gen. Pl. Suppl. 1:407 (1840).

Mortsdorffia Steud., Nomencl. (Edn. 2) 2:161 (1841).

Bilabium Miq., Fl. Ind. Bat. 2:730 (1856).

Chirita sect. *Bilabium* (Miq.) C.B.Cl. in A.D.C., Monogr. Phan. 5:126 (1883).

Chirita sect. *Euchirita* C.B.Cl., op. cit. p. 111 (excl. *C. caliginosa*).

Chirita sect. *Liebigia* (Endl.) C.B.Cl., op. cit. p. 122.

Roettlera sect. *Bilabium* (Miq.) K. Fritsch in Pflanzenfam. IV(3b):148 (1895).

Roettlera sect. *Euchirita* (C.B.Cl.) K. Fritsch, loc. cit.

Roettlera sect. *Liebigia* (Endl.) K. Fritsch, loc. cit.

Didymocarpus sect. *Euchirita* (C.B.Cl.) Chun in Sunyatsenia 6:294 (1946).

Ceratoscyphus Chun in Sunyatsenia 6:276 (1946).

Caulescent or acaulescent perennial herbs, often slightly woody. Flowers one to many. Calyx usually tubular. Anthers fused face to face.

Distribution. The range of the genus, but not well represented in Vietnam and S China, 100–3200 m. Species 24–59.

KEY TO SPECIES OF SECTION CHIRITA

- 1 Mature plant with one large leaf only 57. *monophylla*
- + Mature plant with several leaves, or with one small and one large leaf 2
- 2 Mature plant with several leaves 3
- + Mature plant with one small and one large leaf 59. *bifolia*
- 3 Plant acaulescent 4
- + Plant caulescent 15
- 4 Leaves entire, sub-peltate, petiole inserted about 5 mm from leaf margin 26. *integra*
- + Leaves toothed, petiole inserted at the leaf margin 5
- 5 Calyx glabrous; bracts paired, fused along one margin 28. *trispala*
- + Calyx hairy; bracts, if present, free 6
- 6 Anthers less than 2.2 mm long 7
- + Anthers more than 2.4 mm long 8
- 7 Corolla more than 1.5 cm long, purple 25. *lacunosa*
- + Corolla less than 1.4 cm long, white with purple lines 27. *purpureo-lineata*
- 8 Calyx lobes geniculate at the tip 35. *corniculata*
- + Calyx lobes straight at the tip 9
- 9 Leaf veins palmate; calyx lobes with two small marginal teeth 17. *cortusifolia*
- + Leaf veins pinnate; calyx lobes entire 10
- 10 Lateral veins of the leaf 4–5 on each side; leaves orbicular, if broadly ovate then whorled 30. *dielsii*
- + Lateral veins of leaf more than 6 on each side; leaves narrowly elliptical to ovate, if broadly ovate leaves alternate 11
- 11 Corolla less than 3.5 cm long, filaments inserted within 8 mm of the base of the corolla 31. *lachenensis*
- + Corolla more than 4 cm long, filaments inserted at least 1 cm from the base of the corolla 12
- 12 Leaves sparsely hairy, obscurely serrate; anthers glabrous 33. *insignis*
- + Leaves densely hairy, serrate or doubly serrate; anthers hairy 13
- 13 Bracts absent; flowers solitary 32. *mishmiensis*
- + Bracts present; flowers 2–many on a peduncle 14
- 14 Leaves alternate, margins serrate 56. *speciosa*
- + Leaves whorled, margins doubly serrate 29. *primulacea*

- 15 Leaves scabrid; filaments densely bearded below the anthers 58. *asperifolia*
 + Leaves softly hairy or glabrous; filaments glabrous to hairy below anthers 16
- 16 Plants creeping, stoloniferous; leaves alternate 17
 + Plants erect, without stolons; leaves opposite or whorled. 18
- 17 Corolla less than 3.5 cm long; filaments inserted within 8 mm of the base of the corolla 31. *lachenensis*
 + Corolla more than 3.8 cm long; filaments inserted more than 15 mm from the base of the corolla 34. *reptans*
- 18 Leaves entire 19
 + Leaves serrate 25
- 19 Calyx hairy 20
 + Calyx glabrous 23
- 20 Calyx with a tube; stamen filaments straight 38. *lacei*
 + Calyx divided almost to the base; stamen filaments geniculate. 21
- 21 Leaves in pairs; stamen filaments glabrous 36. *tibetica*
 + Leaves in whorls of 3 or 4; stamen filaments hairy 22
- 22 Flowers 2-5 on a peduncle; calyx less than 2.0 cm long 47. *walkeri*
 + Flowers solitary; calyx more than 2.1 cm long 48. *moonii*
- 23 Leaf surfaces hairy; anthers hairy 46. *zeylanica*
 + Leaf surfaces glabrous; anthers glabrous 24
- 24 Leaf base asymmetrical; anthers 3 mm across 44. *calva*
 + Leaf base symmetrical; anthers 2 mm across 45. *rotundata*
- 25 Calyx divided to the base into 5 separate lobes, or teeth at least 3 times length of tube 26
 + Calyx tubular, teeth not more than 2 times length of tube, or tube cleft to the base only dorsally 27
- 26 Individual vascular strands visible in the midrib on the lower surface of the dried leaf; filaments and anthers glabrous 40. *forrestii*
 + Individual vascular strands not visible; filaments and anthers pubescent 49. *longipedicellata*
- 27 Calyx glabrous or sub-glabrous, or only hairy round the margin of the lobes, if otherwise hairy, then filaments also hairy and anthers less than 2.5 mm across 28
 + Calyx hairy to densely hairy, if sparsely hairy, then filaments glabrous and anthers at least 3 mm across 31
- 28 Anthers 4 mm across; filaments glabrous 43. *macrophylla*
 + Anthers up to 3.5 mm across; filaments sparsely hairy to hairy 29
- 29 Anthers 2 mm across; corolla usually less than 4 cm long; calyx teeth usually with an outward pointing prolongation 39. *pumila*
 + Anthers more than 2.5 mm; corolla more than 4 cm long; calyx lobes without an outward pointing prolongation 30
- 30 Midrib and lateral veins of upper surface of leaves glabrous; corolla white, yellow or pale lilac 41. *anachoreta*
 + Midrib and lateral veins of upper leaf surface hairy; corolla purple 42. *dimidiata*
- 31 Peduncles many-flowered; minute brown glands on leaf surface; ovary hairy 52. *oblongifolia*
 + Peduncles 1-3 flowered; no brown glands on leaves; ovary sparsely hairy or glabrous 32

- 32 Bracts more than 2, whorled; anthers pubescent . . . 54. *heterostigma*
 + Bracts paired; anthers glabrous 33
 33 Bracts connate; filaments glandular 53. *adenocalyx*
 + Bracts free; filaments glabrous 34
 34 Calyx teeth longer than 1.5 cm; corolla purple; anthers more
 than 4 mm across 55. *urticifolia*
 + Calyx teeth less than 1.5 cm; corolla white; anthers less than
 4 mm across 35
 35 Calyx hairy within, teeth about 1 cm long; peduncles 1-flowered 50. *hookeri*
 + Calyx glabrous within, teeth about 4 mm long; peduncles 2-
 flowered 51. *peduncularis*

Sect. *Microchirita* C.B.Cl. in A.DC., Monogr. Phan. 5:127 (1883).

Lectotype: *Chirita hamosa* R. Br. chosen by B. L. Burtt in Notes R. B. G. Edinb. 21:196 (28 i 1954).

Syn.: *Roettlera* sect. *Microchirita* (C.B. Cl.) K. Fritsch in Pflanzenfam. IV (3B):148 (1895).

Didymocarpus sect. *Microchirita* (C.B. Cl.) Chun in Sunyatsenia 6:290 (1946).

Caulescent annual herbs, rarely perennial, often rather fleshy. Inflorescence usually epiphyllous. Calyx appressed to fruit. Anthers most commonly joined by an apical ligature.

Distribution. Predominantly Indo-China, extending to peninsular India, Malaya, Sarawak and Java; usually calcicole, 0-1500 m, but mainly less than 500 m. Species 60-77.

KEY TO SPECIES OF SECTION MICROCHIRITA

1. Petiole winged 3. *heterotricha*
 + Leaves sessile, or, if petiolate, petiole not winged 2
 2. Fringe of clavate hairs in the mouth of the corolla tube above
 the position of the anthers 3
 + No fringe of clavate hairs in the corolla tube 5
 3. Petioles with glandular hairs; stem glabrescent 60. *caliginosa*
 + Petioles eglandular; stem hairy to densely hairy 4
 4. Anthers concolorous; stem woody 61. *sericea*
 + Anthers with dark spots; stem herbaceous 64. *viola*
 5. Corolla cream, yellow or orange 6
 + Corolla blue or purple 12
 6. Corolla lobes cream 7
 + Corolla lobes yellow or orange 8
 7. Corolla with purple spots in the throat; leaves elliptical or
 narrowly elliptical 65. *tubulosa*
 + Corolla without purple spots; leaves ovate 66. *hamosa*
 8. Corolla uniform orange, or orange with darker orange markings
 in the throat 9
 + Corolla yellow or orange with dark purple-brown markings in
 the throat 10

9. Corolla uniform orange; anthers more than 2.5 mm across 67. *marcanii*
 + Corolla with darker orange markings in the throat; anthers
 less than 2.4 mm across 68. *micromusa*
10. Markings forming a ring round the mouth of the corolla 69. *oculata*
 + Markings confined to the lower surface of the throat 11
11. Fruit more than 4 cm long; calyx more than 8 mm long 70. *elphinstonia*
 + Fruit less than 3.5 cm long; calyx less than 7 mm long 71. *bimaculata*
12. Filaments coiled; anther-thecae parallel 37. *obtusata*
 + Filaments geniculate; anther-thecae divergent 13
13. Calyx lobes widest above the middle (narrowly obovate),
 densely hairy 72. *barbata*
 + Calyx lobes widest at or below the middle, or linear, sparsely
 hairy to hairy 14
14. Corolla more than 2.5 cm long 15
 + Corolla less than 2.4 cm long 17
15. Leaves entire; calyx teeth more than 10 mm long 73. *aratriformis*
 + Leaves toothed; calyx teeth less than 8 mm long 16
16. Leaf apex acute to obtuse; anthers joined by an apical
 connective 74. *lavandulacea*
 + Leaf apex acuminate; anthers fused face to face 63. *elata*
17. Bracts fused, cup-like; fruit hairy 18
 + Bracts free; fruit glabrous 75. *involutrata*
18. Stem less than 15 cm; leaves entire or obscurely serrate 76. *caerulea*
 + Stem more than 15 cm; leaves serrate 77. *rupestris*

SECTION GIBBOSACCUS

1. *C. sinensis* Lindl. in Edwards's Bot. Reg. 30: t.59 (1 xi 1844). Curtis's Bot. Mag. 73: t.4284 (1847). Benth. in Fl. Hongkong. 259 (1861). C.B.Cl. in A.D.C., Monogr. Phan. 5: 130 (1883).

Type: herb. Lindley (CGE, not seen).

Icon.: Fl. des Serres 2, 1: t. 23 (1845).

Syn.: *Roettlera sinensis* (Lindl.) O. Kuntze, Rev. Gen. 2: 477 (5 xi 1891). *Didymocarpus sinensis* (Lindl.) Lévl. in C.R. Ass. Fr. Avanc. Sci. 34: 427 (1906).

Chirita sinensis var. *angustifolia* Dunn in J. Bot. Lond. 45: 403 (xi 1907).

Type: Hong-Kong, northern precipices of Ma-on-Shan, *Herb. Hong-Kong* 1135, not seen.

Chirita sinensis var. *bodinieri* Lévl. in Fedde, Rep. 9: 328 (10 v 1911).

Type: Hong-Kong, Happy Valley, Rochers de la Cascade, 17 v 1895, *Bodinier* s.n., (holo. E; iso. P).

Chirita dryas Dunn in Kew Bull. Addit. Ser. 10: 195 (1912). Type: Kwangtung Province, North-west River, *Herb. Hong-Kong* 248 (K).

Acaulescent herbaceous perennial. *Rhizome* up to 2 cm thick, vertical or horizontal, with fibrous roots. *Internodes* very short. *Leaves* apparently whorled, ovate to narrowly elliptical, 11 × 7.5–13 × 4 cm, obtuse to acute, shallowly crenate to dentate; base decurrent; lateral veins 3–5 on each side, not paired; hairs of two kinds, short, appressed and longer, sparser, erect;

upper surface of leaf sometimes with white and purple markings; petiole up to 5 cm, winged, hairy. *Inflorescence* axillary, scapiform, 1-several on each stem, 1-6-flowered, peduncle up to 20 cm, purple, with purple long and short patent hairs. *Bracts* paired, free, ovate or elliptical to narrowly elliptical, $1.4 \times 0.5-3.5 \times 1$ cm, obtuse or acute, entire, veins parallel, outer surface with similar hairs to peduncle, inner surface sub-glabrous. *Bracteoles*, if present, smaller than bracts. *Pedicels* up to 2.5 cm, densely patent hairy with long glandular and short eglandular hairs. *Calyx* divided to the base, teeth ovate to elliptical, $2.3 \times 1.7-3.2 \times 2-4.5 \times 1.5$ mm, rounded at the tip, sparsely hairy. *Corolla* 3-3.5 cm long, slightly hairy outside, tube 1.2-1.5 cm wide at the mouth, deeply pouched, white or pale lavender, two ridges with orange-yellow markings above, two orange-yellow spots below anthers, lobes blue-purple or rose-purple. *Filaments* inserted 1.2 cm from the base of the corolla, 1-1.1 cm long, geniculate about 0.4 cm from the point of attachment, sparsely hairy. *Anther-thecae* divergent, 1.8-2.2 mm across, anthers fused face to face, glabrous. *Staminodes* 0.6-0.7 cm, slightly hairy. *Disc* an obscurely 2-lobed ring 1 mm deep. *Gynoecium* densely hairy with predominantly glandular hairs, 1.8-2.5 cm long, 0.9 mm wide below, narrowing to 0.4 mm below the stigma, which is 2-lobed, up to 1.1 mm wide; fruit not seen.

Distribution. China: Kwangtung. Hong-Kong. Moist, shady, rocky places. Fl. 2, 6-8.

HONG KONG. Pic Victoria, 1000 ft, vii 1894 [fl.], 21 viii 1898 [fr.] Bodinier 761 (P); vi 1851, Hance 378 (BM, P).

CHINA. Kwantung, Wan Chai Gap, wet place, Lamont 532 (BM). Wing-nai-chung Ravine, dripping cavern, viii 1884, Sampson 478 (BM). Tank Ravine, 25 viii 1859, Urquhart s.n. (K), Wright 343 (K). Tai modian, 1500 ft., 19 ii 1909, Herb. Hong Kong 7041 (P).

CULTIVATED MATERIAL. Seed from Batcheller, New Hampshire, U.S.A., 1966, originally from Montreal Botanic Garden, coll. viii 1967, C.5421 (E).

2. *C. colaniae* Pellegrin in Bull. Soc. Bot. Fr. 73:418 (1926). Pellegrin in Lecomte, Fl. Gén. Indo-Chine 4:529 (1930).

Lectotype: Vietnam, Tonkin, province de Bac-Giang, Lang Mit, v 1925, Mlle E. Colani 2.935 (P).

Acaulescent herbaceous perennial. *Rhizome* up to 2 cm thick, short, vertical, with fibrous roots. *Leaves* apparently whorled, broadly ovate to ovate, $6.5 \times 2.5-15 \times 9$ cm, obtuse to acuminate, shallowly crenate; base oblique, decurrent; lateral veins 4-5 on each side, not paired; hairs sparse, except round the margin, which has an appressed band of hairs; petiole up to 9 cm, winged, hairy. *Inflorescence* scapiform, 1-several on each stem, 1-8-flowered, peduncle up to 30 cm, eglandular hairy. *Bracts* paired or ternate, narrowly elliptical, $0.6 \times 0.2-2.5 \times 0.5$ cm, entire, veins parallel, margin ciliate, surfaces slightly hairy. *Bracteoles* similar to but smaller than bracts. *Pedicels* 0.3-2(-13) cm, sparsely to densely hairy with glandular or eglandular hairs. *Calyx* divided to the base, teeth narrowly triangular, $6 \times 1-8 \times 1.6$ mm, acute, sparsely hairy to hairy with eglandular hairs. *Corolla* 3.5-4.2 cm long, tube 1.5 cm wide at the mouth, slightly curved and slightly pouched, slightly hairy outside, violet. *Filaments* inserted 1 cm from the base of the corolla, 1.3 cm long, geniculate about 0.6 cm below the anthers, sparsely hairy. *Anther-thecae* divergent, 3-3.5 mm across, anthers fused

face to face, hairy along suture. *Staminodes* inserted 0.7 cm from the base of the corolla, 0.7 cm long, hairy and with a small tuft of hairs apically. *Disc* an oblique ring 0.5–1 mm deep. *Gynoeceum* densely hairy with eglandular hairs, 2.5 cm long, 1.2 mm wide below, narrowing to 0.5 mm; stigma deeply 2-lobed, 1.5 mm wide. *Fruit* not seen; calyx apparently persistent.

Distribution. Vietnam: Tonkin, Annam. Fl. 2, 4, 5.

VIETNAM. Tonkin, province de Bac-Giang, Lang Mit, v 1925, *Colani* 2.935 (isotype C). Province de Langson, Bang Mac, sur falaises calcaires ombragées, fl. violacées, 17 ii 1940, *Pételot* 7.219 (E,P). Annam, Núi Bach Ma près Huê, grande cascade, 1000 m alt., plante grasse sur roche humide, fl. violet mauve, 15 iv 1939, *Poillane* 29736 (P).

3. *C. heterotricha* Merrill in Lingnan Sci. J. 13:71 (27 i 1934).

Type: China, Hainan, Hung mo Shan, 3 v 1929, *Tsang, Tang & Fung* 17559 (holo. NY not seen; iso. K).

Herbaceous perennial. *Stem* erect, unbranched, to 12 cm, woody at the base, swollen, glabrescent with white hairs. *Internodes* 0.5–2.5 cm. *Leaves* clustered at the stem apex, ovate, 8×3 – 17×10 cm, acute, entire or shallowly dentate; base decurrent; lateral veins 5–7 on each side, not paired, obscure in more membranous leaves; hairs white, appressed, sparse to dense on both surfaces; petiole 1–10 cm, winged; leaf scars prominent. *Inflorescence* axillary, up to 5 towards the apex of a stem, each 2–15 flowered, peduncle 12–25 cm, with a mixture of glandular and eglandular hairs. *Bracts* paired, free, narrowly triangular, acute, 0.5×0.1 – 2.5×0.6 cm, entire, with eglandular hairs on both surfaces. *Bracteoles* similar to but smaller than bracts. *Pedicels* 0.5–5 cm. *Calyx* divided to the base, teeth very narrowly triangular, 10×0.5 –1 mm, with eglandular hairs inside and out. *Corolla* about 3.5 cm long, tube about 1 cm wide, slightly gibbous, sparsely hairy on the outer surface, with a glandular patch on the roof of the mouth inside, white or pale lavender. *Filaments* inserted about 0.5 cm from the base of the corolla, geniculate, hairy in the lower part. *Anther-thecae* divergent, 2 mm across, anthers fused face to face, glabrous. *Staminodes* inserted about 1 cm from the base of the corolla, glabrous. *Disc* an obscurely lobed ring 0.5 mm deep. *Gynoeceum* hairy, 3 cm long, 1.0 mm wide below, narrowing to 0.5 mm; stigma obscurely 2-lobed. *Fruit* to 9 cm, glabrescent; calyx persistent.

Distribution. China: Hainan. Moist, shady, rocky places. Fl. 4–7, 10.

CHINA. Hainan: Ngai District, Wong Kam Shan, erect herb in thicket on moist steep slope, 12 x 1932, *Lau* 555 (BM, E, K, P); Ngo Ko Shan, near Tsat Cha village, moist cliff in forest, 5 vi 1933, *Lau* 1872 (BM); Ch'ang-Kiang District, Ngo Ko Shan, moist cliff in forest, semi-woody, erect, 2 m high [sic], leaves edible, 5 vi 1933, *Lau* 1879 (P); Forest, Bak Sa, herb in dense woods, 17 iv 1936, *Lau* 26309 (A); Yaichow, in dense shade on rocks along streams, 29 vii 1933, *Liang* 62329 (P).

The limited material available shows two extremes: *Lau* 555 with thin-textured leaves with obscure lateral veins, entire margins and narrow bracts and *Lau* 1872 & 26309 with larger, shallowly crenate leaves with obvious lateral veins and wider bracts. *Liang* 62329 is intermediate. Further material may indicate that two species are involved here.

4. *C. rotundifolia* (Hemsley) D. Wood in Notes R. B. G. Edinb. 31:371 (iv 1972).

Syn.: *Didymocarpus rotundifolius* Hemsley in J. Linn. Soc. (Bot.) 26:230 (12 iv 1890).

Type: China, Kwangtung, North River, Ford 106 (K).

Acaulescent herbaceous perennial. *Rhizome* horizontal, up to 0.8 cm thick. *Leaves* clustered at the apex of the rhizome, orbicular, 1.6×1.6 – 4.9×5.3 cm, obtuse, entire, subcordate, lateral veins 3–4 on each side, not paired, both surfaces evenly hairy; petiole up to 4.5 cm, winged, hairy. *Inflorescence* axillary, scapiform, 1–6 on each stem, up to 7-flowered, peduncle up to 13 cm, eglandular hairy. *Bracts* paired, free, narrowly triangular, 4×0.8 – 5×1.0 mm, hairy on outer surface, inner surface subglabrous; bracteoles similar but smaller. *Pedicels* 1.7–7 cm, glandular hairy. *Calyx* divided to the base, teeth narrowly triangular, 4 – 5×1 mm, acute, glandular hairy. *Corolla* 2.3–2.6 cm long, tube 1 cm wide at the mouth, very slightly pouched, slightly hairy outside, shortly hairy above the anthers inside, tube and lobes purple. *Filaments* inserted 0.7 cm from the base of the corolla, 0.7 cm long, strongly geniculate 0.2 cm above the point of insertion, glandular in the upper part. *Anther-thecae* divergent, 2.5 mm across, anthers fused face to face, glabrous. *Staminodes* inserted 0.6 cm from the base of the corolla, 0.3 cm long, glabrous. *Disc* an obscurely lobed ring 0.4 mm deep. *Gynoecium* 1.2–1.6 cm long, densely glandular-hairy, 1.0 mm wide, narrowing to 0.4 mm below the 2-lobed stigma which is 1.1 mm wide. *Fruit* 3.5×0.2 cm, hairy; calyx persistent.

Distribution. China. Known only from the type collection.

5. *C. eburnea* Hance in J. Bot., Lond. 21:168 (vi 1883).

Type: China, prov. Canton, juxta Sai-ngau, secus fl. Lien-chau, 5 x 1881, Henry [Herb Hance] 22129 (holo. BM).

Syn.: *Roettlera eburnea* (Hance) O. Kuntze, Rev. Gen. 2:476 (5 xi 1891).

Didymocarpus eburneus (Hance) Lévl. in C.R. Ass. Fr. Avanc. Sci. 34:427 (1906).

Chirita fauriei Franchet in Bull. Mens. Soc. Linn. Paris 1:450 (1885).

Type: Chine, prov de Kouï-tchéou, 1858, Perny s.n. (holo. P).

Didymocarpus fauriei (Franchet) Lévl. in C.R. Ass. Fr. Avanc. Sci. 34:427 (1906).

Acaulescent perennial herb. *Rhizome* up to 2.5 cm thick, vertical, sometimes branched, heavily marked with leaf scars, with long fibrous roots. *Leaves* apparently whorled, elliptical to narrowly elliptical, 3×1.2 – 15×6 cm, acute to obtuse, entire or shallowly crenate, base decurrent, evenly appressed hairy on both surfaces, lateral veins 3–5 on each side, not paired; petiole winged, up to 1 cm wide, 10 cm long. *Inflorescence* axillary, scapiform, 1–5 on each stem, 1–7 (–17) (often 2)-flowered; peduncle 3–30 cm, with eglandular hairs. *Bracts* paired, free, broadly to narrowly elliptical, 1×0.6 – 4.2×2.8 cm, obtuse or acute, entire, outer surface eglandular hairy, inner surface sparsely hairy with glandular and eglandular hairs, veins parallel. *Bracteoles* narrowly ovate, acute, glandular hairy. *Pedicels* up to 2.5 cm with long glandular and short eglandular hairs. *Calyx* divided to the base, teeth narrowly triangular, 7×1.6 – 9×2.2 mm, outer surface with glandular and eglandular hairs, inner surface eglandular hairy. *Corolla*

3.5–4 cm long, tube 0.8 cm wide, almost straight, not or only slightly pouched, slightly hairy outside, hairy above the anthers inside, lobes violet-blue, deep orange markings in the throat. *Filaments* inserted 0.9 cm from the base of the corolla, 1.2–1.7 cm long, geniculate about 0.4 cm above the point of insertion, hairy. *Anther-thecae* divergent, 3.5 mm across, anthers fused face to face, shortly hairy. *Staminodes* 0.4 cm long, with a tuft of hair at the tip. *Disc* an obscurely lobed ring 1.0 mm deep. *Gynoeceum* 2.7–3.0 cm long, 1.2 mm wide, narrowing to 0.3 mm below the stigma, which is 1.0 mm wide; style densely hairy with eglandular hairs. *Fruit* up to 7 cm long, 2.5 mm wide, densely hairy; calyx persistent.

Distribution. China: Hupeh; Kwangsi; Kwangtung; Kweichow; Szechuan; Yunnan. Rocky places. Fl. 4–8.

CHINA. Kouy-Tchéou: environs de Kouei-Yang-fou, montagne de Nan Yo chan, 11 vi 1899, *Beduvalis* 90 (K, P); environs de Gan-pin, sur les rochers de la grande rocaille près de la ville, 10 vi 1897, *Bodinier* 1630 (P); environs de Gan-pin, 10 vi 1897, *Martin & Bodinier* 1630 (E, P); Kai tcheou, *Cavalerie* 3117 (K, P); Houang-ts'ai-po, 1919, *Cavalerie* s.n. (P); environs de Tou-Chan, 22 v 1898, *Cavalerie* s.n. (E); Ouang mou, 12 vii 1912, *Esquirol* 5085 (P). Kwangsi: Hing On district, Sai On village, 17 viii 1937, *Chung* 83616 (A). Szechuan: Nanchuan-Hsien, 5–6000 ft, 15 v 1928, *Fang* 783 (E, K, P); S Wushan, Henry 5531 (BM, K, P). Kwangtung, Ford 128 (K). Hupeh: Nan-t'o, Henry 3794 (E, K); Nan-t'o, Henry 6364 (K); Lungchow, in clefts of rocks, *Morse* 471 (K); W Hupeh, vii 1900, *Wilson* 1378 (E, K, P); W Hupeh, *Wilson* 2258 (BM, K). North River, Yingtak, 10 iv 1914, *Teicher* in *Herb. Hong Kong* 10656 (K). Kwangtung: Yang Shan, south of Linchow, 1932, *Tsui* 678 (A). Yunnan-Sen district, Lofou, 1907, *Cavalerie* 3117 (E).

The bracts of this species, as in *C. sinensis*, enclose the flowers until late in development. Unlike *C. sinensis* both placentae in the fruit are completely fertile.

Esquirol 5085, with round, slightly toothed leaves, may prove to be an undescribed species.

6. *C. drakei* B. L. Burt in Notes R. B. G. Edinb. 23:98 (11 vii 1960).

Lectotype: Vietnam, Tonkin, Baie d'Along, 3 vii 1885, *Balansa* 827 (P).

Syn.: *Chirita bracteosa* Drake in Bull. Soc. Philomath. Paris Ser. 8, 2:128 (1890), non *C. bracteosa* (Zoll. & Mor.) Miq. (1858). Pellegrin in Lecomte, Fl. Gén. Indo-Chine 4:534 (viii 1930).

Subcaulescent herbaceous perennial. *Rhizome* spreading, fleshy, occasionally branching. *Internodes* up to 2.5 cm at the base of the stem but much shorter at the stem apex. *Stem* to 15 cm, densely hairy, glabrescent. *Leaves* opposite, apparently whorled at the stem apex, narrowly elliptical, 3.5 × 0.7–10 × 2 cm, acuminate, entire, sessile, base attenuate; lateral veins 3–5 on each side ascending, upper and lower surface densely covered with appressed white hairs. *Inflorescence* 1–5 on a stem, in the axils of the older leaves, 2-flowered, peduncle 3.5–6.5 cm, densely hairy with appressed eglandular hairs, glabrescent. *Bracts* 2, opposite, free, narrowly ovate, 3 × 0.7–3.5 × 1.2 cm, acuminate, densely hairy with eglandular hairs, palmately veined. *Pedicels* 1–2 cm, with patent glandular hairs. *Calyx*

divided to the base, teeth 4×1 mm, glandular hairy outside, glabrous inside. *Corolla* 3–4 cm long, about 1.3 cm wide at the mouth of the tube, slightly pouched, slightly hairy outside, lobes subequal, purple, throat with a yellow patch below the stamens. *Filaments* inserted about 1.2 cm from the base of the corolla tube, 1.3 cm long, geniculate, hairy below anthers. *Anther-thecae* divergent, 2.4 mm across, anthers fused face to face, hairy on lower surface. *Staminodes* inserted about 1.4 cm from the base of the corolla, 1 cm long. *Disc* 1 mm deep with a single cleft on the ventral surface. *Gynoecium* densely hairy with glandular and eglandular hairs, 2–2.5 cm long, 0.6 mm wide at the base, widening to 1.6 mm then narrowing to 0.4 mm below the stigma which is 1.5 mm wide. *Fruit* 5–6 cm, sparsely hairy; calyx persistent.

Distribution. Vietnam: Tonkin, calcareous rocks. Fl. 7, 9.

VIETNAM. Tonkin: Tankeuin, Quang-yen, 7 ix 1885, *Balansa* 828 (syntype P, K); Baie de 'Ha-long, Île du Cimetière, 9 vii 1901, *Dedeaux* 11.295 (P); Baie d'Along, 8 ix 1911, *Lecomte & Finet* 839 (P).

This species has characteristic bracts and an unusual 2-flowered inflorescence.

7. *C. annamensis* Pellegrin in Lecomte, Fl. Gén. Indo-Chine 4:530 (viii 1930). Lectotype: Vietnam, Annam, Prov. de Nha-trang, massif de Hon-ba, 1000 m, 3 vii 1918, *Chevalier* 38697 (P).

Acaulescent herbaceous perennial. *Rhizome* vertical or horizontal, up to 7 mm thick. *Leaves* apparently whorled, broadly ovate, 2.7×1.8 – 5.6×5.2 cm, obtuse, entire or obscurely serrulate, sub-cordate, both surfaces hairy to densely hairy with eglandular hairs, especially on the veins of the lower surface and round the margins, lateral veins 5–6 on each side, paired towards the leaf base; petiole up to 8 cm, rounded, densely hairy with reflexed hairs. *Inflorescence* axillary, scapiform, 1–several on each stem, flowers solitary or paired, peduncle up to 10 cm, sparsely hairy with glandular and eglandular hairs. *Bracts* linear, 2–3 mm long, hairy, inserted 1–3 cm below the calyx. *Calyx* divided to the base, teeth narrowly triangular, 8×0.8 – 9×1.5 mm, slightly setose, hairy. *Corolla* 3.5–4.8 cm long, tube 1.2 cm wide, almost straight, not pouched, sparsely hairy outside and in, colour not known. *Filaments* inserted 1.5 cm from the base of the corolla, 1.0 cm long, not geniculate, slightly swollen at the tip, glabrous. *Anther-thecae* divergent, 2.8 mm across, anthers fused face to face, glabrous. *Staminodes* inserted 1.7 cm from the base of the corolla, 3.5 mm long, hairy at the tip. *Disc* an obscurely lobed ring 1.2 mm deep. *Gynoecium* glabrous proximally, hairy distally, 2.2–2.8 cm long, 0.6 mm wide at the base, stigma not known. *Fruit* 4×0.4 cm, glabrescent; calyx persistent.

Distribution. Vietnam: Annam. Rocky soils, 1000–2000 m. Fl. 7, 11.

VIETNAM. Annam: prov. Nhatrang, Mère et l'enfant, 2000 m, granite, 6 xi 1922, *Poillane* 5092 (syntype P).

C. poilanei is also found in the same locality, on the Hon-ba massif. In many ways the two species are very similar, although they can be readily separated by leaf characters.

8. *C. gemella* D. Wood in Notes R. B. G. Edinb. 31:370 (iv 1972).

Type: Vietnam, Tonkin, *Lemarie* 123 (holo. P).

Acaulescent perennial herb, eglandular hairy except for the pedicels. *Rhizome* ascending, up to 1 cm wide, 6 cm long, stolons present. *Leaves* whorled, elliptical or obovate, $1 \times 0.6 - 2 \times 1.3$ cm, rounded, entire, base rounded or decurrent, evenly hairy on both surfaces, lateral veins obscure; petiole 0.4–2 cm long, flattened. *Inflorescence* scapiform, 1–4-flowered, peduncle 4.5–13.5 cm long. *Bracts* paired, free, elliptical, 3×1 mm. *Pedicels* 2.5–5 cm with glandular and eglandular hairs. *Calyx* divided to the base, teeth triangular, 3×1 mm, acute. *Corolla* 1.8 cm long, campanulate, 1.7 cm wide across the mouth, tube slightly pouched, sub-glabrous outside and in, colour not known. *Filaments* inserted 0.3 cm from the base of the corolla, 0.3 cm long, geniculate in the lower part, densely hairy distally. *Anther-thecae* divergent, 2.5 mm across, anthers fused face to face, glabrous. *Staminodes* inserted 0.2 cm from the base of the corolla, 1.5 mm long, glabrous. *Disc* an entire ring 0.3 mm deep. *Gynoeceum* 1.1 cm long, ovary 5×1 mm, densely hairy, style 6×0.3 mm, hairy, stigma shortly 2-lobed, 0.6 mm wide. *Fruit* not known.

Distribution. Vietnam: Tonkin, no further locality.

9. *C. speluncae* (Hand.-Mazz.) D. Wood in Notes R. B. G. Edinb. 31:370 (iv 1972).

Type: China, NE Yunnan, Grotte von Hwawuping, 800 m, April, *Maire* s.n. (E).

Syn.: *Didymocarpus minutus* Hand.-Mazz., Symb. Sin. 7:880 (1 ii 1936) non *D. minutus* Kraenzl. (1927).

Didymocarpus speluncae Hand.-Mazz., Symb. Sin. 7:1377 (15 ix 1936).

Acaulescent herbaceous perennial, leaves and inflorescence eglandular hairy. *Rhizome* short, vertical. *Leaves* whorled, elliptical, $0.9 \times 0.5 - 2.2 \times 0.9$ cm, obtuse, entire, decurrent, evenly hairy on both surfaces, lateral veins 2–3, obscure; petiole 0.2–1 cm, flattened. *Inflorescence* axillary, 2–6 on each plant, flowers solitary, peduncle 1.1–2.2 cm. *Bracts* narrowly triangular, about 1 mm long, hairy, inserted in the upper third of the peduncle. *Calyx* divided to the base, teeth narrowly oblong, 3.5×0.5 mm, rounded at the tip, hairy outside, hairy towards the tip inside. *Corolla* 1.2 cm long, 0.3 cm wide across the mouth, tube curved, not pouched, sparsely hairy inside and out, lobes violet blue, tube pale. *Filaments* inserted 4.5 mm from the base of the corolla, 1.5 mm long, slightly curved, glabrous. *Anther-thecae* divergent, 1 mm across, anthers fused face to face, glabrous. *Staminodes* inserted 3.5 mm from the base of the corolla, 0.5 mm long, glabrous. *Disc* a shallowly lobed ring 0.3 mm deep. *Gynoeceum* 0.6 cm long, ovary 2×0.6 mm, hairy, style 4×0.1 mm, sparsely hairy, stigma shallowly 2-lobed, 0.6 mm wide. *Fruit* 0.7 cm long, hairy; calyx persistent.

Distribution. I have seen only the type collection from China, NE Yunnan.

10. *C. vestita* D. Wood in Notes R. B. G. Edinb. 31:369 (iv 1972).

Type: China, Kouy-Tcheou, Puis-fa, 30 v 1907, *Cavalerie* 3228 (holo. P).

Acaulescent herbaceous perennial, leaves and inflorescence eglandular hairy. *Rhizome* short, obscured with old leaf bases. *Leaves* whorled, elliptical, $1.5 \times 0.9 - 3.4 \times 2.1$ cm, obtuse, entire, decurrent, evenly hairy on

both surfaces, lateral veins 3-4 on each side, obscure; petiole 0.5-1.3 cm, flattened. *Inflorescence* axillary, 2-3 on a flowering stem, flowers solitary, peduncle 0.5-2.5 cm. *Bracts* narrowly triangular, less than 1 mm long, inserted in the upper third of the peduncle. *Calyx* divided to the base, teeth narrowly triangular, 4×0.5 mm, acute, hairy outside, glabrous within. *Corolla* 2.5 cm long, 0.5 cm across the mouth, tube straight, not pouched, sparsely hairy outside and in, lobes violet blue, tube paler. *Filaments* inserted 1.2 cm from the base of the corolla, 0.5 cm long, curved glabrous. *Anther-thecae* divergent, 2 mm across, anthers fused face to face, glabrous. *Staminodes* inserted 2 mm from the base of the corolla, 1.5 mm long, glabrous. *Disc* a ring 0.3 mm deep. *Gynoeceum* 1.7 cm long, ovary 3×0.5 mm, densely hairy, style 1.4×0.2 mm, hairy, stigma 2-lobed, 0.8 mm wide. *Fruit* 1.2 cm long, hairy; calyx caducous. Distribution. Known only from the type specimen.

11. *C. fordii* (Hemsley) D. Wood in Notes R. B. G. Edinb. 31:371 (iv 1972). Type: China, Kwangtung, viii 1887, Ford 130 (K).

Syn.: *Didymocarpus fordii* Hemsley in J. Linn. Soc. (Bot.) 26:229 (12 iv 1890).

Acaulescent herbaceous perennial. *Rhizome* ascending, up to 1 cm wide. *Leaves* apparently whorled, ovate, up to 10×5.5 cm, acute, obscurely crenate, decurrent, indumentum dense, of long and short eglandular hairs, lateral veins 4-5 on each side, obscurely paired; petiole up to 3 cm long, winged, hairy. *Inflorescence* scapiform, up to 4 on a stem, each scape up to 4-flowered, peduncle up to 5 cm long, with long glandular and eglandular hairs. *Bracts* paired, free, very narrowly triangular, 5×0.6 mm, hairy. *Pedicels* 0.3-1.2 cm, with long glandular and short eglandular hairs. *Calyx* divided to the base, teeth very narrowly triangular, $4-5 \times 0.8$ mm, with glandular and eglandular hairs on the outer surface, sparse eglandular hairs on the inner surface. *Corolla* 2.3-2.7 cm long, tube straight, slightly pouched ventrally, 0.8 cm wide at the mouth, slightly hairy outside, lobes ciliate with glandular hairs, two glandular ridges below the anthers in the mouth of the throat, lobes violet. *Filaments* inserted about 4 mm from the base of the corolla, about 3.5 mm long, slightly geniculate, glabrous. *Anther-thecae* divergent, 3 mm across, anthers fused face to face, hairy on the lower surface. *Staminodes* inserted 2 mm from the base of the corolla, 1 mm long, glabrous. *Disc* an obscurely lobed ring 0.5 mm deep. *Gynoeceum* densely hairy with glandular and eglandular hairs, 1.8-2 cm long, 1 mm wide at the base, narrowing to 0.3 mm below the stigma, which is 2-lobed, 1.4 mm wide. *Fruit* 1 cm long; calyx caducous.

Distribution. China: Kwangtung. Fl. 8, 9.

CHINA. Kwangtung: north River, 2 ix 1889, Ford 176 (K).

12. *C. pellegriniana* B. L. Burtt in Notes R. B. G. Edinb. 23:98 (11 viii 1960). Lectotype: Vietnam, Tonkin, Mt. Bavi, sur les bords ombragés et rocheux des torrents, vii 1887, Balansa 4287 (P, K).

Syn.: *Didymocarpus balansae* Pellegrin in Bull. Soc. Bot. Fr. 73:415 (1926) non *Chirita balansae* Drake (1890).

Acaulescent herbaceous perennial. *Rhizome* vertical, up to 1.5 cm thick. *Leaves* apparently whorled, orbicular to elliptical, $4 \times 2.5 - 18 \times 11.5$ cm, obtuse, crenate, obliquely truncate to sub-cordate, both surfaces with appressed eglandular hairs, denser on the veins of the lower surface, lateral veins 4-8 on each side, obscurely paired; petiole up to 7 cm long, winged. *Inflorescence* scapiform, up to 4 on a stem, each (2-4-20-flowered, peduncle 2-14 cm long, with patent eglandular hairs. *Bracts* ternate, free, very narrowly triangular, about 6×0.6 mm, eglandular hairy. *Bracteoles* bract-like but smaller. *Calyx* divided to the base, teeth narrowly triangular, $5 \times 1 - 8 \times 1.5$ mm, eglandular hairy on both surfaces. *Corolla* 2.5-3 cm long, tube campanulate at the base, 1.4 cm wide at the mouth, slightly pouched ventrally, very sparsely hairy outside, sparsely hairy above the anthers inside, lobes violet, with an orange patch deep in the throat ventrally. *Filaments* inserted about 4 mm from the base of the corolla, 9 mm long, slightly geniculate 3 mm from the point of attachment, very slightly glandular hairy. *Anther-thecae* divergent, 3.3 mm long, anthers fused face to face, glabrous. *Staminodes* inserted 3 mm from the base of the corolla, 2 mm long, very sparsely hairy, tip glabrous. *Disc* an obscurely lobed ring 0.4 mm deep. *Gynoecium* densely hairy with glandular and eglandular hairs, 1.5-1.7 cm long, 0.9 mm wide narrowing to 0.4-0.6 mm wide below the stigma, which is spatulate, entire, 1.0 mm wide. *Fruit* 2.5-3 cm \times 1.8 mm, hairy; calyx persistent.

Distribution. Vietnam: Tonkin. China: Kwangsi. Moist rocky places in the shade. Fl. 4, 6, 7, 9.

VIETNAM. Tonkin: Mont Bavi, près de Van-Maou, sur les roches moussues, 22 vii 1886, *Balansa* 4294 (syntype P); prov. de Sontây, Mont Bavi, rochers siliceux dans un ravin, iv 1940, *Pételot* 7.233 (E, P); entre Cao Bang et Nguyễn Binh, vi 1939, *Pételot* 7256 (E, P); Sai Wong Mo Shan, Ha-coi, ix 1939, *Tsang* 29473 (E); Sai Wong Mo Shan, Long Ngong village, Dam-ha, 18 vii-9 ix 1940, *Tsang* 30186 (E).

CHINA. Kwangsi: Sup-man-ta Shan, wet or moist rocky place in shaded forest, fl. blue, white, 14 vii 1937, *Liang* 69669 (A).

13. *C. juliae* Hance in J. Bot., Lond. 21:168 (vi 1883).

Type: China, prov. Cantonensis, secus flumen Lien-chau, x 1881, [*Hance*] 22077 (holo. BM).

Syn.: *Roettlera juliae* (Hance) O. Kuntze, Rev. Gen. 2:476 (5 xi 1891).

Didymocarpus juliae (Hance) Lévl. in C.R. Ass. Fr. Avanc. Sci. 34:427 (1906).

Habit unknown. *Leaves* elliptical, $4.5 \times 2.5 - 6.5 \times 4.5$ cm, obtuse, shallowly lobed, decurrent or rounded at the base, both surfaces with appressed hairs, evenly long and short hairy on the upper surface, more densely hairy on the veins of the lower surface, lateral veins 5 on each side; petiole flattened, 1 cm long, hairy. *Inflorescence* scapiform, axillary, 2-flowered, peduncle 0.7-1.3 cm long, densely hairy. *Bracts* narrowly triangular, 0.8-6 mm, densely hairy. *Pedicels* 1-5 mm, densely eglandular hairy. *Calyx* divided to the base, teeth narrowly triangular, 8×1.5 mm, densely hairy. *Corolla* 4-4.5 cm long, tube 1.5 cm wide at the mouth, straight, sparsely hairy inside and out. *Filaments* inserted 1.6 cm from the base of the corolla, 1.3 cm long, curved, sparsely hairy. *Anther-thecae* divergent,

3.5 mm across, anthers fused face to face, glabrous. *Staminodes* inserted 1.7 cm from the base of the tube, 4.5 mm long, curved, slightly hairy. *Disc* an obliquely truncate ring about 0.5 mm deep. *Gynoecium* 3 cm long, densely eglandular hairy, 1.8 mm wide at the base, narrowing to 0.3 mm below the deeply 2-lobed stigma, which is up to 1.4 mm wide. *Fruit* unknown. Distribution. China: Kwangtung. Known only from the type collection.

14. *C. quercifolia* D. Wood in Notes R. B. G. Edinb. 31:369 (iv 1972).

Type: China, Kwangsi, Tong Shan (along Kwantung border) near Sap-luk Po village, Sai Yeung Shek Sheung Lin (Waitsap District), 5 ix 1933, fairly common, fl. light reddish green, *Tsang* 22710 (holo. P).

Acaulescent herbaceous perennial. *Rhizome* short. *Leaves* narrowly elliptical, $4.5 \times 1.4-9.5 \times 3$ cm, obtuse, sinuate, decurrent, lateral veins 3-4 on each side, upper and lower surfaces sparsely eglandular hairy, more densely hairy on the veins, margin with dense appressed hairs; petiole not winged, up to 4 cm long, sparsely hairy. *Inflorescence* scapiform, two on the stem, each with 3 flowers, peduncle up to 6 cm, eglandular hairy. *Bracts* opposite, paired, free, ovate, 1.5×0.6 cm, acute, slightly serrate with palmate venation, eglandular hairy. *Pedicels* up to 0.5 cm long, with glandular and eglandular hairs. *Calyx* divided to the base, teeth narrowly elliptical, 5.5×1.5 mm, rounded at the tip, serrate, with glandular and eglandular hairs. *Corolla* 3.9 cm long, tube 1.4 cm wide at the mouth, slightly pouched ventrally, apparently reddish purple with yellow markings in the throat, hairy outside, almost glabrous within. *Filaments* inserted 1.2 cm from the base of the corolla, 1 cm long, geniculate 3 mm from the point of insertion, slightly glandular. *Anther-thecae* divergent, 3.5 mm across, anthers fused face to face, hairy along the lower margin. *Staminodes* inserted 1 cm from the base of the corolla, 3 mm long, glabrous. *Disc* a shallowly lobed ring 0.7 mm deep. *Gynoecium* glandular hairy, 1.2 mm wide at the base, narrowing to 0.4 mm below the emarginate stigma which is 0.8 mm wide. *Fruit* not seen.

Distribution. China: Kwangsi. Known only from the type collection.

15. *C. fimbrisejala* Hand.-Mazz. in Anz. Akad. Wiss. Wien 62:65 (28 x 1925).

Type: China, prov. Hunan austro-occ.: Ad rupes humidus argilloso-schistosus reg. calide temperatae in silva umbrosa montis Yün-schan ad urbem Wukang, 850-1000 m, 9 viii 1917, *Hand. Mazz.* 11225 (iso. C, E, K). Syn.: *Didymocarpus fimbrisejalus* (Hand.-Mazz.) Hand.-Mazz., Symb. Sin. 7:882 (1 ii 1936).

Acaulescent herbaceous perennial. *Rhizome* up to 1 cm thick, roots fibrous. *Leaves* apparently whorled, broadly elliptical to orbicular, $4.5 \times 3.5-9 \times 11$ cm, obtuse, crenate to dentate, truncate to cordate, sparsely to densely hairy, lateral veins 4-6 on each side; petiole up to 6 cm, flattened, hairy. *Inflorescence* axillary, scapiform, 1-3 on each stem, each 1-4-flowered, peduncle up to 9 cm, sparsely to densely eglandular hairy. *Bracts* paired, free, $3 \times 1.5-6 \times 3$ mm, elliptical, entire, eglandular hairy. *Pedicels* 1-2.5 cm, with long and short eglandular hairs. *Calyx* divided to the base, teeth narrowly elliptical, $7 \times 2.5-11 \times 3.5$ mm, with sparse to dense eglandular hairs, 2-5 teeth on each side, veins parallel. *Corolla* 4-5 cm

long, tube 1.5–2 cm wide at the mouth, slightly curved, slightly pouched, sparsely hairy outside, lobes light purple, one or two yellow lines in the throat. *Filaments* inserted 1.3–1.6 cm from the base of the corolla, 1.2–1.4 cm long, geniculate about 0.3 cm above point of attachment, shortly glandular hairy towards the tip. *Anther-thecae* divergent, 3.8–4.2 mm across, anthers fused face to face, slightly hairy on the lower margin. *Staminodes* inserted at the same level as the filaments, 0.7 cm long, glabrous. *Disc* a ring up to 1.4 mm deep, cleft ventrally. *Gynoeceum* densely eglandular hairy, 2.5–3.2 cm long, 1.2–1.4 mm wide basally, narrowing to 0.4–0.5 mm below the stigma which is 2-lobed, up to 1.4 mm wide. *Fruit* up to 6.5 cm long, hairy; calyx persistent.

Distribution. China: Hunan; Kwangtung. Fl. 3, 4, 8.

CHINA. Kwangtung: Shek Sheung Lin, Sam Kok Shan, Cheung Uk village, Ts'ung-hwa district, fairly common, swampy thicket, fl. pinkish green, 1–16 iii 1935, *Tsang* 24844 (A).

CULTIVATED MATERIAL. Hong Kong Bot. Gardens, 1888, Native Collector 147, ex North River (K).

16. *C. heucherifolia* (Hand.-Mazz.) D. Wood in Notes R. B. G. Edinb. 31:371 (iv 1972).

Type: [China, Kiangsi-Fukien border] Steiniger Hang des Schehsing-schan am Dunghwa-schan zwischen Schitscheng und Ninghwa, c. 1200 m, 7 v 1921, *Wang* [330] (iso. E).

Syn.: *Didymocarpus heucherifolius* Hand.-Mazz., *Symb. Sin.* 7:881 (I ii 1936).

Acaulescent herbaceous perennial. *Rhizome* horizontal, up to 1 cm thick, 7 cm long, roots fibrous. *Leaves* clustered at the apex of the rhizome, apparently whorled, orbicular, up to 7 × 8.5 cm, doubly serrate, subcordate, veins 5–7, palmate, biramous towards the leaf margin, the upper surface with dense eglandular short hairs and sparse long hairs, lower surface with sparse short hairs and with long fuscous hairs confined to the veins; petiole up to 8 cm, flattened, with long fuscous hairs. *Inflorescence* axillary, scapiform, up to 4 on a stem, each 4–10-flowered, peduncle up to 13 cm, with long fuscous eglandular and short glandular hairs. *Bracts* opposite, paired, free, elliptical, 5 × 2 mm, serrate, with long fuscous and short white hairs on the outer surface. *Bracteoles* like bracts but smaller. *Pedicels* up to 2.5 cm, with predominantly glandular hairs. *Calyx* divided to the base, teeth narrowly elliptical, 5 × 1.5–6 × 2 mm, acute, 1–3 small teeth on each side, outer surface with short white eglandular and glandular hairs and longer fuscous eglandular hairs, inner surface glabrous. *Corolla* 2.5–2.9 cm long, tube 1.2 cm wide at the mouth, campanulate at the base, straight, slightly pouched, slightly glandular hairy outside, lobes red. *Filaments* inserted about 1 cm from the base of the corolla, about 0.8 cm long, slightly glandular hairy. *Anther-thecae* divergent, 2.5–2.9 mm across, anthers fused face to face, hairy. *Staminodes* absent. *Disc* an obscurely lobed ring 1.3 mm deep. *Gynoeceum* 1.8–2.4 cm long, densely glandular hairy, 0.8 mm wide below, widening to 0.5 mm below the truncate stigma, which is 0.8 mm wide. *Fruit* stipitate, up to 7 cm long, hairy; calyx persistent.

Distribution. China: Kiangsi. The only material I have seen is the type collection.

17. *C. cortusifolia* Hance in J. Bot., Lond. 21:324 (xi 1883).

Type: China, prov. Che-kiang, circa oppid. Wen-chau, *Stronach*, [Herb. propr. Hance] 22178 (holo. BM).

Syn.: *Didymocarpus cortusifolius* (Hance) Lévl. in C. R. Ass. Fr. Avanc. Sci. 34:427 (1906).

Acaulescent herbaceous perennial. *Rhizome* short, 0.6 cm wide, covered by roots. *Leaves* whorled, broadly orbicular, up to 4×5 cm, obtuse, doubly serrate, cordate, veins palmate, 5, dichotomous, upper surface evenly red-brown hairy, veins of the lower surface densely red-brown hairy; petiole round, up to 2.5 cm long, red-brown hairy. *Inflorescence* axillary, scapiform, peduncle up to 10 cm long, red-brown hairy. *Bracts* paired, free, 4.5×1.5 mm, entire, red-brown hairy. *Pedicels* 0.3–1 cm, red-brown glandular and eglandular hairy. *Calyx* 0.7 cm long, teeth triangular, 2.5×2 mm, each with a small lateral tooth, with white and red-brown predominantly eglandular hairs. *Corolla* 2.4–2.9 cm long, tube 0.9 cm across the mouth, straight, slightly pouched, hairy outside, slightly hairy towards the base inside, colour not known. *Filaments* inserted 1.2 cm from the base of the corolla, 0.8 cm long, curved, glabrous. *Anther-thecae* divergent, 2.5 mm across, anthers fused face to face, slightly hairy. *Staminodes* inserted 0.6 cm from the base of the corolla, less than 0.1 cm long, glabrous. *Disc* deeply lobed, segments 2.25×0.5 mm. *Gynoecium* 1.7 cm long, hairy, stigma truncate, 0.3 mm wide. *Fruit* not known.

Distribution. China: Chekiang. Known only from the type collection.

This species is very similar to *C. heucherifolia* in many ways, including the possession of a truncate stigma; it differs from *C. heucherifolia* in having a divided disc and a tubular calyx. Both species lie close to the boundary between *Chirita* and *Didymocarpus*.

18. *C. balansae* Drake in Bull. Soc. Philomath. Paris Ser. 8, 2:129 (1890). Pellegrin in Lecomte, Fl. Gén. Indo-Chine 4:533 (viii 1930).

Type: Vietnam, Tonkin, Ké-só, sur les parvis des roches calcaires, 6 v 1886, *Balansa* 4293 (holo. P).

Subcaulescent herbaceous perennial. *Stem* unbranched, sheathed with imbricate leaf bases, internodes very short. *Leaves* whorled, narrowly obovate, up to 15×3 cm, acute, entire, slightly revolute, base attenuate, lateral veins up to 5 on each side, both surfaces with short appressed hairs, petiole merging with the leaf blade, winged. *Inflorescence* several to a flowering stem, each 8- to more than 30-flowered, branching to the third order. *Peduncles* up to 20 cm, with short glandular and longer eglandular hairs. *Bracts* paired, free, narrowly elliptical, 1.0×0.5 – 1.5×0.7 cm, eglandular hairy on both surfaces. *Bracteoles* bract-like but smaller. *Pedicels* 0.5–4 cm. *Calyx* divided to the base, teeth narrowly triangular or narrowly ovate-triangular, 5×1 – 9×1.3 mm, acute, glandular hairy on both surfaces. *Corolla* 3.0–3.6 cm long, lower lip prominent, tube slightly gibbous, white, sub-glabrous outside, a hairy patch in the mouth above the anthers inside. *Filaments* inserted 6 mm from the base of the corolla, 1.2 cm long, geniculate, slightly hairy at the point of insertion. *Anther-thecae* divergent, 3 mm across, anthers fused face to face, slightly hairy on the lower margin. *Staminodes* inserted 7 mm from the base of the corolla, slightly hairy at the

base. *Disc* an obscurely lobed ring 0.9 mm deep. *Gynoecium* glandular hairy, 1.7–2.3 cm long, 1.0 mm wide at the base, narrowing to 0.2 mm below the stigma, which is bilobed, 0.6 mm wide. *Fruit* unknown; calyx persistent.

Distribution. Vietnam: Tonkin. Calcareous rocks on mountains. Fl. 3–5. VIETNAM. Tonkin: O Cách, in rupib. montis, 28 iii 1883, *Bon* 2009 (P); in montib. prope Lan Mát, 17 iv 1883, *Bon* 2068 (P).

Species 18–23 are restricted to Vietnam and form a natural group. These species tend towards caulescence and this is associated with prominent leaf scars on the stem.

19. *C. poilanei* Pellegrin in Bull. Soc. Bot. Fr. 73:419 (1926). Pellegrin in Lecomte, Fl. Gén. Indo-Chine 4:534 (viii 1930).

Type: Vietnam, Annam, dans le lit d'un ruisseau, dans la forêt à l'ouest de Nhatrang, Giang-Ly, 2000 m, *Poilane* 3616 (holo. P).

Syn.: *Chirita poilanei* var. *villosa* Pellegrin, op. cit. p. 419. Type: Vietnam, Annam, Nhatrang, massif de Houba, 1000 m, *Chevalier* 38.640, (holo. P).

Acaulescent herbaceous perennial. *Rhizome* up to 0.6 cm thick, horizontal. *Leaves* apparently whorled, narrowly elliptical, 4.8×0.6 – 14×2.6 cm, acute, entire, often slightly sinuate, base decurrent, lateral veins 4–7 on each side, not paired, hairs dense on margin and veins of lower surface, absent or sparse on lamina; petiole 1.5–10 cm, rounded, very hairy. *Inflorescence* axillary, scapiform, 1–5 on each stem, flowers solitary or paired, peduncle up to 18 cm, glandular or eglandular hairy. *Bracts* paired, free, linear, up to 6 mm long, hairy. *Pedicels* 1–2 cm, glandular or eglandular hairy. *Calyx* divided to the base, teeth narrowly triangular, 11×1 – 14×3 mm, acute, hairy outside, glabrous within. *Corolla* 4.2–4.6 cm long, tube 1–1.5 cm wide at the mouth, slightly curved, not pouched, sparsely hairy outside, lobes violet blue, tube pale. *Filaments* inserted 1.5 cm from the base of the corolla, 0.7–0.9 cm long, geniculate 2 mm from the point of insertion, glabrous, tip somewhat enlarged. *Anther-thecae* divergent, anthers fused face to face, glabrous. *Staminodes* inserted 1.2 cm from the base of the corolla, 0.4 cm long, glabrous. *Disc* a ring 1.2 mm deep. *Gynoecium* glabrous or hairy with eglandular hairs, 2.6–3.0 cm long, 1.4 mm wide narrowing to 0.6 mm below the obscurely 2-lobed stigma, which is 2.5 mm wide. *Fruit* 6 cm long, glabrescent; calyx persistent.

Distribution. Vietnam: Annam. Fl. 5, 8, 9.

VIETNAM. Annam: prov. de Nhatrang, massif de Hon Bà, 1000–1500 m (sommets), 26 viii 1918, *Chevalier* 38:747 (P); Nhatrang, 19 v 1922, *Poilane* 3429 (P).

20. *C. semicontorta* Pellegrin in Lecomte, Fl. Gén. Indo-Chine 4:531 (viii 1930).

Lectotype: Indo-Chine, Baie d'Along, Les Merveilles, 7 xi 1911, *Lecomte & Finet* 765 (P).

Herbaceous perennial. *Rhizome* ascending, 0.7–1.0 cm wide. *Stem* fleshy, up to 6 cm long, strongly marked with leaf scars. *Leaves* alternate, elliptical, 3×1.8 – 5.5×4.5 cm, obtuse, shallowly crenate, decurrent,

slightly oblique, margins slightly ciliate, otherwise sub-glabrous, lateral veins 4-5 on each side; petiole flattened, up to 8.5 cm long, with very short hairs and sparser long hairs. *Inflorescence* scapiform, one in each leaf axil, 3-9-flowered, peduncle up to 9 cm, glandular hairy, glabrescent. *Bracts* linear, 2 mm long, glandular hairy. *Pedicels* up to 2 cm, glandular hairy. *Calyx* divided to the base, teeth narrowly triangular, 2×0.3 mm, glandular hairy on the outer surface, glabrous within. *Corolla* 1 cm long, tube 2.5 mm wide, straight, slightly pouched, glandular hairy on the outside, glabrous inside. *Filaments* inserted 2 mm from the base of the corolla, 2.5 mm long, geniculate just above the point of insertion, slightly glandular. *Anther-thecae* divergent, 1.6 mm across, anthers fused face to face, glandular. *Staminodes* inserted 0.5 mm from the base of the corolla, 0.5 mm long, glabrous. *Disc* a ring 0.3 mm deep. *Gynoeceum* 6 mm long, glandular hairy, ovary 2.5×0.4 mm, style 3.5×0.1 mm, stigma very shortly bifid. *Fruit* 1.4-2.2 cm, glabrescent, breaking into slightly twisted valves; calyx tardily deciduous.

Distribution. Vietnam: Tonkin. Fl. 12.

VIETNAM. Tonkin, baie d'Along, dans les grottes, 25 xii 1908, d'Alleizette 474 (syntype, P).

21. *C. cynostyla* B. L. Burtt in Notes R. B. G. Edinb. 23:96 (11 viii 1960). Type: Vietnam, Annam, Ba-Na, près Tourane, petite plante sur roche. Tige florale et sépale grenat, après eclusion les sepales sont blanches a la face interne et rosé a la partie externe, petales blanches jolies mais inodore, feuilles epaisses vert bronze clair en dessus et vert résédal ou vert d'eau pâle en dessous. Sol granitique couvert de vieille forêt, 1000 a 1500 m alt., 27 ii 1939, Poilane 29123 (P).

Subcaulescent herbaceous perennial. *Rhizome* up to 0.7 cm thick, ascending, leaf scars prominent. *Leaves* apparently whorled, fleshy, elliptical, up to 1.8×0.8 cm, rounded to obtuse, slightly revolute, crenate, base narrowly cuneate, upper and lower surfaces sparsely eglandular hairy, lateral veins obscure; petiole rounded, up to 1.5 cm long, eglandular hairy. *Inflorescence* axillary, scapiform, 1-4 on a stem, each with 10-14 flowers, peduncle up to 12 cm, with hooked hairs. *Bracts* paired, free, about 4×1.4 mm, slightly hairy. *Pedicels* up to 3 mm, with hooked hairs. *Calyx* divided to the base, teeth narrowly elliptical, about 4.5×1.4 mm, acute, purple, sparsely hairy. *Corolla* up to 1.2 cm long, tube 0.4 cm wide at the mouth, straight, pouched, sparsely glandular hairy outside, glabrous inside, white. *Filaments* inserted 1.5 mm from the base of the corolla, 3 mm long, geniculate, glandular. *Anther-thecae* divergent, anthers fused face to face, glandular on the lower surface. *Staminodes* inserted 2 mm from the base of the corolla, 1 mm long, slightly glandular at the tip. *Disc* an obscurely lobed ring not more than 0.2 mm deep. *Gynoeceum* hairy with glandular and hooked hairs, ovary 2×0.8 mm, style 6×0.2 mm, stigma linguiform, slightly notched at the tip, 0.2 mm wide. *Fruit* not seen.

Distribution. Vietnam: Annam. Known only from the type collection.

Chirita cynostyla, *C. eberhardtii* and *C. minutihamata* are characterised by small hooked hairs on the pedicels. There is no tendency for these hairs to

stick to rough surfaces and to act as a dispersal mechanism for the fruits. A probable function of the hairs is to discourage insects reaching the flowers from the ground. Glandular hairs serve this function in other species.

22. *C. eberhardtii* Pellegrin in Bull. Soc. Bot. Fr. 73:418 (1926). Pellegrin in Lecomte, Fl. Gén. Indo-Chine 4:531 (viii 1930).

Type: Vietnam, Annam, prov. de Thua-Thien, Baïka, 3–500 m, fl. blanc veiné de violet, *Eberhardt* 2466 (P).

Perennial. *Stem* up to 10 cm, woody, slightly procumbent and rooting at the base, glabrescent with short hooked and long hairs, internodes up to 0.5 cm. *Leaves* whorled, elliptical, 2.5×1.2 – 5.75×2.5 cm, obtuse, slightly undulate, crenate, sub-peltate, indumentum of hooked and straight hairs, lateral veins 3–5 on each side; petiole inserted up to 0.5 cm from the leaf margin, 2.5 cm long, not winged, hairy. *Inflorescence* axillary, scapiform, 2–3 on a stem, each up to 17-flowered, peduncle up to 12 cm, with long glandular and eglandular hairs and short hooked hairs. *Bracts* paired, free, ovate, 5×3.5 – 6.5×4 mm, acute, entire, hairy. *Pedicels* up to 2 cm, with short hooked and long glandular hairs. *Calyx* divided to the base, teeth narrowly elliptical, 6.5×1.3 mm, hairy on both surfaces. *Corolla* 3–3.3 cm long, narrowly funnel-shaped, tube 0.8–1.0 cm wide at the mouth, not pouched, slightly hairy outside, with a glandular patch above the anthers inside, white or blue. *Filaments* inserted 8 mm from the base of the corolla, 5 mm long, slightly geniculate, glandular towards the tip. *Anther-thecae* divergent, 2.5 mm across, anthers fused face to face, very hairy. *Staminodes* inserted about 8 mm from the base of the corolla, 3 mm long, densely hairy at the tip. *Disc* of 5 separate lobes, each 0.5 mm long. *Gynoecium* hairy with long glandular and eglandular and short hooked hairs, ovary 6×1.4 mm, style 7×0.3 mm, stigma 2-lobed, 1.5 mm wide. *Fruit*, excluding persistent style, 2.5×0.18 cm, hairy; calyx persistent.

Distribution. Vietnam: Annam. 300–600 m. Fl. 8.

VIETNAM. Annam, Linh Chien près Tourane, forêt, 5–600 m, 8 viii 1923, *Poilane* 7389 (P).

23. *C. minutihamata* D. Wood in Notes R. B. G. Edinb. 31:370 (iv 1972). Type: Vietnam, Annam, Massif du Ngok Pau, prov. du Kontum, pl. grasse sur roche en vieille forêt, fl. bleu, 2300 m, 12 xii 1946, *Poilane* 35803 (holo. P).

Herbaceous perennial. *Stem* decumbent, branching, up to 40 cm long, densely hairy, glabrescent, with glandular, eglandular and minute hooked hairs, internodes up to 0.8 cm, leaf scars prominent. *Leaves* alternate, narrowly ovate to elliptical, 2.5×1.7 – 8.5×4 cm, acute, shallowly crenate, decurrent, lateral veins 4–5 on each side, both surfaces hairy to densely hairy with glandular and eglandular hairs, the hairs of the lower surface predominantly on the veins and midrib; petiole 2–5.5 cm, with eglandular, glandular and hooked hairs. *Inflorescence* axillary, 1–5-flowered, peduncle 5–9 cm, with glandular, eglandular and hooked hairs. *Bracts* paired, free, ovate, 4×1.5 – 12×5 mm, acuminate, dentate, with glandular and hooked hairs. *Pedicels* 0.9–1.8 cm, with glandular, eglandular and hooked hairs. *Calyx* divided to the base, teeth very narrowly ovate, 12×1.5 –2 mm, glandular, eglandular and hooked hairy outside, glabrous inside.

Corolla 3.5–4 cm long, tube about 1.2 cm wide across the mouth, slightly curved, slightly pouched, very sparsely hairy outside, glabrous inside, lobes blue. *Filaments* inserted 1.3 cm from the base of the corolla, 1 cm long, geniculate in the lower part, sparsely hairy distally. *Anther-thecae* strongly divergent, pointed, sparsely hairy. *Staminodes* inserted 1.3 cm from the base of the corolla, 0.6 cm long, glabrous. *Disc* a lobed ring 0.5 mm deep. *Gynoeceum* about 2.3 cm long, ovary 9×1.3 mm, densely glandular hairy, style 14×0.3 mm, sparsely hairy, stigma 2-lobed, up to 1 mm across. *Fruit* 2.5×0.5 cm, narrowed at the base, sparsely hairy.

Distribution. Vietnam; Annam. China; Kwangtung. Fl. 7, 8.

VIETNAM. Annam, massif du Ngok Pau, vieille forêt étouffé par le bambou, 2300 m, 12 vii 1946, *Poilane* 35781 (P).

CHINA. Kwangtung (Kwangtung-Tonkin border), Kung P'ing Shan, Fang Ch'eng District, semi-woody, growing in thicket, 25–30 vii 1936, *Tsang* 26711 (A).

SECTION CHIRITA

24. *C. fulva* Barnett in Kew Bull. 15:253 (9 x 1961).

Type: Thailand, Surat, Ban Kawp Kep, on limestone rocks, c. 50 m, flowers white, 5 viii 1927, *Kerr* 13171 (holo. K).

Acaulescent herbaceous perennial. *Rhizome* very short, about 0.6 cm wide. *Leaves* apparently whorled, elliptical, 3×1.4 – 8.5×4 cm, acute, serrate, decurrent, upper and lower surfaces with white, patent, eglandular hairs, lower surface with longer red-brown hairs on the veins, lateral veins 5–7 on each side; petiole up to 4.5 cm, not winged, densely red-brown hairy. *Inflorescence* axillary, 1–5 on a stem, each 1–9-flowered, peduncle 0.7–2 cm, densely red-brown hairy. *Bracts* paired, free, linear, about 5.5×0.7 mm, densely red-brown eglandular hairy. *Pedicels* up to 1.8 cm, densely hairy with long red-brown eglandular hairs and shorter, white, glandular hairs. *Calyx* divided to the base, teeth narrowly triangular, 5.6×0.8 mm, setose, densely pale red-brown hairy outside, sparsely white hairy on inner surface. *Corolla* 1.5 cm long, tube narrowly funnel-shaped, 0.8 cm wide at the mouth, straight, only slightly pouched, very slightly hairy outside, glabrous inside, lobes white. *Filaments* inserted 5 mm from the base of the corolla, 5 mm long, straight, glabrous. *Anther-thecae* divergent, 1.4 mm across, anthers fused face to face, glabrous. *Staminodes* inserted 5 mm from the base of the corolla, 0.5 mm long, glabrous. *Disc* a shallowly lobed ring 0.1 mm deep. *Gynoeceum* 1–1.2 cm long, ovary 1.2×0.8 mm, densely hairy with white glandular hairs, style 9×0.3 mm, white glandular hairy, stigma entire, 0.8 mm wide. *Fruit* $7.5 \text{ mm} \times 2 \text{ mm}$, hairy; calyx persistent.

Distribution. Thailand. On limestone rocks at low altitudes. Fl. 4, 7, 8.

THAILAND. Jar Saka, N Sritamarat, on limestone rocks, 100 m, 25 iv 1928, *Kerr* 15390 (K). Kao Chem, Tung Song, on rock, 21 vii 1929, *Rabil* 138 (K).

Species 24–28, from the Malay Peninsula and Thailand, are distinguished from other species in the section by an acaulescent habit and a scapose inflorescence.

25. *C. lacunosa* (Hook. f.) B. L. Burtt in Notes R. B. G. Edinb. 26:267 (16 xi 1965).

Type: [Thailand, Pulau Terutau] Langkawi, Curtis s.n. (K).

Syn.: *Didymocarpus lacunosus* Hook. f. in Curtis's Bot. Mag. t. 7236 (1 v 1892). Ridley in J. Straits Brch R. Asiat. Soc. 43:54 (1905). J. Asiat. Soc. Bengal 74:762 (1907). Fl. Mal. Pen. 2:510 (1923).

Didymocarpus cyaneus Ridley in J. Bot., Lond. 38:68 (iii 1900). Sprague in Curtis's Bot. Mag. t. 8204 (vii 1908).

Type: [Thailand, near Phangnya] Kasum, Curtis, s.n. (K, not seen).

Chirita cyanea (Ridley) B.L. Burtt in Notes R. B. G. Edinb. 26:267 (16 xi 1965).

Acaulescent herbaceous perennial. *Rhizome* very short. *Leaves* apparently whorled, ovate, up to 10×5 cm, acuminate, serrate, base rounded to decurrent, oblique, both surfaces with red-brown hairs, which are dense on the veins of the lower surface, lateral veins 3-6; petioles not winged, up to 10 cm long, densely hairy with red-brown hairs. *Inflorescence* scapiform, up to 8 on one plant, each 2-10-flowered; peduncle 7-14 cm, densely red-brown eglandular hairy. *Bracts* ternate, free, narrowly oblong, 5×1 mm, red-brown hairy. *Pedicels* up to 1.5 cm, red-brown eglandular hairy. *Calyx* broadly funnel-shaped, tube 1.5-3.5 mm, teeth narrowly triangular, $4 \times 0.7-5(-10) \times 1.1$ mm, usually 5, rarely 6, white and red-brown hairy, glabrous on the inner surface. *Corolla* 3-3.5 cm long, tube 0.9-1.2 cm wide at the mouth, straight, slightly pouched, very narrow at the base, almost glabrous outside, a diffuse glandular patch above the anthers within, tube and lobes a deep blue-purple. *Filaments* inserted 1.2-1.6 cm from the base of the corolla, 8 mm long, geniculate 3 mm from the point of insertion, shortly continued beyond the anthers, glabrous. *Anther-thecae* divergent, 1.6-1.8 mm across, anthers fused face to face, glabrous. *Staminodes* inserted 1-1.2 cm from the base of the corolla, 2 mm long, glabrous. *Disc* a lobed ring 1.4 mm deep. *Gynoeceum* 2-2.3 cm long, glandular hairy, 4 mm wide at the base, widening to 7 mm, then narrowing to 3 mm below the 2-lobed stigma, which is 1.2 mm wide. *Fruit* 3 cm \times 1.4 mm, curved, sparsely hairy, dehiscing to 4 membranous valves; calyx caducous.

Distribution. Malaya. Thailand. Crevices of limestone cliffs, 100-200 m. Fl. 4, 9, 12.

MALAYA. Upper Perak, Gua Badak, near Lenggong, in one place only on a vertical limestone cliff, flowers deep violet, c. 90 m, 12 xii 1962, Allen 4844 (E). Pulau Langkawi, iv 1892, Curtis 1655 (K).

THAILAND. Surat, Khao Phra Rahu, c. 200 m, common in limestone rock crevices, flowers blue, 20 ix 1963, Smitinand & Sleumer 1151 (E).

Although I have seen no authentic material of *C. cyanea* I have included it with *C. lacunosa*. Smitinand & Sleumer 1151 is close to the description of *C. cyanea*, with relatively long calyx and corolla, and I consider this specimen to be conspecific with typical *C. lacunosa*.

26. *C. integra* Barnett in Kew Bull. 15:254 (9 x 1961).

Type: Thailand, Puket, Panom Bencha, Krabi, 700-1000 m, on rocks in evergreen forest, 26 iii 1930, Kerr 18684 (holo. K; iso. BM).

Acaulescent herbaceous perennial. *Leaves* apparently whorled, ovate, $8.5 \times 3.8-15 \times 7$ cm, acuminate, entire, base rounded, sub-peltate, both surfaces with very sparse, eglandular white hairs, lower surface with longer yellow-brown hairs restricted to the veins, lateral veins 6-8 on each side; petiole inserted about 5 mm from the leaf margin, up to 18 cm long, not winged, yellow-brown hairy. *Inflorescence* scapiform, 6-flowered, peduncle 7 cm long, white hairy. *Bracts* paired, free, narrowly triangular, 3×0.5 mm, with white eglandular hairs on the outer surface, glabrous on the inner surface. *Pedicels* up to 0.8 cm long, white eglandular hairy. *Calyx* 5-toothed, narrowly funnel-shaped, with white or purple hairs on the outer surface, tube 5.5 mm long, teeth triangular, 5×2.5 mm with a truncate tip 0.5 mm wide. *Corolla* $3.5-4.5$ cm long, tube 1.3 cm wide at the mouth, straight, only slightly pouched, sparsely hairy on the outer surface, sparsely glandular inside, tube purple, with two yellow streaks in the throat, lobes white. *Filaments* inserted 1.2 cm from the base of the corolla, 1.2 cm long, slightly curved, glabrous. *Anther-thecae* not divergent, 2 mm long, anthers fused face to face, glabrous. *Staminodes* well developed, inserted 1.3 cm from the base of the corolla, 1 cm long, with rudimentary anthers, fused apically, glabrous. *Disc* a ring 0.7 mm deep. *Gynoecium*, ovary 6.5×1.4 mm, densely eglandular hairy, style 14×0.3 mm, sparsely hairy, stigma entire, 1.4 mm wide. Fruit not known.

Distribution. Known only from the type collection.

27. *C. purpureo-lineata* (Kerr) D. Wood in Notes R. B. G. Edinb. 31:371 (iv 1972).

Type: Thailand, gorge below Ban Kaw, on damp rocks in jungle, c. 195 m, 24×1911 , Kerr 2196 (holo. E).

Syn.: *Damrongia purpureo-lineata* Kerr in Kew Bull. 1918:364 (31 xii 1918).

Acaulescent herbaceous perennial. *Rhizome* short, 5 mm wide. *Leaves* apparently whorled, ovate to narrowly ovate, $4.4 \times 2.2-7.5 \times 5.5$ cm, obtuse, serrate, decurrent, hairs on upper surface sparse, white, on lower surface sparse, red-brown, denser on veins, lateral veins 4-5 on each side; petiole up to 6 cm, with red-brown hairs. *Inflorescence* scapiform, up to 4 on a stem, each 1-3-flowered, peduncle up to 4 cm long, sparsely red-brown hairy, glabrescent. *Bracts* paired, free, narrowly elliptical, 2.4×0.6 mm, ciliate, sparsely hairy. *Pedicels* up to 6 mm, red-brown hairy. *Calyx* 5-toothed, narrowly funnel-shaped, tube 4.5 mm long, teeth narrowly triangular, 3.5×1.4 mm, red-brown hairy. *Corolla* up to 1.4 cm long, tube 0.5 cm wide at the mouth, slightly curved, not pouched, glabrous outside, with a glandular patch ventrally in the throat, tube and lobes white, with purple lines in the throat. *Filaments* inserted 5 mm from the base of the corolla, 4 mm long, slightly curved, glabrous. *Anther-thecae* divergent, 1.4 mm across, anthers fused face to face, glabrous. *Staminodes* inserted 5 mm from the base of the corolla, 1.5 mm long, glabrous. *Disc* an obscurely lobed ring 0.3 mm deep. *Gynoecium* about 1.4 cm long, sparsely hairy, 0.4 mm wide at the base, widening to 0.9 mm then narrowing to 0.2 mm below the stigma, which is shortly 2-lobed, 0.9 mm wide. Fruit not known.

Distribution. Known only from the type collection.

28. *C. trisepala* Barnett in Kew Bull. 15:254 (9 x 1961).

Type: Thailand, Chantaburi, Kao Sabap, on rocks, 6 vii 1927, Put 905 (holo. K; iso. BM).

Acaulescent herbaceous perennial. *Rhizome* up to 0.8 cm wide. *Leaves* apparently whorled, ovate, 9.5×4 – 16.5×8 cm, acuminate, crenate, decurrent or rounded at the base, sparsely eglandular hairy on both surfaces, nerves of lower surface densely hairy, lateral nerves 4–8 on each side, not paired; petiole up to 8 cm, slightly channelled, densely hairy. *Inflorescence* scapiform, up to 12 on a stem, each with 1–7 flowers, peduncle 3.5–16 cm, sparsely hairy with appressed eglandular hairs. *Bracts* paired, opposite, fused along one margin, ovate up to 15×8 mm, acute, entire, sub-glabrous. *Pedicels* up to 2 cm, sub-glabrous. *Calyx* 1.5 cm long, tubular, with three broadly triangular teeth, 4×5 mm, glabrous. *Corolla* 4–5 cm long, tube narrowly funnel-shaped, 1–1.5 cm wide at the mouth, straight, slightly pouched ventrally, sparsely hairy outside and inside, tube and lobes dark purplish blue. *Filaments* inserted 1.4 cm from the base of the corolla, 1.1 cm long, slightly curved, glabrous. *Anther-thecae* divergent, 3 mm long, glabrous, anthers fused face to face. *Staminodes* absent. *Disc* an obscurely lobed ring 0.2 mm deep. *Gynoecium* 2.5–3 cm long, almost glabrous, 0.8 mm wide at the base, widening to 1.4 mm, narrowing to 0.4 mm below the 2-lobed stigma which is 2 mm wide. *Fruit* not seen.

Distribution. Thailand. Fl. 7, 8.

THAILAND. Nang Rong falls at Nakhon Nayok, 300 m, 13 viii 1968, Larsen *et al.* 3355 (AAU, E).

The dried plant contains a blue pigment. This causes the leaves to dry a deep, unusual, green. It also appears as a dark band above the disc, as if secreted in the nectar. The corolla too is an intense colour. The deep coloration of the corolla is also seen in *C. lacunosa*, although with this species the vegetative parts are not coloured.

29. *C. primulacea* C.B. Cl., Comm. et Cyrt. Beng. t. 82 (1874). C.B. Cl. in A.DC., Monogr. Phan. 5:120 (ix 1883). In Hook. f., Fl. Brit. Ind. 4:360 (i 1884).

Lectotype: Sikkim, Anderson 267 (K).

Syn.: *Roettlera primulacea* (C.B.Cl.) O.Kuntze, Rev. Gen. 2:476 (5 xi 1891).

Acaulescent herbaceous perennial, leaves and inflorescence densely velvety hairy. *Rhizome* vertical, up to 6 mm wide. *Leaves* whorled, narrowly ovate to ovate, 5.5×3 – 13×7.5 cm, acute, doubly serrate, rounded or cordate, very oblique at the base, lateral veins 8–11 on each side; petioles 1.5–12 cm, round. *Inflorescence* axillary, up to 8 on a stem, each (1–)2–6-flowered, peduncles from less than 1 cm up to 5 cm. *Bracts* solitary, paired or ternate, free, linear or narrowly triangular, 6 – 12×1 mm. *Pedicels* 0.4–3 cm. *Calyx* funnel-shaped, tube about 5 mm long, teeth triangular, 5×4 mm, acute or acuminate with the tip recurved, densely eglandular hairy on both surfaces. *Corolla* 4–5 cm long, tube 4.5 mm wide at the base, 1.8 cm wide at the mouth, slightly curved, slightly pouched, very sparsely hairy inside and outside, white with yellow markings in the throat, lobes white. *Filaments* inserted 0.8 cm from the base of the corolla, 1.2 cm long, geniculate, hairy. *Anther-thecae* divergent, 3–3.5 mm across, anthers fused face to face, shortly hairy from the

lower surface. *Staminodes* inserted about 8 mm from the base of the corolla, 5 mm long, glabrous. *Disc* an entire ring 0.3 mm deep. *Gynoeceum* 2.4-2.7 cm long, ovary 1.5 mm wide, densely hairy, style 0.5 mm wide, hairy, stigma shallowly 2-lobed, up to 4.5 mm wide. *Fruit* not seen.

Distribution. India. Nepal. Sikkim. 600-2400 m. Fl. 5, 6, 7.

INDIA. Darjeeling, Mongpo, 2000 ft, 6 vi 1870, *Clarke* 11809 (K); Darjeeling, 6-8000 ft, vi-vii 1885, *Kurz* 12307 (P); *ibid.*, 27 v 1863, *Rémy* 14 (P); Darjeeling, Lenbong, 5500 ft, 22 vi 1884, *Clarke* 35453A (BM); Darjeeling, Puttabong, vi 1880, *Gamble* 8173 (K).

SIKKIM. reg. trop., 4-5000 ft, *J. D. Hooker* s.n. (P); 3000 ft, 1878, *King* s.n. (BM).

NEPAL. Phewa Tal, 2500 ft, 8 v 1954, *Stainton, Sykes & Williams* 5278 (BM).

30. *C. dielsii* (Borza) B. L. Burtt in Notes R. B. G. Edinb. 23:97 (11 vii 1960). Type: China, Yunnan, Kwang-dung, bei Schia-schi-kuan, zwischen Sche-tse und Lu-feng-hsien, 2100 m, 27 viii 1913, *Limpricht* 868 (B, not seen).

Syn.: *Didymocarpus dielsii* Borza in Feddes Rep. 13:390 (25 vii 1914).

Roettlera uniflora Franchet in Bull. Mus. Hist. Nat. Paris 5:251 (1899), non *Chirita uniflora* Ridley (1912). Type: China, Yunnan, près de Tien-Chian, *Delavay* s.n. (holo. P).

Didymocarpus uniflorus (Franchet) Borza in Feddes Rep. 13:390 (25 vii 1914).

Chirita orbicularis W.W. Sm. in Notes R. B. G. Edinb. 9:94 (ii 1916). Type: China, Yunnan, Yang-pi mountains, shady humus covered boulders by streams, 26°45'N, 9000 ft, viii 1913, *Forrest* 10923 (holo. E; iso. BM).

Acaulescent herbaceous perennial. *Rhizome* up to 0.7 cm thick, densely covered by roots. *Leaves* whorled, orbicular or broadly ovate, $4 \times 4.5 - 6 \times 4.5 - 11.5 \times 8$ cm, obtuse, crenate or serrate, base obliquely rounded or cordate, upper surface villous with white or pale yellow-brown hairs, more densely so between the veins and on the teeth, lower surface sparsely hairy, hairs mainly on the midrib and lateral veins, vascular strands visible in the midrib of the dried leaf, lateral veins 4-5 on each side; petioles 1-11 cm, sparsely to densely hairy with white to red-brown hairs. *Inflorescence* axillary, flowers solitary, rarely peduncles 2-flowered, peduncles 4-10.5 cm, up to 6 on a stem, sparsely hairy to hairy with white or yellow-brown hairs. *Bracts* rarely present, narrowly triangular, about 5×1.5 mm, sparsely hairy. *Calyx* tubular, 1.5-2.5 cm long, tube 1-1.2(-1.8) cm, often cleft dorsally, teeth triangular, about 1×0.45 cm, sparsely hairy outside, glabrous inside. *Corolla* 5.5-7 cm long, tube about 6 mm wide at the base, 2 cm wide at the mouth, slightly curved, slightly pouched, yellowish, with a bright yellow streak in the mouth below the anthers, glabrous outside and inside, lobes purple-blue. *Filaments* inserted 1.6 cm from the base of the corolla, 1 cm long, geniculate below the mid-point, sparsely hairy distally. *Anther-thecae* divergent, 3 mm across, anthers fused face to face, sparsely pubescent from the lower surface. *Staminodes* inserted 1.2 cm from the base of the corolla, 0.6 cm long, curved, glabrous. *Disc* an entire ring 0.8 mm deep. *Gynoeceum* 3.2-3.5 cm long, ovary 1.6 mm wide, glabrous, style 1.1 mm wide, glabrous, stigma deeply 2-lobed, up to 5 mm wide. *Fruit* 14 cm \times 1.6 mm, glabrous; calyx not persistent.

Distribution. China: Yunnan; Szechuan. On shady rocks, 700–3200 m. Fl. 6–9.

CHINA. SW Szechuan: Yung-peh to Yungning, 27°20'N, 100°48'E, 10–11000 ft, viii 1922, *Forrest* 22065 (BM, E, K, P). Yunnan: mountains north of Yung-peh, 26°45'N, 100°45'E, ix 1922, *Forrest* 22326 (E); Lou fung, 25 ix 1909, *Ducloux* s.n. (P); Long-Ky, 700 m, *Maire* s.n. (P); Shunning, Wenkuankau, fls violet blue, on shady rock surfaces, 1900 m, 16 vi 1938, *Yü* 16288 (E); Shunning, Litah, on shady rock surfaces, 2100 m, 10 ix 1938, *Yü* 17605 (E).

31. *C. lachenensis* C.B.Cl. in A.DC., Monogr. Phan. 5:118 (1883).

Type: Sikkim, in valle septentrionali subalpina Lachena, alt. 2500 m, *Hooker* s.n. (holo. K).

Syn.: *Chirita clarkei* Hook. f., Fl. Brit. Ind. 4:359 (i 1884). Type: homotypic with *C. lachenensis*.

Roettlera lachenensis (C.B. Cl.) O. Kuntze, Rev. Gen. 2:476 (5 xi 1891).

Chirita umbricola W.W. Sm. in Notes R. B. G. Edinb. 10:172 (vii 1918). Type: Upper Burma, ridge of Naung-chaung-Nwai divide, flowers violet blue or white, on wet rocks of shady gullies or by streams in forest, 6–8000 ft, 24 vii 1914, *Ward* 1824 (holo. E).

Chirita stolonifera Fischer & Kaul in Kew Bull. 1940:196 (24 x 1940). Type: India, Assam, Delei Valley, 25°21'N, 96°37'E, mouth of corolla pure violet, throat white, no yellow streaks, pedicels upright, flowers nodding, more or less hidden beneath the leaves, on rocks and banks in the forest, 6–7000 ft, 16 vii 1928, *Ward* 8462 (holo. K).

Stem procumbent, rooting, internodes up to 3 cm, with red-brown hairs. *Leaves* alternate, ovate, 5 × 4–13 × 8 cm, acute or acuminate, base cordate or rounded, oblique, upper surface sparsely hairy with yellow-brown hairs, lower surface sub-glabrous, veins sparsely hairy, lateral veins 6–8 on each side; petioles 5.5–18 cm, with sparse red-brown hairs. *Inflorescence* axillary, cymose or flowers solitary, if solitary peduncle up to 8 cm long and bracts inserted in the upper half of the peduncle, if cymose, peduncle up to 9 cm long, sparsely red-brown hairy. *Bracts* paired, free, narrowly ovate, up to 4 × 0.8 mm, entire, red-brown eglandular hairy. *Pedicels* 2–3.5 cm, sub-glabrous to sparsely hairy with red-brown eglandular hairs. *Calyx* up to 1.5 cm long, deeply cleft dorsally, teeth triangular or narrowly triangular, 5 × 1.5–9 × 3 mm, acute, red-brown eglandular hairy on the outside, glabrous inside, tips recurved. *Corolla* funnel-shaped, 2.5–3(–3.5) cm long, tube 1.4 (–2.2) cm wide at the mouth, straight, very slightly pouched, very sparsely hairy outside, glabrous inside, lobes pale violet to deep mauve, tube paler, to white or greenish at the base, 2 distinct flaps 6 mm long, 1 mm deep from the roof of the tube. *Filaments* inserted 4–7 mm from the base of the corolla, 6–10 mm long, geniculate near the point of insertion, glandular or eglandular hairy. *Anther-thecae* divergent, 3–4 mm long, anthers slightly hairy from the lower surface. *Staminodes* inserted 3–5 mm from the base of the corolla, 1.5–3 mm long, glabrous or sparsely hairy proximally. *Disc* a shallowly lobed ring up to 0.4 mm deep. *Gynoecium* 1.4 cm long, sparsely hairy, 1.1 mm wide at the base, narrowing to 0.5 mm below the stigma, which is entire or shallowly lobed, 3–4 mm wide. *Fruit* up to 5 cm × 1.5 mm,

sub-glabrous or pubescent with red-brown eglandular hairs; calyx not persistent.

Distribution. Sikkim. Bhutan. India: Assam. N Burma. China: Yunnan.

Damp rocks and banks in forest, 1600–2700 m. Fl. 5–8.

BHUTAN. Trashi Yangsi valley, shady damp rock face, 8500 ft, 2 viii 1933, *Ludlow & Sherriff* 357 (BM); Tobrang, Trashi Yangsi Chu, banks and mossy rocks in dense mixed forest, 8000 ft, 5 vii 1949, *Ludlow, Sherriff & Hicks* 20837 (BM, E).

CHINA. W Yunnan, hills NW of Tengyueh, 25°30'N, shady rocks by stream, vi 1931, *Forrest* 29681 (E).

BURMA. Valley of the Nam Tamai, 27°45'N, 97°55'E, creeping plant, growing on banks in the forest, 19 viii 1926, *Ward* 7317 (K); Nam Tisang-Mali divide, 27°30'N, 97°50'E, 6000 ft, on rocks and clay banks in shady places on the ridge, 28 viii 1926, *Ward* 7330 (K); hills east of Mali hka, 27°30'N, 5000 ft, 31 vii 1937, *Ward* 12853 (BM); NE Upper Burma, western flank of the N'Maikha-Salwin divide near Pan-ti ho, 26°20'N, 98°48'E, on humus covered boulders and on cliffs by streams, *Forrest* 26511 (E).

Ward 1824 (the type of *C. umbricola*) differs from other specimens by having dense glandular hairs on the filaments. It is not notably different in other features. *Ward* 7317 is a drawn-out, stoloniferous plant but shows the habit of leaves alternate by reduction which is characteristic of the species.

A group of specimens (*Forrest* 24838, 25416, 27565, 29918 and 30383, *Ward* 3455, all E) doubtfully belong here. These plants tend to be larger, of more compact growth habit and have the calyx inserted on the pedicel much more obliquely than other specimens of *C. lachenensis*.

32. *C. mishmiensis* Debbarman ex Biswas in Assam Forest Rec. Bot. 1:21, t.9 (1934).

Type: India, Assam, Mishmi country, Lohit Valley road, 300 m, v 1916, *Alexander* 21 (CAL, not seen).

Acaulescent herbaceous perennial. *Leaves* whorled, narrowly elliptical to narrowly ovate, 3.5 × 2–27 × 7 cm, acute, serrate, decurrent, densely velvety hairy on both surfaces, hairs white except on the midrib and veins of the lower surface, which have yellow-brown hairs, lateral veins 8–21 on each side. *Inflorescence* axillary, many on a plant, flowers solitary, peduncles 1–3 cm, ebracteate, densely yellow-brown eglandular hairy. *Calyx* shortly tubular, tube about 8 mm long, sometimes split dorsally, teeth triangular, acuminate, 9 × 2.5–11 × 4 mm, densely hairy on the outer surface, sparsely hairy on the inner surface. *Corolla* 5–7 cm long, 3 mm wide at the base, 1.6 cm wide at the level of the anthers, up to 3 cm wide at the mouth of the tube, tube slightly curved, slightly pouched, very sparsely hairy inside and outside, lobes violet, with two yellow streaks in the throat. *Filaments* inserted 1.8–2 cm from the base of the corolla, 1–1.2 cm long, geniculate near the base, glandular distally, otherwise glabrous. *Anther-thecae* divergent, 4 mm across, anthers fused face to face, hairy from the lower surface. *Staminodes* inserted 1.5 cm from the base of the tube, 0.6 cm long, glabrous. *Disc* a shortly lobed ring 0.6 mm deep. *Gynoecium* 4 cm long, ovary 1.8 mm wide, densely hairy, style 0.8 mm wide, hairy, stigma shallowly 2-lobed,

7 mm wide. *Fruit* densely pubescent, 3.2 cm long, 1 mm wide; calyx not persistent.

Distribution. India: Assam, Lohit Valley. On shaded cliffs of crystalline limestone or gneiss, 300–1500 m. Fl. 2, 3, 5, 12.

INDIA. Assam: Lohit Valley, 28°0'N, 96°15'E, shaded cliffs of crystalline limestone or schist, 7 xii 1926, *Ward* 7696 (K); Arbor Hills, Dihaing valley, on shady bare cliffs in the forest, 1000–2000 ft, 12 ii 1928, *Ward* 7852 (K); Lohit Valley Road, 28°10'N, 96°25'E, Drezi, above Denning, leaves hanging straight down, 2–3000 ft, 5 iii 1928, *Ward* 7917 (K); Lohit valley, on cliffs in forest, 2–3000 ft, 19 iii 1933, *Ward* 10315 (BM); Mishmi Hills, Kamtang-river, in cracks of gneiss cliffs of the river gorge, 1500 ft, 19 ii 1942, *Ward* 18425 (BM).

33. *C. insignis* C.B.Cl. in A.DC., Monogr. Phan. 5:121 (1883).

Type: [Burma] Inter Assam et Ava, in convallae Hookong [Hukawng], *Griffith* 3831 (holo. K; iso. P.)

Syn.: *Roettlera insignis* (C.B. Cl.) O. Kuntze, Rev. Gen. 2:476 (5 xi 1891).

Acaulescent or shortly caulescent herbaceous perennial. *Rhizome* to 5 cm long, with old leaf-bases. *Stem* up to 5 cm long, prostrate, internodes up to 0.8 cm, with dense yellow-brown or white hairs. *Leaves* opposite, elliptical or ovate, 18 × 9–26 × 14 cm, obtuse, obscurely or shallowly serrate, obliquely rounded or decurrent at the base, sparsely hairy to hairy, more densely so on the midrib and lateral veins of the lower surface, lateral veins 12–15 on each side; petiole 0.5–1.1 cm, sparsely hairy with white or yellow-brown hairs. *Inflorescence* axillary, 2–4 on a plant, each 2-flowered, peduncle 1–1.5 cm, pubescent. *Bracts* paired, free, ovate to linear, 3 × 1.5–7 × 0.5 mm, hairy. *Calyx* 1.7–2 cm long, tube about 0.8 cm long, teeth narrowly triangular, 0.9–1.2 × 0.2 cm, acuminate, densely hairy on the outer surface, glabrous inside. *Corolla* 5–6 cm long, narrowly funnel-shaped, tube 2.5 cm wide at the mouth, curved, not pouched, very sparsely hairy outside and inside, tube white, lobes purple-blue. *Filaments* inserted 1.5 cm from the base of the corolla, 1.1 cm long, geniculate at the mid-point, sparsely pubescent. *Anther-thecae* divergent, 3–3.5 mm across, anthers fused face to face, glabrous. *Staminodes* inserted 1.4 cm from the base of the corolla, 0.5 cm long, curved, sparsely hairy. *Disc* an entire ring 0.4 mm deep. *Gynoeceum* 2.5–3 cm long, ovary 1.8 mm wide, densely hairy, style 0.8 mm wide, sub-glabrous, stigma shallowly 2-lobed, 4 mm wide. *Fruit* not seen.

Distribution. Burma: Hukawng Valley.

In addition to the type material I have seen only one collection: Burma, Kachin State, Sumprabum Sub-Division, 26°40'N, 97°20'E, hills NW of Kanang, in mixed hill forest, flowers white with purple blotching, 4–5000 ft, iii 1962, *Keenan* 3863 (E).

34. *C. reptans* Burt & Panigrahi in Notes R. B. G. Edinb. 26:265 (16 xi 1965).

Type: Burma, Nyitadi, head of Akhyang Valley, 27°15'N, 98°45'E, trailing about in damp, rocky (non-calcareous), steep places and little bluffs, flowers fine violet blue, 6000 ft., 30 iv 1920, *Farrer* 1526 (holo. E.)

Herbaceous perennial. *Stem* up to 28 cm, creeping, rooting throughout its length, internodes to 3 cm, red-brown hairy. *Leaves* alternate by reduction, ovate, $2.2 \times 1.5-6 \times 4$ cm, acute, serrate, cordate, indumentum a mixture of long and short eglandular red-brown hairs, lateral veins 5-6 on each side; petiole 0.6-4.5 cm, red-brown hairy. *Inflorescence* axillary, 1-flowered, peduncle 4-7 cm, rather stout, red-brown eglandular hairy. *Bracts* paired, free, inserted about 0.7 cm below the calyx, elliptical, $2.5 \times 1-5 \times 2$ mm, entire or slightly serrate, sparsely hairy. *Calyx* 1.2-1.5 cm long, tube 0.6-0.8 cm, more deeply cleft dorsally, teeth triangular, $4.5(-7) \times 2.5$ mm, acuminate, sparsely eglandular red-brown hairy outside, glabrous inside. *Corolla* 3.8-6.5 cm long, tube narrowly funnel-shaped, 2 cm across at the mouth, slightly curved, slightly pouched, very sparsely pubescent outside, glabrous inside except for 2 hairy lines along the roof of the tube, lobes violet, tube paler, 2 yellow lines in the floor of the throat. *Filaments* inserted 1.8 cm from the base of the corolla, 1 cm long, geniculate near the base, pubescent towards the tip. *Anther-thecae* divergent, 4.5 mm across, anthers fused face to face, slightly hairy from the lower surface. *Staminodes* inserted 1.3 cm from the base of the corolla, 0.5 cm long, curved, slightly hairy. *Disc* an entire ring 1.4 mm deep. *Gynoecium* 3-3.7 cm long, about 1.8 mm wide, glabrous below, with a mixture of glandular and eglandular hairs distally, stigma shallowly 2-lobed, 5 mm wide. *Fruit* at least 3.5 cm long, about 2 mm wide; calyx persistent.

Distribution. India: N.E.F.A., Tirap distr. N Burma. 1200-1800 m. Fl. 4, 5. N BURMA. Langa Bum, $27^{\circ}28'N$, $97^{\circ}42'E$, creeping plant, growing over rocks and tree trunks in the jungle, flowers pale violet with guide lines, Ward 6637 (K). Nam Tamai, on damp and well-shaded banks, 4000 ft, 5 v 1926, Ward 6689 (K).

35. *C. corniculata* Pellegrin in Bull. Soc. Bot. Fr. 73:420 (1926). Pellegrin in Lecomte, Fl. Gén. Indo-Chine 4:535 (viii 1930).

Type: Vietnam, Tonkin, Tuyen-Quang, Ban-Coc, fl. blanc violacé, Eberhardt 4004 (holo. P).

Acaulescent herbaceous perennial. *Rhizome* horizontal or vertical, up to 0.7 cm thick. *Leaves* whorled, narrowly ovate or narrowly elliptical, $9 \times 3.5-21 \times 9$ cm, acute or acuminate, serrate or crenate, base rounded to acute, oblique, upper surface hairy, lower surface with the hairs predominantly on the lateral veins and midrib, lateral veins 8-13 on each side; petiole 4-22 cm, sparsely hairy to hairy. *Inflorescence* 2-7 on a stem, each 1-2-flowered, peduncles 2-7 cm, sparsely hairy to hairy. *Bracts* paired, free, ovate, $4 \times 1.4-13 \times 7$ mm, entire or serrate, sparsely hairy. *Pedicels* 0.8-5 cm, sparsely hairy to hairy. *Calyx* 2-2.5 cm long, divided almost to the base, teeth about 3.5 mm wide, up to 2 cm long, with a strongly geniculate recurved tip 0.6-1 cm long, hairy on the outer surface, glabrous inside. *Corolla* 6 cm long, tube narrowly funnel-shaped, slightly curved, slightly pouched, 2.5 cm wide at the mouth, white with yellow markings in the throat, very sparsely hairy inside and out, lobes violet. *Filaments* inserted 1.5 cm from the base of the corolla, 1 cm long, strongly geniculate at the mid-point, sparsely hairy distally. *Anther-thecae* divergent, 3 mm across,

anthers fused face to face, shortly hairy from the lower surface. *Staminodes* inserted 1.2 cm from the base of the corolla, 0.5 cm long, curved, sparsely hairy, with rather well developed anthers. *Disc* an entire ring 0.3 mm deep. *Gynoeceum* 3.2–3.5 cm long, ovary 1 mm wide, hairy, style 0.6 mm wide, sparsely hairy to glabrous, stigma shallowly 2-lobed, up to 5.5 mm wide. *Fruit* 2.2 mm wide, up to 6.5 cm long, pubescent; calyx not persistent. Distribution. Vietnam: Tonkin, Mt. Bavi. Shady, rocky places. Fl. i, 2, 7. VIETNAM. Tonkin: Mt. Bavi, les parvis humides et verticales des roches, i 1888, *Balansa* 4288 (P); Mt. Bavi, roches moussues des torrents, 700 m, 21 vii 1886, *Balansa* 4289 (P); Mt Bavi, rochers siliceux très ombragés, 400 m, ii 1938, *Pételot* 7.248 (P).

36. *C. tibetica* (Franchet) B. L. Burtt in Notes R. B. G. Edinb. 23:99 (11 viii 1960).

Type: China, Sutchuen, près de Tatsienlou [Szechuan, Kangking, 30°5'N, 102°4'E], *Henri d'Orléans*, s.n. (holo. P).

Syn.: *Roettlera tibetica* Franchet in Bull. Mus. Hist. Nat. Paris 5:251 (1899).

Didymocarpus tibeticus (Franchet) Hand.-Mazz., Symb. Sin. 7:881 (1 ii 1936).

Herb, with annual stems. *Roots* with a pubescent, spherical (0.5–0.7 cm) tuber. *Stem* erect or shortly decumbent, up to 20 cm, sub-glabrous or sparsely hairy, internodes up to 9 cm. *Leaves* tending to be clustered apically, ovate or elliptical, 1.8 × 1.4–7 × 3.6 cm, obtuse, entire, obliquely rounded or decurrent at the base, sparsely hairy on both surfaces, lateral veins 5–7 on each side; petiole 0.5–1.3 cm, sparsely hairy. *Inflorescence* axillary, 1–4 on a plant, each 2–3-flowered, peduncle 2–5 cm, sparsely glandular and eglandular hairy. *Bracts* paired, free, narrowly elliptical to ovate, 6 × 1.5–14 × 6 mm, glandular and eglandular hairy. *Pedicels* 0.4–2 cm, with predominantly glandular hairs. *Calyx* divided to the base, teeth linear or narrowly triangular, 6 × 1–10 × 1.2 mm, acuminate, glandular hairy outside, glabrous inside. *Corolla* 2.8–4.2 cm long, tube curved, slightly pouched, 1.4 cm wide at the mouth, sparsely hairy outside, glabrous inside except for a patch of long hairs in the throat below the anthers, lobes white, throat yellow. *Filaments* inserted 1.2 cm from the base of the corolla, 1.1 cm long, geniculate above the middle, glabrous. *Anther-thecae* divergent, 2 mm across, anthers fused face to face, glabrous. *Staminodes* inserted 1 cm from the base of the corolla, 0.5 cm long, curved, glabrous. *Disc* an entire ring 0.2 mm deep. *Gynoeceum* 2–2.5 cm long, ovary 0.6 mm wide, glabrous at the base, glandular hairy above, style 0.5 mm wide, glandular hairy, stigma shallowly 2-lobed, 2.8 mm wide. *Fruit* (young) up to 3 cm long, hairy; calyx not persistent; mature fruit not seen.

Distribution. China: Szechuan; Yunnan. 1900–3200 m. Fl. 7–9.

CHINA. Yunnan: Ta-fen-chan, T chao tong, 15 viii 1905, *Ducloux* 3969 (P); San Chan près Tchen Liong, 9 viii 1905, *Ducloux* 3970 (P); Tche Ky près Tong tchouan, vii 1909, *Ducloux* 6428 (P); Do bè près Piz tchouan, 1909, *Ducloux* 6669 (P); Tan-kia, 2700 m, *Maire* s.n. (P); Kou-niou-tchai, 3000 m, viii, *Maire* s.n. (P); To-chan, 3200 m, ix, *Maire* s.n. (E, P). Szechuan, SW: Lutschang, sandy substrate, 1900 m, 14 ix 1914, *Handel-Mazzetti* 5114 (E).

37. *C. obtusa* C.B.Cl. in A.DC., Monogr. Phan. 5:114 (1883).

Type: China, Amoy-Interior, vi 1870, *Swinhoe* s.n. (holo. K).

Syn.: *Roettlera obtusa* (C.B.Cl.) O. Kuntze, Rev. Gen. 2:476 (5 xi 1891).

Didymocarpus clarkei Lévl. in C. R. Ass. Fr. Avanc. Sci. 34:427 (1906), based on *Chirita obtusa* C.B.Cl. (non *Didymocarpus obtusus* Wall.).

Herbaceous annual. *Stem* decumbent, up to 22 cm, rooting along the internodes in the lower part, internodes up to 8 cm long, hairy. *Leaves* opposite, ovate, $1.5 \times 0.9-7 \times 5$ cm, obtuse, crenate, rounded at the base, sparsely hairy between the veins on the upper surface, sparsely hairy on the midrib and veins of the lower surface, lateral veins 4-7 on each side; petiole 0.6-2.5 cm, hairy. *Inflorescence* in the axils of the upper leaves, 2-4-flowered, peduncles 1.2-3 cm, glandular and eglandular hairy. *Bracts* linear, about 5×0.2 mm. *Pedicels* 0.6-1.2 cm. *Calyx* divided to the base, teeth linear or very narrowly triangular, 1.1×0.1 cm, sparsely hairy with glandular and eglandular hairs. *Corolla* 5 cm long, tube 3 mm wide at the base, 1.2 cm wide at the level of the stigma, 1.5 cm wide at the mouth, straight, not pouched, very slightly hairy outside and inside, lobes lavender, tube white, two yellow lines in the throat. *Filaments* inserted 2 cm from the base of the corolla, about 1.3 cm long, coiled, glabrous. *Anther-thecae* parallel, 1.5 mm long, anthers fused face to face. *Staminodes* inserted 2 cm from the base of the corolla, about 1 cm long, slightly coiled, glabrous. *Disc* an entire ring 1.4 mm deep. *Gynoeceum* 3-3.5 cm long, ovary 1.2 mm wide, pubescent, style 0.5 mm wide, sparsely pubescent, stigma slightly capitate, shallowly 2-lobed, 1.8 mm wide. *Fruit* to 8 cm, sub glabrous; calyx persistent.

Distribution. China: Fukien; Kwangtung. 250-600 m. Fl. 6-9.

CHINA. Swatow, common in damp woods, 1901, *Dalziel* 17 (BM). Thai yong, 60 miles W of Swatow, 2000 ft, 5 vii 1901, *Dalziel* s.n. (E). Canton, Lo-fau-shan, ix 1883, *Faber* in *Hana* 22221 (BM). Lo Fau Shan, sides of stream, 800 ft, 13 viii 1883, *Hong Kong Bot. Gard.* 55 (K).

The filaments, anthers and stigma are not similar to those found in the majority of species of *Chirita*. As *Chirita obtusa* cannot conveniently be transferred to an existing genus related to *Chirita* I have preferred the alternative of leaving it in *Chirita* to that of erecting a new monotypic genus.

38. *C. lacei* (W.W. Sm.) B. L. Burtt in Notes R. B. G. Edinb. 21:187 (28 i 1954).

Type: Burma, Gokteik Gorge, 1500 ft, tube purple, lobes yellow, 2 viii 1908, *Lace* 4152 (holo. K; iso. E).

Syn.: *Didymocarpus lacei* W.W. Sm. in Rec. Bot. Surv. India 6:41 (1913).

Perennial herb; stem, leaves, inflorescence and calyx white eglandular hairy. *Rhizome* 3 mm thick. *Stem* up to 10 cm, curved towards the base. *Leaves* clustered at the apex of the stem, elliptical, $2.5 \times 1.7-10 \times 3.2$ cm, acute, entire or obscurely serrate, obliquely rounded or obtuse at the base, lateral veins 4-8 on each side; petioles 0.4-3.8 cm. *Inflorescence* axillary, flowers solitary, peduncles to 0.8 cm. *Calyx* tubular, tube 0.8 cm, teeth triangular or narrowly triangular, $2 \times 0.5-4 \times 1.5$ mm, acute, glabrous on the inner surface. *Corolla* 4.5 cm long, tube straight, not pouched,

1.1 cm wide at the mouth, sparsely hairy outside and inside, tube purple, lobes yellow. *Filaments* inserted 2 cm from the base of the corolla, 1.2 cm long, straight, with long soft hairs. *Anther-thecae* not divergent, 1.5 mm long, glabrous, filament with a cartilaginous extension. *Staminodes* inserted 2.3 cm from the base of the corolla, 0.8 cm long, joined apically, hairy. *Disc* an entire ring 0.4 cm deep. *Gynoeceum* 3 cm long, ovary 1 mm wide, pubescent, style 1 mm wide, sparsely pubescent, stigma an entire lamina 1.4 mm wide. *Fruit* 4 cm \times 2.5 mm, stipitate to 0.5 cm, stalk 0.5 mm wide; calyx persistent.

Distribution. Burma, N Shan States. Fl. 8, 10.

BURMA. Gokteik gorge, fruiting, 1800 ft, 8 x 1911, *Lace* 5456 (E, K).

This is another anomalous species. It has parallel anther-thecae, an entire stigma and a stipitate fruit. The stigma appears to be a thin lamella and not sub-capitate (the usual form in *Didymocarpus*). Wright Smith, when describing it as a *Didymocarpus*, was unsure of its affinity. Even with the fruiting material of *Lace* 5456 (not seen by Wright Smith) the taxonomic position of *C. lacei* remains uncertain.

39. *C. pumila* D. Don, Prodr. Fl. Nep. 90 (1 ii 1825). C.B. Cl., Comm. et Cyrt. Beng. t.74 (1874). C.B.Cl. in A.D.C., Monogr. Phan. 5:114 (1883). C.B.Cl. in Hook. f., Fl. Brit. Ind. 4:357 (1884). Pellegrin in Lecomte, Fl. Gén. Indo-Chine 4:537 (viii 1930).

Lectotype: [Nepal] rupibus montium Nepalia, fl. sub pluviis, *Wallich* [List 801] (K, BM).

Syn.: *Bonnaya pumila* (D. Don) Spreng., Syst. Veg. 4, 2:15 (1827).

Henckelia pumila (D. Don) Dietr., Sp. Pl. 1:574 (1831).

Roettlera pumila (D. Don) O. Kuntze, Rev. Gen. 2:476 (5 xi 1891).

Didymocarpus anthonyanus Hand.-Mazz., Symb. Sin. 7:881 (1 ii 1936)

(*Chirita pumila* D. Don, non *Didymocarpus pumilus* Ridl., 1905).

Chirita edgeworthii DC. in Prodr. 9:269 (1 i 1845). Type: 1843,

Edgeworth s.n. (holo. G-DC, not seen; isotype, Kumaon, 4700 ft, K).

Chirita polyneura Miq. var. *thomsonii* C.B. Cl., Comm. et Cyrt.

Beng. t.75 (1874). Type: the figure.

Chirita sphagnicola Lévl. & Vant. in Bull. Soc. Bot. Fr. 53:550

(xii 1906). Type: China, Kweichow, Ko-tchang-kéou, lieux humides et sombres, au milieu des Sphaignes, viii 1904, *Esquirol* 171 (E).

Calosacme flava Wall., List 801 (1829), nom. nud.

Chirita diaphana Royle, Illustr. Bot. Himal. 294 (v 1836), nom. nud.

Chirita flava Wall. ex R. Br. in Bennett & Brown, Pl. Jav. Rar. 117

(v 1840), superfluous name.

Chirita flava Steud., Nom. Bot. (Edn 2) 1:351 (viii 1840), nom. nud.

Didymocarpus speciosus Wall. ex C.B.Cl. in A.D.C., Monogr. Phan.

5:114 (1883), superfluous name.

Herbaceous annual. *Stem* shortly decumbent, 10–45 cm, pale green, purple near nodes, internodes up to 15 cm. *Leaves* usually in unequal pairs, ovate to narrowly elliptical, 1.5 \times 0.7–21 \times 7.5 cm, acute to acuminate, shallowly serrate, base oblique, rounded to decurrent, one or more pairs of smaller, marcescent, basal leaves often present, both surfaces hairy to

sparsely hairy, hairs of the lower surface predominantly on the veins, circular purple markings often present on the midrib and lateral veins, lateral veins 7-13(-17) on each side; petiole 0.1-3.5 cm, sparsely hairy to hairy. *Inflorescence* axillary, flowers solitary or in few to many-flowered cymes, peduncles of the solitary flowers up to 3.5 cm, peduncles of the cymes up to 6.5 cm. *Bracts* elliptical, ciliate, those subtending solitary flowers inserted in the upper third of the peduncle, 1.5 × 0.5-4.5 × 2.5 mm, bracts of cymes 2.5 × 1.5-16 × 8 mm. *Pedicels* paired, 0.1-3 cm, sub-glabrous to sparsely glandular hairy, unequal at first, becoming equal in the fruiting stage. *Calyx* 7-12(-16) mm long, funnel-shaped, teeth narrowly triangular, 6 × 2-12 × 3 mm, usually outwardly curving at the tip, with a short inwardly directing projection, sparsely hairy to hairy. *Corolla* 3.0-4.5 cm long, tube narrowly funnel-shaped, slightly curved, slightly pouched, 1.4-1.8 cm wide across the mouth, slightly hairy outside, lobes violet, tube pale lavender to white or pale yellow, with a dark yellow to orange patch in the throat. *Filaments* inserted 1-1.6 cm from the base of the corolla, about 1 cm long, strongly geniculate in the lower third, slightly hairy below the anthers. *Anther-thecae* divergent, 2 mm across, anthers fused face to face, sparsely hairy. *Staminodes* 2-4 mm long, glabrous, dark tipped. *Disc* a ring 0.5 mm deep. *Gynoecium* 2.2-2.7 cm long, glabrous, rarely pubescent, 1.0-1.7 mm wide at the base, narrowing to 0.6-1.1 mm wide below the stigma, which is deeply 2-lobed, 3-3.2 mm wide. *Fruit* up to 12 cm long; calyx not persistent.

Distribution. N India: Simla to Assam. Nepal. Sikkim. Bhutan. N Burma. China: Kweichow; Yunnan. Thailand. Vietnam: Tonkin. Shady moist cliffs and banks in forest, 1000-2500 m. Fl. 6-11 (mainly 8). This is the species of *Chirita* most represented in herbaria. I have seen 134 collections; only a sample is cited below.

INDIA. Assam, Naga Hills, Chipoketami, 4000 ft, 10 vii 1935, *Bor* 5089 (K). Assam, Barapani, Khasi Hills, 3000 ft, 10 ix 1954, *Chand* 8151 (E). Simla, 6000 ft, viii 1885, *Collett* 245 (K). Darjeeling, Rishap, 3000 ft, 27 viii 1870, *Clarke* 12521 C (K). Assam, Delei Valley, 28°21'N, 96°37'E, on shady cliffs, 18 vii 1928, *Ward* 8468 (K).

NEPAL. Maina, sheltered earth banks, 7000 ft, 16 viii 1952, *Polunin*, *Sykes & Williams* 458 (BM, E). Kakani, N Nepal valley to Chandragiri, S Nepal valley, 6500-7500 ft, viii 1961, *Proud* 4/1961 (BM). Tamur Valley, Phembo, N of Taplejung, 4500 ft, 3 viii 1956, *Stainton* 1243 (BM, E).

SIKKIM. Mongpo, 4000 ft, 1 x 1884, *Clarke* 36056 (BM).

BHUTAN. Tushigangsi Kurted, under moist oak forest, 6000 ft, 11 viii 1915, *Cooper* 4414 (BM). Denchung, 7500 ft, 6 viii 1949, *Ludlow*, *Sheriff & Hicks* 21403 (BM).

BURMA. NE Upper Burma hills around Hlawgaw, 26°10'N, 98°25'E, on moist rocks and shady banks, 6-7000 ft, vii 1924, *Forrest* 24863 (BM, E). Upper Burma, Nam Tamai Valley, 27°42'N, 97°54'E, 3000 ft, 16 viii 1938, *Kaulback* 61 (BM).

CHINA. Kweichow, Ton-Yun, 2 viii 1908, *Cavalerie* 3120 (P). Yunnan-sen District, Houang-ts'ao-pa, 1916, *Cavalerie* 4043 (E, P). Yunnan, Shweli valley, lat. 25°20'N, shady moist situation, 7000 ft, ix 1913, *Forrest* 11990 (E, K). Yunnan, Jang-tzaw Shan, Shweli-Salwin divide, lat. 25°10'N, moist moss-covered rocks, 8000 ft, viii 1919, *Forrest* 18296 (E, K).

THAILAND. Da Angka, Da Pa Mawn spur, 1700 m, 10 ix 1927, Garrett 445 (K).

VIETNAM. Tonkin, Chafsu, 1600 m, vii 1921, Pételot 4.496 (C). Tonkin, entre Chapa et la Garderie de Lô qui Hô, talus argileux vers 1600 m, viii 1923, Pételot 8.473 (P).

Towards the eastern part of the range specimens are larger than in the west. This is clinal variation, apparently unrelated to any other character and no taxonomic distinction can be recognized. There is also variation in the leaf colour, some specimens showing purple blotches, others having concolorous leaves. The significance of this is not known.

For a species with such a wide range there is a close distribution of flowering times. The 94 dated flowering specimens seen were collected as follows: 1 in June, 21 in July, 48 in August, 19 in September, 4 in October and 1 in November. This late summer flowering habit is shared with other species such as *C. dimidiata*, *C. macrophylla*, *C. calva* and *C. urticifolia* but not with *C. oblongifolia*, which flowers from late summer until March.

40. *C. forrestii* Anthony in Notes R. B. G. Edinb. 18:192 (iv 1934).

Lectotype: China, NW Yunnan, Bey-ti Shan, 27°45'N, 100°18'E, on moist humus-covered boulders by streams, 7–8000 ft, flower limb pale blue, tube yellowish white, vi 1921, Forrest 20564 (holo. E; iso. BM, K, P).

Syn.: *Didymocarpus forrestii* (Anthony) Hand.-Mazz., Symb. Sin. 7:882 (1 ii 1936).

Annual herb. Stem to 20 cm, curving and rooting at the base, glabrous or sparsely hairy, internodes up to 12 cm. Leaves, usually a pair of small marcescent leaves at the base of the stem, subsequent leaves clustered apically, ovate or elliptical, 3.5 × 2.5–12.5 × 8 cm, obtuse, deeply serrate, rounded, sometimes obliquely so, sparsely hairy on both surfaces, lateral veins 6–8 on each side, vascular strands usually visible in the midrib of the dried leaf; petiole 0.3–2.4 cm, sparsely hairy. Inflorescence in the axils of the upper leaves, 1–4 on a plant, each 1–7-flowered, peduncle 4–8 cm long, sparsely hairy with glandular and eglandular hairs. Bracts paired, free, narrowly elliptical or narrowly triangular, 4 × 1.2–5 × 2.5–12 × 1.5 mm, eglandular hairy. Pedicels 0.5–4 cm, glandular hairy. Calyx divided to the base, teeth narrowly triangular 1.1 × 0.1 cm, glandular hairy on the outer surface, sub-glabrous inside. Corolla 3–4 cm long, tube curved, slightly pouched, 1.2–1.5 cm wide at the mouth, lobes pale purple-blue, yellow markings in the throat, tube yellowish towards the base. Filaments inserted 1.1 cm from the base of the corolla, 0.9 cm long, curved towards the base but not geniculate, glabrous. Anther-thecae divergent, 2.3 mm across, anthers fused face to face, glabrous. Stamens inserted 0.9 cm from the base of the corolla, 0.4 cm long, curved, glabrous. Disc a shallowly lobed ring 0.4 mm deep. Gynoecium 1.8–2 cm long, ovary 1.3 mm wide, densely glandular hairy, style 0.2 mm wide, sparsely hairy, stigma deeply 2-lobed, up to 3 mm wide. Fruit 7 cm long by 1.7 mm wide, hairy; calyx not persistent. Distribution. China: Yunnan; Szechuan. Shady, damp rocks by streams, 2–3000 m. Fl. 6–9.

CHINA. NW Yunnan, Muli, Consinhang near Ngerya, Chungtien border, by streams on shady moist cliffs, 23 viii 1939, *Feng* 2753 (A). Yunnan, mountains NE of the Yangtze bend, 27°45'N, clefts of cliffs and moss-covered boulders, 10000 ft, ix 1913, *Forrest* 11119 (syntype E, K). Yunnan, mountains E of Yung-ning, 27°50'N, shady situations by streams on moss-covered rocks, 9000 ft, vi 1918, *Forrest* 16640 (syntype E, K). SW Szechuan, Mu-li mountains, 28°12'N, shady dry situations in ravines, 9-10000 ft, viii 1918, *Forrest* 16818 (syntype E, K). NW Yunnan, mountains N of Yungpeh, 26°31'N, 100°45'E, on moist humus-covered boulders and rocks by streams, 10000 ft, viii 1922, *Forrest* 22033 (syntype E, K, P). SW Szechuan mountains SE of Muli, 27°30'N, 101°E, moist shady banks and on rocks by streams in side valleys, 10000 ft, ix 1922, *Forrest* 22405 (syntype E, K, P). Szechuan, Yahung River towards Yenguen, 27°21'N, calcareous substrate, 2200 m, 29 ix 1914, *Hand.-Mazz.* 5343 (syntype E, K). Mu-li, in damp shady gullies in the bed of the Litang River, 8000 ft, 9 viii 1921, *Ward* 4599 (E). Western China, shady rocks, 3000 ft, vii 1903, *Wilson* 4278 (BM, E, K).

This species is close to *C. pumila* and resembles that species superficially. It differs from *C. pumila* by having a hairy fruit, deeply divided calyx and a disc that persists after flowering.

41. *C. anachoreta* Hance in *Ann. Sci. Nat. (Sér. 5)* 5:231 (1866). C.B. Cl. in A. DC., *Monogr. Phan.* 5:115 (1883). Pellegrin in *Lecomte, Fl. Gén. Indo-Chine* 4:538 (viii 1930).

Type: [China, Kwantung] In rupibus madidis torrentis prope coenobium buddhisticum Fi-loi-tsz, secus fluvium North River, circa 100 mill. pass. ab urbe Cantone septentrionem versus, 27 vii 1864, *Sampson*, *Herb. propre [Hance]* 111377 (holo. BM; iso. K).

Syn.: *Roettlera anachoreta* (Hance) O. Kuntze, *Rev. Gen.* 2:476 (5 xi 1891). Matsumura, *Ind. Pl. Jap.* 2, 2:577 (1912).

Didymocarpus anachoretus (Hance) Lévl. in C. R. Ass. Fr. *Avanc. Sci.* 34:427 (1906).

Chirita minuteserrulata Hayata, *Ik. Pl. Form.* 5:133, t. 12 (1915).

Type: China, Taiwan, Boho, vii 1911, *Inaba* s.n. (TI, not seen).

Didymocarpus minuteserrulatus (Hayata) Yamamoto in *J. Soc. Trop. Agric., Taiwan* 8:72 (24 iii 1936).

Chirita dimidiata auct. non R. Br., Drake in *Bull. Soc. Philomath. Paris Ser. 8*, 2:128 (1890). Pellegrin in *Lecomte, Fl. Gén. Indo-Chine* 4:538 (viii 1930).

Annual herb. Stem up to 35 cm, curved at the base, sparsely hairy to glabrous, often marked with purple, internodes to 12 cm. Leaves opposite, ovate to elliptical, 3 × 2-19 × 9 cm, acute or acuminate, shallowly serrate to coarsely dentate, base oblique, rounded to decurrent, sparsely hairy on the midrib and lateral veins of the lower surface and on the lamina between the veins of the upper surface, lateral veins 6-14 on each side. Inflorescence axillary, up to 8 on a stem, each up to 7-flowered, peduncle 2.5-8 cm, sparsely hairy or glabrous. Bracts paired, free, orbicular to elliptical,

0.4 × 0.2–1.5 × 2 cm, ciliate. *Pedicels* paired, 0.3–1.4 cm, swollen distally, glabrous or sparsely eglandular hairy. *Calyx* 0.8–2.2 cm, tube 0.4–1.2 cm, deeply cleft dorsally, teeth triangular to narrowly triangular, 3 × 2.5 mm–1.4 × 0.6 cm, acuminate, glabrous or very sparsely hairy inside and out, ciliate. *Corolla* 4–6.8 cm, tube slightly curved, slightly pouched, 1.5–2.7 cm wide at the mouth, very sparsely hairy or glabrous inside and out, lobes white, yellow or pale lilac, tube paler with yellow markings in the throat. *Filaments* inserted 1–1.6 cm from the base of the corolla, 1.2 cm long, geniculate 0.3 cm from the point of insertion, sparsely hairy with long white hairs. *Anther-thecae* divergent, 2.5–3 mm across, anthers fused face to face, hairy. *Staminodes* inserted about 1 cm from the base of the corolla, 0.5 cm long, sparsely hairy. *Disc* an entire ring 0.5 mm deep. *Gynoeceum* 1.9–3 cm long, about 1 mm wide, sparsely pubescent or glabrous, stigma 2-lobed, 4 mm wide. *Fruit* up to 17 cm long 1.2–1.6 mm wide, glabrous or sparsely pubescent. *Calyx* not persistent, disc persistent.

Distribution. Burma. China: Yunnan; Kwangsi; Kwangtung. Taiwan. Thailand. Laos. Vietnam: Tonkin. Wet rocky places in forest, 100–2100 m. Fl. 7–10.

BURMA. *Toppin* 2750 (E). Mangkyi, on rocks in the open, 4000 ft, 15 viii 1919, *Ward* 3536A (E).

CHINA. Yunnan: Si-chour-hsien, Shiang-pyng-shan, on cliffs by streams, flowers pale purple, 1400–1500 m, *Feng* 11450 (A); Feng Chen Lin mountains, 7000 ft, *Henry* 11275 (K); Szemeo, 4500 ft, *Henry* 12281A (K), mixed with *Chirita pumila*; Szemeo, 5000 ft, *Henry* 13438 (BM, E, K). Kwangsi: Sup-man-ta Shan, wet places on rocks in woods, flowers white, 14 vii 1937, *Liang* 69670 (A). Kwangtung: Lin Fa Shan, viii 1935, *Tsang* 25492 (A); Kung P'ing Shan, on wet sandy soil, flowers white, viii 1936, *Tsang* 26748 (A, E); Lo Fau Shan, 9 ix 1896, *Ford* 541 (K); Kung P'ing Shan, 10–18 ix 1936, *Tsang* 26826 (A, C, E, K, P). Kwangsi: Yao Shan, on moist rocks along the stream, flowers white, 24 vii 1936, *Wang* 39638 (A).

TAIWAN. Bankinsing, *Henry* 1696 & 1697 (K).

THAILAND. Doi Sootik, on rocks by stream, flowers white, tinged purple, 2300 ft, 25 ix 1910, *Kerr* 1417 (BM, K, P). Lêm Dan Kao, Kau Chang, on rocks in evergreen forest, flowers white, 400 m, 3 x 1924, *Kerr* 9302 (ABD, BM, K). Nakhawn Nayok, flowers cream coloured, 100 m, 22 x 1961, *Smitinand* 6986 (K). Doi Sutep, on wet rocks, 1250 m, 5 ix 1958, *Sørensen et al.* 4761 (C). *ibid.*, 1200 m, 12 ix 1958, *Sørensen et al.* 4937 (C). *ibid.* 900 m, 18 ix 1958, *Sørensen et al.* 5101 & 5100 (C).

LAOS. Muông Pan, San Neua, 17 ix 1920, *Poilane* 1903 (P).

VIETNAM. Tonkin, Mont Bavi, a la lisière des forêts, 22 vii 1886, *Balansa* 4286 (P). *ibid.*, sur les roches des torrents, 14 ix 1886, *Balansa* 4297 (K, P). Tonkin, Chapa, 1500 m, vii 1927, *Pételot* 5036 (P). *ibid.*, 600 m, vii 1929, *Pételot* 5188 (P). Tonkin, Dam-ha, Sai Wong Mo Shan, vii–ix 1940, *Tsang* 30389 (A, C, E).

CULTIVATED MATERIAL. Seed from Forest Herbarium, Bangkok, cult. at Cornell University, G. 585 (E).

This is a very variable species which I can find no satisfactory way of subdividing. There seems to be no correlation between the corolla size, corolla colour and bract size.

It can be separated only with difficulty from the allopatric *C. dimidiata*, which consistently has a more hairy upper surface to the leaf.

The Taiwan locality represents the most easterly range of *Chirita*.

42. *C. dimidiata* Wall. ex C.B.Cl. in A.DC., Monogr. Phan. 5:115 (1883). C.B.Cl. in Hook. f., Fl. Brit. Ind. 4:357 (i 1884).

Lectotype: Pundooa, Fl. augusto, Wallich [List 803] (K-W, K).

Syn.: *Chirita polyneura* Miq. var. *amabilis* C.B. Cl., Comm. et Cyrt. Beng. t.76 (1874). Type: as for *Chirita dimidiata*.

Roettlera dimidiata (Wall. ex C.B. Cl.) O. Kuntze, Rev. Gen. 2:476 (5 ix 1891).

Calosacme dimidiata Wall., List 803 (1829), nom. nud.

Chirita dimidiata Steud., Nom. Bot. (Edn. 2) 1:351 (viii 1840), nom. nud.

Annual herb. Stem to 60 cm, decumbent at the base, internodes up to 12 cm, glabrous or sub-glabrous. Leaves narrowly elliptical to elliptical $4 \times 1.5 - 19 \times 6.5(-10)$ cm, acute to acuminate, shallowly serrate to serrate, base oblique, rounded to decurrent, surfaces sub-glabrous to sparsely hairy, upper surface more hairy than the lower, with the hairs evenly distributed, hairs of the lower surface restricted to the veins, lateral veins 6-12 on each side; petiole up to 9 cm, glabrous or sub-glabrous. Inflorescence axillary, apparently of short helicoid cymes, peduncle $0.3-2.2$ cm, glabrous or sparsely hairy, rather stout. Bracts ovate, up to 1.6×1.3 cm, ciliate, otherwise glabrous or sub-glabrous. Pedicels paired, up to 1 cm long, glabrous or very sparsely hairy. Calyx membranous, glabrous or very sparsely hairy towards the base, $1.5-2$ cm long, divided to half way, teeth triangular about 10×3 mm, acuminate. Corolla $4.2-7.0$ cm long, tube slightly pouched ventrally, up to 1.8 cm wide at the mouth, lobes purple with yellow throat and tube, glabrous. Filaments inserted 1-1.5 cm from the base of the corolla, about 1 cm long, strongly geniculate at the mid-point, hairy along the inner surface. Anther-thecae strongly divergent, 3-3.5 mm across, anthers fused face to face, hairy on the lower surface. Stamens inserted 1.2 cm from the base of the corolla, 0.2 cm long. Disc an entire ring $0.75-1.0$ mm deep. Gynoecium $2.5-3.0$ cm long, hairy, about 0.75 mm wide, stigma shallowly 2-lobed, 4 mm wide. Fruit up to 12 cm long, 1.2 mm wide, glabrous or very sparsely pubescent. Disc persistent in fruit.

Distribution. Sikkim. India: Assam. 750-1500 m. Fl. 8-10.

SIKKIM. Kumisy, 5000 ft, Hook. f. s.n. (K).

INDIA. Darjeeling, Pomong, 2500 ft, Clarke 12371B (BM). Khasia, Mamloo, 3500 ft, Clarke 15803C (BM). Khasia, Sohra, 3000 ft, 13 x 1872, Clarke 17522A (BM). Khasia, Mowlong, 2500 ft, 24 ix 1886, Clarke 45064C (BM). Darjeeling, 9 viii 1923, Cowan s.n. (E). Khasia, reg. trop., Hooker & Thomson s.n. (BM, C, E, K, P). Khasia, Chuma, 10 viii 1850, Hooker & Thomson 2041 (K). Khasia, Amwee, 27 ix 1850, Hooker & Thomson s.n. (K). Assam, Mack s.n. (K). Cherra-Poonji, Voigt s.n. (C).

The record of this species from Vietnam by Pellegrin in Lecomte, Fl. Gén. Indo-Chine 4:538 is based on a misidentification of *Balansa* 4297, which is the related species *Chirita anachoreta*.

43. *C. macrophylla* Wallich, Pl. As. Rar. 1:56, t.72 (15 vii 1830). C.B. Cl., Comm. et Cyrt. Beng. t.71 (1874). C.B.Cl. in A.D.C., Monogr. Phan. 5:116 (1883). C.B. Cl. in Hook. f., Fl. Brit. Ind. 4:358 (i 1884).

Lectotype: In monte Sheopore Nepaliae [Nepal, N of Thota to N of Khatmandu] Wallich [List 805] (K-W, also BM, K, E).

Syn.: *Henckelia grandifolia* Dietr., Sp. Pl. 1:576 (1831), (non *Henckelia macrophylla* (Wall. ex D. Don) Dietr. (1831)).

Didymocarpus grandifolius (A. Dietr.) F. G. Dietr., Vollst. Lexik. Gaertn. Nachtr. 2, 3:389 (1834).

Roettlera grandifolia (Dietr.) O. Kuntze, Rev. Gen. 2:476 (5 xi 1891), (non *Roettlera macrophylla* (Wall. ex D. Don) O. Kuntze, 1891).

Chirita macrophylla Wall. subsp. *tirapensis* Panigrahi in Bull. Bot. Soc. Beng. 21:32 (1967). Type: Laju (1500 m) in the Tirap Frontier District, NEFA, 12 viii 1958, *Panigrahi* 14795 (holo. ASSAM, not seen).

Calosacme macrophylla Wall., List 805 (1829), nom. nud.

Herbaceous perennial, indumentum of pale red-brown hairs. *Rhizome* up to 5 cm long, less than 0.6 cm wide. *Stem* up to 30 cm, rooting in the lower part, internodes up to 20 cm long, sparsely hairy. *Leaves*, basal leaves ovate, 9×5.5 – 17×10 cm, acuminate, serrate, cordate to truncate, petiole up to 25 cm, cauline leaves similar but smaller, 3×1.5 – 10.5×6.5 cm, petiole up to 7 cm; hairy to sparsely hairy, hairs evenly dispersed on the upper surface, predominantly on the veins of the lower surface, lower surface paler than the upper, lateral veins 5–10 on each side. *Inflorescence* axillary, apparently terminal by reduction of vegetative shoot, a several-flowered cyme, peduncle up to 20 cm, sparsely hairy. *Bracts* paired, free, orbicular, 0.6×0.2 – 2×1 cm, entire, apex acute or obtuse, ciliate, otherwise sparsely hairy. *Pedicels* up to 3 cm, bracteoles as for bracts but smaller. *Calyx* 1.5–2.5 cm, glabrous, tube deeply cleft dorsally, teeth narrowly triangular, about 1×0.4 cm. *Corolla* 4.5–6 cm long, narrowly funnel-shaped, tube slightly curved, slightly pouched, 1–1.5 cm across the mouth, slightly hairy outside, lobes yellow or purple, tube yellow, paler outside, with darker yellow markings in the throat. *Filaments* inserted about 1.5 cm from the base of the corolla, 0.7 cm long, slightly geniculate in the lower third, glabrous. *Anther-thecae* divergent, 4 mm across, anthers fused face to face, very slightly hairy at the junction with the filaments. *Staminodes* inserted 3 mm from the base of the corolla, 5 mm long, slightly hairy distally. *Disc* a ring 0.5 mm deep. *Gynoeceum* sparsely hairy distally, about 2.7 cm long, 1.5–2.0 mm wide at the base, narrowing to 0.7–1.0 mm below the stigma, which is 2-lobed, up to 5 mm wide. *Fruit* up to 10 cm, glabrescent; calyx not persistent.

Distribution. India: Assam. Nepal. Sikkim. Bhutan. N Burma. China: Yunnan. Thailand. Damp banks and rocks in forest, 750–3000 m. Fl. 6–9. INDIA. Darjeeling, 7000 ft, 30 viii 1869, *Clarke* 8892C (BM). Darjeeling, Rungbee, 6000 ft, 20 vi 1870, *Clarke* 12104F (K). *ibid.*, 12448 (BM). Darjeeling, 2500 ft, 7 vii 1923, *Cowan* s.n. (K). Darjeeling, Rangiram, 6500 ft, vii 1881, *Gamble* 9564 (K). *ibid.*, vi 1874, *Gamble* 3500A (K). NEPAL. Mangning, 5000 ft, 13 viii 1935, *Bailey's coll.* s.n. (BM). E Nepal, Arum Valley, Chhoyang Khula, W of Num, corolla white with yellow tongue, 6000 ft, 24 vi 1956, *Stainton* 762 (BM). $27^{\circ}19'N$, $87^{\circ}30'E$, 8000 ft,

3 vii 1969, *Williams* 1110 (BM). E Nepal, Tinjure Danda, 27°10'N, 87°29'E, corolla white, lobes yellow, bank in wet forest, 7500 ft, 6 ix 1967, *Williams & Stainton* 8381 (BM).

SIKKIM. Nohore, 2400–4000 ft, 8 vii 1862, *Anderson* 980 (P). Sikkim, *Beddome* 5811 (BM). Sikkim, *Griffith* 3824 (C, P, K). Sikkim, reg. temp., 6–8000 ft, *Hook. f. s.n.* (BM, E, K, P). Sikkim Himalaya, 7000 ft, 3 vii 1874, *Treutler* 212 (K).

BHUTAN. Chungkar, 27°03'N, 91°27'E, Diwangiri-Trashiguni Rd., deep violet, in shady dense jungle, 4500 ft, 24 vi 1934, *Ludlow & Sherriff* 557 (BM).

BURMA. Muku-ji woods, in the deep sub-alpine forest, flower pale yellow with deeper throat, scentless, 9500 ft, 28 vii 1920, *Farrer* 1760 (E). Hills around Tzi-tzo-ti, 25°58'N, 98°29'E, shady situations in side valleys on boulders and amongst scrub, flowers pale yellow, 8000 ft, viii 1925, *Forrest* 27149 (E, K). N'Maikha-Salwin divide, 26°30'N, on banks in thickets and on shady rocks by streams, flowers yellow, 8000 ft, *Forrest* 29816 (E). Valley of Naw-chaung, on wet moss-covered rocks and tree trunks in rain forest, flowers white outside, corolla tip pale yellow, inside throat yellow ochre with red stripes, 6000 ft, 24 viii 1914, *Ward* 1898 (E). Esakam, Mt Victoria, flowers creamy white with yellow streaks in the lower lobe, 5500 ft, 4 ix 1956, *Ward* 22660 (BM).

CHINA. Yunnan, no further data, *Forrest* 15886 (BM, K), 17649 (BM, K), 18256 (BM, K), 18261 (K). Humus covered boulders and moist shady cliffs, flowers dull yellow tinged with blue exterior, 10000 ft, vi 1924, *Forrest* 24473 (K). Hills NW of Tengyueh, 25°30'N, 98°30'E, on humus covered rocks and ledges of cliffs in side valleys, flowers dull pale yellow, stained purplish, 8000 ft, *Forrest* 26773 (E, K, P).

THAILAND. Pa Kampeng, east slope, Doi Angka, Me ka Pak drainage, on rocks, 1780 m, 2 viii 1927, *Garrett* 412 (ABD, K).

44. *C. calva* C.B.Cl. in A.DC., Monogr. Phan. 5:116 (1883). C.B.Cl. in Hook. f., Fl. Brit. Ind. 4:358 (i 1884).

Lectotype: Sikkim, Lachen, 6000 ft, 5 viii 1849, *Hooker f. s.n.* (K).

Syn.: *Roettlera calva* (C.B. Cl.) O. Kuntze, Rev. Gen. 2:476 (5 xi 1891).

Chirita glabra auct. non Miq.; C.B.Cl., Comm et Cyrt. Beng. t.73 (1874).

Annual herb, glabrous except for the ciliate leaf margins. Stem to 21 cm, curved at the base, internodes up to 10 cm. Leaves opposite, lowest pair unequal, upper leaves narrowly ovate or elliptical, 8 × 2.8–21 × 6 cm, acute or acuminate, entire or obscurely crenate, base rounded, strongly oblique, margin sparsely ciliate, lateral veins 7–11 on each side, vascular strands visible in the midrib on the dried leaf; petiole up to 6 cm. Inflorescence of axillary 2–5-flowered cymes, peduncles 1–3.5 cm. Bracts paired, free, up to 1.2 × 0.2 cm. Pedicels 0.6–2.1 cm, thickened distally. Calyx 1.6 cm long, tube 0.4 cm, teeth narrowly triangular, 1.2 × 0.3 cm, mucronate, glabrous. Corolla 4.3–4.5 cm long, tube curved, 1.3 cm wide at the mouth, lobes purple, with two yellow streaks in the throat. Filaments inserted 1.6 cm from the base of the corolla, 0.8 cm long, slightly geniculate towards the base, glabrous. Anther-thecae divergent, 3 mm across, anthers fused apically, glabrous. Stamines inserted 1.3 cm from the base of the corolla,

0.3 cm long, recurved, glabrous. *Disc* an entire ring 0.5 mm deep. *Gynoeceum* 2.5–3 cm long, ovary 1.6 mm wide, glabrous, style 0.9 mm wide, glabrous, stigma 2-lobed, 5 mm wide. *Fruit* 4.5 cm \times 1 mm, glabrous; calyx and disc not persistent.

Distribution. Sikkim. India: Assam. N Burma. Stream banks in forest, 1000–1950 m. Fl. 8.

INDIA. Darjeeling, Sakeral Road, 3500 ft and 5500 ft, 28 viii 1875, *Gamble* 3503C (K). Darjeeling, 6500 ft, viii 1882, *Gamble* 10535 (BM, K).

BURMA. Mang-kyi [26°16'N, 98°19'E], on banks in heavily shaded gully full of jungle, 4000 ft, 15 viii 1919, *Ward* 3543 (E).

45. *C. rotundata* Barnett in Kew Bull. 15:254 (9 x 1961).

Type: Thailand, Payap, Me Chem, Chiangmai, on rocks near stream in deciduous forest, c. 700 m, 11 vii 1922, *Kerr* 6274 (holo. K; iso. BM).

Annual herb. *Stem* to 16 cm, internodes to 7 cm, glabrous. *Leaves* opposite, broadly elliptical, 1.5 \times 1.3–6 \times 3.2 cm, obtuse, entire, base rounded or decurrent, lower surface glabrous, upper surface very sparsely hairy, margin ciliate, lateral veins 5–6 on each side; petiole 0.5–1.4 cm, glabrous. *Inflorescence* axillary, 2-flowered, peduncle 0.3–0.5 cm, glabrous. *Bracts* paired, free, ovate, about 0.5 \times 0.4 cm, entire, glabrous. *Pedicels* 0.2–1.0 cm, glabrous. *Calyx* up to 2 cm long, tube about 0.9 cm, teeth 1.1 \times 0.4 cm, glabrous on both surfaces. *Corolla* 5–5.5 cm long, tube straight, not pouched, 1.5 cm wide at the mouth, glabrous on the outside, slightly hairy towards the base of the tube inside, lobes purple, tube white with a yellow patch in the throat. *Filaments* inserted 0.7 cm from the base of the corolla, 1.0 cm long, slightly geniculate at the mid-point, glabrous. *Anther-thecae* divergent, 2 mm across, anthers fused face to face, glabrous. *Staminodes* inserted 1.0 cm from the base of the corolla, 0.5 cm long, curved, glabrous. *Disc* an entire ring 0.5 mm deep. *Gynoeceum* 2.3–2.7 cm long, ovary 2 mm wide, glabrous, style 0.8 mm wide, glabrous, stigma shallowly 2-lobed, 4 mm wide. *Fruit* not seen; calyx not persistent.

Distribution. Known only from the type collection. Fl. 7.

46. *C. zeylanica* Hook. in Curtis's Bot. Mag. 71: t. 4182 (1 ix 1845). Fl. des Serres 2, 4: t. 3 (iv 1846). Paxton's Mag. Bot. 13:265 (1847). C.B.Cl. in A.D.C., Monogr. Phan. 5:112 (1883). C.B.Cl. in Hook. f., Fl. Brit. Ind. 4:356 (i 1884). Trimen, Fl. Ceylon 3:276 (1895).

Lectotype: the figure with the type description.

Syn.: *Chirita zeylanica* var. *angusta* C.B.Cl. in A.D.C., Monogr. Phan. 5:113 (1883). C.B.Cl. in Hook. f.; Fl. Brit. Ind. 4:357 (i 1884). Trimen, Fl. Ceylon 3:276 (1895). Type: Ceylon, inter Galle et Ratnapoora, *Thwaites* C.P. 3437 (holo. K; iso. BM, P).

C. angusta (C.B.Cl.) Theobald & Grupe in Ceylon Journ. Sci. (Biol. Sci.) 10, 1:70 (1972).

Herbaceous perennial, indumentum white to rust-coloured. *Stem* erect, to 60 cm, often very woody near the base, glabrous in the lower parts, densely hairy above, lower internodes up to 15 cm. *Leaves* paired, ovate to elliptical 5 \times 2.5–15 \times 7 cm, acuminate, entire, base rounded, upper surface very hairy,

hairs evenly dispersed, lower surface hairy, predominantly on the veins, lateral veins 7-9 on each side; petiole up to 7 cm, hairy. *Inflorescence* of axillary 4-15-flowered cymes, peduncle up to 14 cm, glabrescent. *Bracts* paired, free, elliptical, $3.5 \times 1.5 - 8 \times 2$ mm, acute, entire, hairy on the lower surface only. *Pedicels* up to 2 cm, glabrous. *Bracteoles* bract-like but smaller. *Calyx* 0.8-1.3 (-1.5) cm long, divided to more than half way, glabrous or very sparsely hairy, margins of the lobes cohering, lobes triangular or elliptical. *Corolla* 2.5-4.6 cm long, tube slightly curved, slightly pouched, up to 2 cm wide at the mouth, slightly hairy outside, glabrous inside, lobes purple-blue, tube pale lilac to white, with two orange-yellow lines ventrally in the throat. *Filaments* inserted 0.5 cm from the base of the corolla, about 1 cm long, geniculate at the mid-point, sparsely hairy in the upper part. *Anther-thecae* strongly divergent, about 2 mm across, anthers fused face to face, hairy. *Staminodes* inserted 0.5 cm from the base of the corolla, 0.5 cm long, hairy towards the tip. *Disc* a ring 0.75 mm deep. *Gynoeceum* 2 cm long, very sparsely glandular hairy distally, 1 mm in diameter at the base, narrowing to 0.75 mm below the stigma, the lower lip of which is entire or bifid. *Fruit* up to 7.5 cm long; calyx and disc not persistent.

Distribution. Ceylon. Rocks and stream beds in forest, 300-750 m. Fl. 2-5, 11.

CEYLON. Hantane, 2300 ft, *Gardner* 602 (BM, K). Ratnapura district, Kehelwatupele near Kudawe, Weddagala, prov. of Sabaragamuwa, common amongst rocks in creek bed in rain forest, corolla pale purple, almost white, deep purple lobes, 300 m, 20 ii 1969, *Hoogland* 11447 (E). sine loc., *Macrae* 243 (BM, K). sine loc., 12 iv 1819, *Moon* 681 (BM). Hunnasgiriya, 25 miles east of Kandy, abundant along trails in forest above tea plantation, flower with white tube, violet limb, yellow flush in throat, 21 xi 1963, *Moore et al.* 9036 (E). Kalugammane, 2500 ft, 20 v 1930, *Silva* 38 (BM). Suffragam, 1866, *Thwaites*, C.P. 1788 (BM, K, P). sine loc., *Walker* 152 (K), 1312 (E), 1398 (E), 1400 (E), 1721 (E). *Mrs Walker* s.n. (K). iii 1836, *Wight* 2348 (K).

CULTIVATED MATERIAL. Chelsea, viii 1853, *Moore* s.n. (K)—mixed collection with *C. walkeri*. Raised from seed of *Moore et al.* 9036, v 1965, Edinburgh C.4694 (E).

Theobald recognizes var. *angusta* C.B.Cl. as a species, differing from *C. zeylanica* by narrower leaves, blue (not purple) corolla and a characteristic corolla shape. The last of these characters is not visible in herbarium specimens. From collectors' notes the corolla colour is not a reliable distinction—*Hoogland* 11447 is the narrow-leaved form and is described as having corolla lobes deep purple. The broad-leaved plant may also have violet lobes (*Moore et al.* 9036). The narrow-leaved form may be a response to the streamside habitat: this condition, known as stenophyllism, is usually found in shrubs, for example, in *Homonoia riparia* (Euphorbiaceae).

47. *C. walkeri* Gardner in Calcutta J. Nat. Hist. 6:480 (1846). Curtis's Bot. Mag. 73: t. 4327 (1 xi 1847). Fl. des Serres 2, 3: t. 285 (xi 1847). C.B.Cl. in A.D.C., Monogr. Phan. 5:112 (1883). C.B.Cl. in Hook. f., Fl. Brit. Ind. 4:356 (i 1884). Trimen, Fl. Ceylon 3:275 (1895).

Lectotype: Ceylon, *Walker* 1722 (K, duplicate at E).

Syn.: *Roettlera walkeri* (Gardner) O. Kuntze, Rev. Gen. 2:477 (5 xi 1891). *Chirita walkeri* Gard. var. *parviflora* C.B.Cl. in A.D.C., Monogr. Phan. 5:112 (1883). C.B.Cl. in Hook. f., Fl. Brit. Ind. 4:356 (i 1884). Trimen, Fl. Ceylon 3:276 (1895). Type: Ceylon, *Thwaites*, C. P. 542 (holo. K; iso. BM, P).

C. walkeri Gard. subsp. *parviflora* (C.B.Cl.) Theobald & Grupe in Ceylon Journ. Sci. (Biol. Sci.) 10 (1):70 (1972).

Herbaceous perennial, indumentum white or red-brown. *Stem* up to 60 cm, densely hairy in the upper part, sparsely hairy below, internodes up to 4 cm long. *Leaves* ternate, or, in the same plant, occasionally opposite, elliptical to narrowly elliptical, $6.3 \times 2.3 - 15 \times 5.5$ cm, acute to acuminate, entire, or with very small projections from the margin, base acute to narrowly cuneate, both surfaces densely hairy, hairs evenly dispersed on the upper surface, mainly on the veins of the lower surface, lateral veins 7-11 on each side; petiole 1-4 cm long, very hairy. *Inflorescence* of 2-5-flowered axillary cymes, peduncle 4-8 cm long, hairy. *Bracts* paired, free, linear, up to 5 mm long, hairy. *Pedicels* up to 3 cm. *Bracteoles*, when present, bract-like, up to 2.5 mm, inserted in the upper half of the pedicel. *Calyx* divided to the base, teeth 1.5-1.7 cm long, linear or very narrowly triangular, hairy outside, glabrous within. *Corolla* 3-5 cm long, tube almost straight, slightly pouched ventrally, narrowed towards the base, 2 cm wide at the mouth, slightly hairy outside, glabrous inside, lobes purple, tube paler, with a yellow streak in the throat. *Filaments* inserted 1.5 cm from the base of the corolla, about 1.2 cm long, geniculate at the mid-point, hairy distally. *Anther-thecae* strongly divergent, 2.5 mm across, anthers fused face to face, hairy from the lower surface. *Staminodes* 0.5-0.6 cm long, very hairy at the tips. *Disc* a shallowly lobed ring 0.75-1 mm deep. *Gynoeceum* 2.5-3 cm long, sparsely glandular hairy distally, 0.5-0.75 mm wide, stigma lower lobe bifid or entire, 2 mm wide, upper lobe present as a small tooth or absent. *Fruit* up to 11 cm; calyx not persistent.

Distribution. Ceylon. Rocks in forest, no other information available.

CEYLON. Udalamatta, on surface of rocks in shady forest, not common for southern part of island, 90 m, *Cramer* 2300 (E). *Thwaites*, C. P. 2843 (BM, P). *Walker* 18 (K), 41 (K), 177 (K). *Mrs Walker* 191 (K).

48. *C. moonii* Gardner in Calcutta J. Nat. Hist. 6:479 (1846). Curtis's Bot. Mag. 74: t. 4405 (1 xi 1848). Fl. des Serres 2, 4: t. 407 (xi 1848). Paxton's Mag. Bot. 16:33 (1849). C.B.Cl. in A.D.C., Monogr. Phan. 5:111 (1883). C.B.Cl. in Hook. f., Fl. Brit. Ind. 4:356 (i 1884). Trimen, Fl. Ceylon 3:275 (1895). Lectotype: Ceylon, sine loc., *Mrs Walker* 42 (K).

Syn.: *Roettlera moonii* (Gardner) O. Kuntze, Rev. Gen. 2:476 (5 xi 1891). *Martynia lanceolata* Moon, Cat. Ceylon Pl. 45 (1824), nom. nud.

Herbaceous perennial. *Stems* to 35 cm, woody at the base, red-brown hairs dense on the younger parts, becoming sparse below, internodes up to 5 cm long. *Leaves* in whorls of three or four, narrowly elliptical, often slightly falcate, $6.5 \times 1.2 - 12 \times 2.5$ cm, acute, entire, base decurrent, both surfaces densely hairy, hairs evenly dispersed on the upper surface, more dense on the veins of the lower surface, lateral veins 5-9 on each side; petioles very hairy, 1-2 cm long. *Inflorescence*, flowers solitary, axillary, peduncles 4-5 cm

long, hairy. *Bracts* setaceous, 1.5–2.5 mm long, hairy. *Calyx* divided to the base, teeth narrowly triangular, up to 3 cm × 0.4 cm, acute, hairy outside, especially on the thickened midrib, glabrous inside. *Corolla* 7–9 cm long, tube slightly curved, pouched ventrally, up to 4.5 cm wide across the mouth, slightly hairy outside and within, lobes deep blue, throat with yellow markings. *Filaments* inserted about 0.5 cm from the base of the corolla, up to 1 cm long, geniculate just below the mid-point, hairy. *Anther-thecae* divergent, 4 mm across, anthers fused face to face, hairy. *Staminodes* 4 mm long, very hairy distally. *Disc* a shallowly lobed ring 0.75 mm deep. *Gynoeceum* 2–2.5 cm long, sparsely glandular, 1.2 mm wide at the base, stigma lower lobe deeply emarginate, 3–5 mm wide. *Fruit* up to 12 cm long, glabrous; calyx not persistent.

Distribution. Ceylon. Rocks in rain forest. Fl. 4, 8.

CEYLON. Rangala, edge of slab rock in jungle, flowers dark blue with yellow spot, 29 vii 1926, *Alston* 462 (C, K), sine loc., *Macrae* 16 (BM). *Shuttleworth* s.n. (BM). Madugoda-Alutnuvra road, wet rocks in jungle clearing, 18 iv 1932, *Simpson* 9466 (BM). *Thwaites*, C. P. 1789 (BM, K, P). Hantane, s. coll., (E).

CULTIVATED MATERIAL. Chelsea, viii 1853, s.n. (K).

The series *C. zeylanica*—*C. walkeri*—*C. moonii* shows a trend in leaf arrangement: paired—ternate—ternate or in fours. This trend is accompanied by a narrowing of the leaves. The same series also shows an increase in flower size, with an associated reduction in flower number. The corolla is markedly different between the species: in *C. zeylanica* the corolla tube is wide at the base, similarly, on a larger scale in *C. moonii*. In *C. walkeri* the tube is very narrow towards the base. Although the species are obviously closely related the difference in the corolla type suggests ethological isolation.

The corolla in *C. moonii* is the largest of any found in *Chirita*.

49. *C. longipedicellata* B. L. Burt in Notes R. B. G. Edinb. 26:264 (16 xi 1965). Type: Upper Burma, valley of the Seinghku, amongst high herbaceous undergrowth beneath Alder copse, flowers more or less violet, darker above than below and outside than inside, 7000 ft, 5 viii 1926, *Ward* 7241 (holo. K; iso. E).

Herbaceous perennial. *Rhizome* about 2 mm thick. *Flowering stems* annual, unbranched, up to 25 cm, internodes up to 14 cm, hairy with yellow-brown glandular and eglandular hairs, glabrescent. *Leaves* ovate, 2.5 × 1.7–5.5 × 3.5 cm, acute or shortly acuminate, serrate, base decurrent, eglandular hairy on both surfaces, sparsely so on the lower surface, lateral veins 5–7 on each side; petioles 0.3–2.5 cm, with glandular and eglandular hairs. *Inflorescence* axillary, several on a stem, flowers solitary, peduncles up to 7 cm long, with predominantly glandular hairs. *Bracts* inserted just below the calyx, paired, free, narrowly elliptical, about 4 × 1 mm, entire or obscurely crenate, sparsely glandular and eglandular hairy. *Calyx* deeply divided, tube 3 mm long, teeth narrowly triangular, 9–11 × 2.5 mm, acuminate, sparsely glandular and eglandular hairy on the inner and outer surface. *Corolla* 3–3.5 cm long, tube narrowly funnel-shaped, straight, slightly pouched ventrally, 1.4 cm wide at the mouth, sparsely hairy outside, glabrous inside, lobes violet, tube

paler. *Filaments* inserted 5 mm from the base of the corolla, 6 mm long, curved, pubescent distally. *Anther-thecae* divergent, 2-2.4 mm across, anthers fused face to face, pubescent on the lower surface. *Staminodes* inserted 4 mm from the base of the corolla, 1 mm long, curved, glabrous. *Disc* absent. *Gynoeceum* 1.8 cm long, ovary 7×1.5 mm, glandular hairy, style 0.5 mm wide, sparsely glandular hairy, stigma lower lip emarginate, 2.5 mm wide. *Fruit* not seen.

Distribution. Burma, known only from the type material.

50. *C. hookeri* C.B.Cl., Comm. et Cyrt. Beng. t. 70 (1874). C.B.Cl. in A.DC., Monogr. Phan. 5:118 (1883). C.B.Cl. in Hook. f., Fl. Brit. Ind. 4:359 (i 1884). Lectotype: [India, Assam] Mishmee, "22 *Chirita*", Griffith 3826 (K).

Syn.: *Roettlera josephi* O. Kuntze, Rev. Gen. 2:476 (5 xi 1891), (non *Roettlera hookeri* [C.B.Cl.] O. Kuntze [1891]).

Herbaceous perennial, indumentum white to rust-coloured. *Stem* to more than 30 cm, strongly 4-angled when dry, internodes up to 10.5 cm, sparsely hairy. *Leaves* ovate or elliptical, $7 \times 3.5 - 15 \times 7.5$ cm, acuminate, serrulate, base rounded or slightly decurrent, hairs evenly distributed on upper and lower surfaces, lower surface paler than upper surface, lateral veins 6-10 on each side; petiole 1-5.5 cm, densely hairy. *Inflorescence* axillary, flowers solitary, peduncles 1-3.75 cm, densely hairy. *Bracts* paired, broadly triangular, about 2.5×1.75 cm, acuminate, serrate, slightly cordate at the base, densely hairy, inserted immediately below and partly enclosing the calyx. *Calyx* 1.75-3 cm long, tube 1.25 cm long, teeth 1×0.8 cm, acuminate, densely eglandular hairy. *Corolla* about 4 cm long, tube slightly curved, slightly pouched, 1.75 cm wide at the mouth, sparsely hairy outside and inside (fide Griffith "extus albidus, intus flavus"). *Filaments* inserted 1.5 cm from the base of the corolla, very strongly geniculate, glabrous. *Anther-thecae* divergent, 3.5 mm across, anthers fused face to face. *Staminodes* not seen. *Disc* an entire ring 0.4 mm deep. *Gynoeceum* 3.5 cm long, style 1.5 mm wide, sparsely glandular hairy in the upper part, stigma lower lobe divided, strongly recurved, up to 5 mm across. *Fruit* about $10 \text{ cm} \times 1.2 \text{ mm}$, glabrous; calyx persistent.

Distribution. India: Assam, known only from two old collections of rather poor material.

INDIA. Khasiya, Griffith s.n. (K).

From one of Griffith's specimens, Clarke (Monogr. Phan., p.119) describes the corolla as "pallide caerulea lobo inferiore 2 lineis luteis notato". He also describes the pedicels as 1-2 cm long, whereas I consider the bracts to be inserted immediately below the calyx.

51. *C. peduncularis* B. L. Burtt in Notes R. B. G. Edinb. 26:265 (16 xi 1965). Type: Upper Burma, valley of the Nam Tamai, $27^{\circ}45' \text{N}$, $97^{\circ}55' \text{E}$, plant 12-18 inches, growing in colonies in the shade, flowers white with 2 raised yellow ribs along the floor, 3000-4000 ft, 12 ix 1926, Ward 7402 (holo. K; iso. E).

Herbaceous perennial. *Rhizome* long, horizontal, 2.5 mm thick. *Stem* decumbent at the base, up to 30 cm long, unbranched, internodes up to

12 cm, hairy with red-brown hairs, glabrescent. *Leaves* opposite, ovate, $5.5 \times 4-12.5 \times 7.5$ cm, acuminate, serrate, base decurrent, upper surface sparsely hairy with white eglandular hairs, lower surface hairy on the midrib and veins with yellow-brown eglandular hairs, lateral veins 6-8 on each side; petiole to 4 cm. *Inflorescence* axillary, up to 12 on a stem, each 2-flowered, peduncles 2.5-4 cm, sparsely eglandular hairy. *Bracts* paired, broadly ovate, 1.5×1.5 cm, acute, serrate, fused together in the lower third to form a shallow cup, sparsely eglandular hairy on both surfaces. *Pedicels* 0.4-2.5 cm, sparsely eglandular hairy. *Calyx* tubular, tube about 1.4 cm long, teeth triangular, 4×4 mm, acute, sparsely hairy inside and outside. *Corolla* 4 cm long, tube curved, slightly pouched, 1.5 cm wide at the mouth, very slightly hairy outside, glabrous inside, white with 2 yellow lines in the throat. *Filaments* inserted 1.1 cm from the base of the corolla, 1.1 cm long, curved, glabrous. *Anther-thecae* divergent, 3 mm across, anthers fused face to face, glabrous. *Staminodes* inserted 1.2 cm from the base of the corolla, 0.4 cm long, curved, glabrous. *Disc* an entire ring 1.5 mm deep. *Gynoecium* 2.5 cm long, ovary 2 mm wide, glabrous, style 1.2 mm wide, glabrous, stigma lower lobe shallowly divided, 4.5 mm wide. *Fruit* up to 10 cm long, 1.2 mm wide, glabrous; calyx and disc not persistent.

Distribution. N Burma. 900-1800 m. Fl. 8, 9.

BURMA. Valley of the Nam Tamai, $27^{\circ}45'N$, $97^{\circ}50'E$, flowers white, 6000 ft, 7 viii 1937, Ward 12935 (BM).

52. *C. oblongifolia* (Roxb.) Sinclair in Bull. Bot. Soc. Bengal 9:102 (1957). Lectotype: Chittagong Hills, Gulyompha, x-xi 1810, *sine col.* 238 (BM).

Syn.: *Incarvillea oblongifolia* Roxb., Fl. Ind. (Edn 2) 3:113 (1832).

Aeschynanthus oblongifolius (Roxb.) G. Don, Gen. Syst. 4:657 (1838).

Babactes oblongifolia (Roxb.) DC. in Meisn., Pl. Vasc. Gen. tab. diag. 302, Comm. 211 (x 1840). DC., Prodr. 9:260 (i i 1845).

Roettlera oblongifolia (Roxb.) O. Kuntze, Rev. Gen. 2:475 (5 xi 1891).

Calosacme acuminata Wall., List 802 (1829), nom. nud.

Chirita acuminata Steud., Nom. Bot. (Edn 2) 1:351 (viii 1840) nom. nud.

Chirita acuminata Wall. ex R. Br. in Bennett & Brown, Pl. Jav. Rar. 117 (v 1840), superfluous name. C.B. Cl., Comm. et Cyrt. Beng. t.81 (1874). C.B. Cl. in A.D.C., Monogr. Phan. 5:119 (1883) et in Hook. f., Fl. Brit. Ind. 4:359 (1884).

Herbaceous or woody perennial with a short, dense, indumentum of red-brown hairs with minute, deep red-brown sessile glands. *Stem* to 2.5 m, lower part with adventitious roots, internodes up to 6.5 cm, glabrescent. *Leaves* ovate, $7 \times 3.5-25 \times 15$ cm, acuminate, serrulate, base rounded to narrowly cuneate, strongly oblique, sparsely hairy to hairy, hairs of upper surface evenly distributed, predominantly on the midrib and veins of the lower surface, lateral veins 11-17 on each side; petiole 1-11 cm, hairy. *Inflorescence* of up to 12-flowered cymes in the axils of the upper two or three pairs of leaves, peduncles 0.75-3 cm long, densely hairy. *Bracts* $5 \times 1.25-9.0 \times 2.0$ mm, narrowly lanceolate, acute, entire or with a few short teeth, densely hairy; bracteoles similar but smaller. *Pedicels* 1-3.0 cm, thin, glabrescent. *Calyx* 1-1.3 cm, teeth triangular, 0.4×0.4 cm, acuminate, hairy outside, glabrous within. *Corolla* 3.5-4.5 cm long, tube straight,

very narrow towards the base, slightly pouched ventrally, about 1 cm wide across the mouth, slightly hairy outside, lobes and tube white with a yellow spot in the throat. *Filaments* inserted 1–1.6 cm from the base of the corolla, about 1 cm long, straight, slightly hairy distally. *Anther-thecae* slightly divergent, 2.5 mm across, anthers fused face to face, glabrous. *Staminodes* inserted 1.2 cm from the base of the corolla, 0.4–0.6 cm long, glabrous. *Disc* an entire ring 1 mm deep. *Gynoeceium* 2.5–2.9 cm long, hairy, 0.6–0.8 mm wide at the base, widening to 1.5 mm, then 0.5–0.8 mm wide below the stigma, which is 2-lipped, the lower lip emarginate, 1.5–3.0 mm wide, the upper lip much smaller, rounded. *Fruit* up to 9 cm long, sparsely hairy; calyx and disc persistent.

Distribution. India: Assam. N Burma. China: Yunnan. Rocks, banks and gullies in shady forest, 200–2000 m. Fl. 1–3, 8–12.

INDIA. Assam, Naga Hills, Henima, 4500 ft, 5 ix 1935, *Bor* 6289 (K). Assam, Khasi Hills, Pynursla, 4000 ft, 23 viii 1949, *Chand* 2059 (E). Chittagong, Kasalong, spreading shrub 6–8 ft high, 10 i 1869, *Clarke* 8243 (K). Khasia, Nunklow, 3500 ft, 1 xi 1871, *Clarke* 15772B (BM). Khasia, Nunkloa, 4000 ft, 1 xi 1872, *Clarke* 19297B (BM). Shillong, 3500 ft, 14 viii 1886, *Clarke* 44550D (BM). N Cachar Hills, Haflong, 2500–2675 ft, 10 viii 1908, *Craib* 192 (E, K). Assam, *Griffith* 1118 (BM). Mishmee, *Griffith* 3829 (BM, C, K, P). Khasia, 2–4000 ft, 18 x 1850, *Hook. f. & Thomson* s.n. (C, E, K, P). Assam, Pynursla, annual herb to 120 cm, 25 xi 1956, *Panigrahi* 4633 (E). Tirap F.D., Niusa to Wann, 1441 m, *Panigrahi* 15064 (E). Lushai Hills, Tuisenban, 4000 ft, 22 x 1927, *Parry* 327 (K). Cox's Bazar, Kelatuli Sorra, wooded ravine, 8 xii 1944, *Sinclair* 3853 (E). Assam, Dekho, 700 ft, 29 iii 1895, *Rep. Econ. Prod. Gov. India* 11044 (P).

BURMA. Kachin State, Sumprabum, 26°40'N, 97°20'E, Ndum-Zup to Hpuginhku, mixed evergreen and deciduous forest, flowers yellow with pink spots, 6–6500 ft, 30 xii 1961, *Keenan* 3092 (E). Kachin State, Sumprabum, 26°40'N, 97°20'E, Hpuginhku village, 5000 ft, ii 1962, *Keenan* 3691 (E). Namma to Nammuu, Myit Kyina District, 1000 ft, 1 iii 1910, *Lace* 5187 (E). Upper Chindwin District, Kodan Chaung, near Yeson Camp, in bottom of valley in moist place, 800 ft, 26 xi 1917, *Rogers* 1023 (E). Nwai valley, shady earth banks in forest, granite rock, under trees and shrubs with other undergrowth, shrubby perennial of 1–2 ft, flower white with 2 yellow ridges on the underlip, 4–6000 ft, 9 ix 1914, *Ward* 1931 (E). Tibet and Burma frontier, valley of the Nam Tamai, 27°45'N, 97°55'E, flowers white with yellow ridges, 3–4000 ft, 12 ix 1926, *Ward* 7401 (K). Valley of the Nam Tamai, 27°55'N, 97°45'E, shady ravines, corolla milk-white, 4000 ft, *Ward* 13122 (BM). Sumpra Bum, damp shady gullies, 3–4000 ft, 18 i 1953, *Ward* 20405 (BM).

CHINA. Yunnan, Kiukiang Valley, south of Kongpong, margin of forest, herb 1.5–3 ft high, flowers white marked yellow on throat, 1200 m, *Yü* 20458 (E).

There are two species included under number 802 in the Wallich Herbarium at Kew. Parts α and β are *Chirita oblongifolia*, part γ is *Didymocarpus acuminata* R. Br.

The minute brown glands on the stem and leaves of this species are distinctive.

53. *C. adenocalyx* Chatterjee in Kew Bull. 1948:63 (10 viii 1948). Burtt in Notes R. B. G. Edinb. 26:261 (16 xi 1965).

Type: Burma, Upper Burma, Kachin Hills, 2300 ft, xii 1911, *Toppin* 4251 (holo. K).

Herbaceous perennial. *Stem* decumbent towards the base, rooting along the internodes, up to 40 cm long, internodes up to 10 cm long, densely red-brown pubescent when young. *Leaves* ovate to narrowly ovate, to 14.5×7.5 cm, acuminate, serrate, obliquely rounded or decurrent at the base, densely pubescent on both surfaces, midrib and veins of the lower surface with red-brown hairs, lateral veins 9–12 on each side; petiole 1–6 cm, hairy. *Inflorescence* axillary to the mature leaves, each (1–)2–3-flowered, peduncles (1–)2–4(–8) cm, red-brown eglandular hairy. *Bracts* opposite, connate at the base, broadly ovate, 0.6×0.5 – 2.8×1.8 cm, acuminate, shallowly toothed, densely hairy to hairy, venation palmate. *Pedicels* 0.1–0.8 cm, densely hairy. *Calyx* tubular, tube 1.3 cm long, teeth narrowly triangular, 1.1 – 1.3×0.4 cm, acuminate, tip often recurved, densely hairy on the outer surface, glabrous within, white or red-brown sessile glands often visible on both surfaces. *Corolla* 4–5 cm long, tube straight, slightly pouched, 2–2.4 cm wide across the mouth, sparsely hairy outside, glandular in the throat, lobes white, yellow or purple, pink, red or yellow markings in the throat. *Filaments* inserted about 2 cm from the base of the corolla, 1 cm long, strongly geniculate just above the point of insertion, with sessile glands. *Anther-thecae* divergent, 4 mm across, anthers fused face to face, glabrous. *Stamens* inserted 1 cm from the base of the corolla, 0.7 cm long, hairy with long, fine hairs. *Disc* an entire ring, 2.5 mm deep. *Gynoecium* sparsely glandular and eglandular hairy, 3.5 cm long, 1.8 mm wide at the base, 1.2 mm wide below the stigma, the lower lip of which is deeply 2-cleft, 4.5 mm wide. *Fruit* not seen.

Distribution. India: Assam. N Burma. Shady banks in montane rain forest, 550–2400 m. Fl. 3, 8–12.

INDIA. Lohit Frontier District, Dreyi to Shoeliang, herb on moist shaded soil, flower yellowish along the tube with bluish or bluish violet lobes, 4800–5500 ft, 13 xi 1957, *Panigrahi* 10495 (E). Tirap Frontier District, Rusa to Bimalpur, flowers deep violet, 7 ix 1958, *Panigrahi* 16933 (E). Siang Frontier District, Garising to Eyo, flowers white with pinkish lines inside, 2000 ft, 22 xi 1958, *Rao* 17938 (E). Tirap Frontier District, Namchik to Chenglang, flowers yellow, 550 m, 15 x 1959, *Rao* 20212 (E). Assam, Therouliang, on damp banks in the shade, flowers yellow with red stripes in the throat, 3–4000 ft, *Ward* 20297 (BM).

BURMA. Nam Tamai Valley, $27^{\circ}42'N$, $97^{\circ}54'E$, flowers yellow, 3000 ft, 27 viii 1938, *Kaulback* 93 (BM, E). Sumprabum to Kumon Range, ca $26^{\circ}40'N$, $97^{\circ}20'E$, flowers creamy yellow with orange blotch, 4–5000 ft, 26 xii 1961, *Keenan et al.* 3051 (E). Kachin State, Sumprabum sub-division, $26^{\circ}40'N$, $97^{\circ}20'E$, between Ning W'Krok and Kanang, in sub-tropical hill jungle, 5000 ft, iii 1962, *Keenan et al.* 3936 (E). Nwai Valley, fls. with deep violet lobes, yellow and brown inside the throat, 6–8000 ft, 13 ix 1914, *Ward* 1942 (E). same loc., flowers yellow striped with dull red, *Ward* 1932 (E). Valley of the Nam Tamai, $27^{\circ}45'N$, $97^{\circ}55'E$, flowers purple with tube striped, 4–5000 ft, 19 viii 1926, *Ward* 7320 (E, K). Mountains east of Fort Hertz, $27^{\circ}20'N$, $97^{\circ}20'E$, flowers yellow with thin purple regular lines,

3000 ft, 25 viii 1926, *Ward* 7343 (K). Nam Tamai Valley, flowers purple with two yellow stripes along the floor and several purple stripes along the roof, sometimes with the yellow *Chirita* 7343, 5000 ft, 11 ix 1926, *Ward* 7393 (E, K). Burma-Tibet frontier, Kachin Hills, 2000 ft, 5 xii 1930, *Ward* 9025 (BM). No data, *Ward* 9030 (BM). Nam Tisang valley, 27°30'N, 97°35'E, on damp shady banks, flowers pale yellow, 3000 ft, 8 xii 1937, *Ward* 13553 (BM).

In some specimens (*Kaulback* 93, *Ward* 13553) the stigma has a large, divided lower lip and a much smaller, entire, rounded, upper lip. This is the form of stigma found in *C. oblongifolia* and *C. heterostigma*. From the collectors' notes the corolla colour is unusually varied.

54. *C. heterostigma* B. L. Burtt in Notes R. B. G. Edinb. 26:262 (16 xi 1965). Type: Burma, Nam Hat, growing on shady banks, flowers pale violet with white throat and a few guide lines, 2000–2500 ft, 27 iv 1926, *Ward* 6655 (holo. K).

Rhizomatous herbaceous perennial, stem leaves and inflorescence with red-brown hairs. *Stem* erect, 45–75 cm, branched towards the apex with short axillary shoots, internodes to 12 cm, glabrescent with age. *Leaves* opposite, elliptical, $5.5 \times 2-17 \times 8$ cm, acuminate, shallowly dentate or serrate, base rounded, upper surface sparsely hairy, lower surface hairy on midrib and veins, lateral veins 11–13 on each side; petiole 0.7–1.5 cm. *Inflorescence* axillary, several on a stem, each 1–2-flowered, peduncles about 1 cm long. *Bracts* several, whorled, up to 8×2 mm, hairy on the lower surface, glabrous on the upper. *Pedicels* up to 8 mm, hairy. *Calyx* 2.2 cm long, tube 1.1 cm, teeth narrowly triangular, 11×2.5 mm, acuminate, hairy on the outer surface, glabrous on the inner. *Corolla* 5.5 cm long, tube slightly curved, slightly pouched, 2.2 cm wide at the mouth, very sparsely hairy outside, glabrous inside, lobes pale violet, tube white, dark guide lines in the throat. *Filaments* inserted 2 cm from the base of the corolla, 1.2 cm long, geniculate below the mid-point, glabrous. *Anther-thecae* divergent, 3.5–4 mm across, anthers fused face to face, pubescent from the lower surface. *Staminodes* inserted 1.4 cm from the base of the corolla, 0.5 cm long, curved, glabrous. *Disc* a shallowly lobed ring 0.7 mm deep. *Gynoecium* 4 cm long, 2 mm wide, pubescent, stigma with a small, entire upper lip and a shallowly cleft lower lip 5 mm wide, glandular hairy. *Fruit* not known.

Distribution. Burma. Shady banks in jungle, 600–900 m. Fl. 4, 11.

BURMA. Nam Tamai Valley, well shaded banks in jungle, flower pale violet with 3 darker guide lines in each of the lower lobes and a strip of pale yellow between each lobe, 3000 ft, 9 xi 1922, *Ward* 5528 (E).

The unusual lobing of the stigma has been pointed out by Burtt (loc. cit.). The hair pattern of the gynoecium is also unusual in *Chirita*: the ovary and style have long, septate, red-brown hairs, with, just below the stigma, a band of short, glandular hairs.

55. *C. urticifolia* Buch.-Ham. ex D. Don, Prodr. Fl. Nep. 90 (1 ii 1825). C.B. Cl., Comm. et Cyrt. Beng. t.69 (1874). C.B.Cl. in A.D.C., Monogr. Phan. 5:117 (1883). C.B.Cl. in Hook. f., Fl. Brit. Ind. 4:358 (i 1884). Lectotype: Nepal, in montibus Sheopori, *Wallich* [List] 800 (K-W).

Syn.: *Henckelia urticifolia* (Buch.-Ham. ex D. Don) Dietr., Sp. Pl. 1:574 (1831).

Roettlera urticifolia (Buch.-Ham. ex D. Don) O. Kuntze, Rev. Gen. 2:477 (5 xi 1891).

Didymocarpus urticifolius (D. Don) Wonisch in Sitzungsber. Akad. Wiss. Wien, Math.-nat. Kl. 118:454 (1909).

Chirita grandiflora Wall., Pl. As. Rar. 1:t.50 (6 iv 1830). Type: the figure.

Henckelia wallichiana Dietr., Sp. Pl. 1:574 (1831), (non *Henckelia grandiflora* (Retz.) Dietr. (1831).

Gonatostemon boucheanum Regel in Gartenflora 15:353, t.526 (1866). Type: not seen.

Calosacme grandiflora Wall., List 800 (1829), nom. nud.

Herbaceous perennial spreading by decumbent stems with adventitious roots, indumentum white to rust-coloured. Stem to 50 cm, internodes up to 12 cm, sparsely hairy. Leaves ovate 6×2.5 – 12×7.5 cm, acuminate, serrulate, base obliquely attenuate, sparsely hairy to hairy, veins and midrib less hairy than the lamina on the upper surface, more hairy than the lamina on the lower surface, lower surface paler than the upper surface, lateral veins 6–9 on each side; petiole 1–6 cm, sparsely hairy to hairy. Inflorescence axillary, flowers solitary or paired, rarely in threes, peduncles 3–6 cm. Bracts paired, ovate to narrowly ovate, 4×1.5 – 15×4 mm, entire or serrate with 2–3 teeth, inserted in the upper third of the peduncle, almost glabrous except for the hairy midrib. Pedicels 1–2.5 cm, glabrous to sparsely eglandular hairy. Calyx 2–4 cm long, sub-regular, funnel-shaped, the tube 2–5 mm adaxially, 7–10 mm abaxially, teeth narrowly triangular, 2.25×0.5 cm, long attenuate, often slightly reflexed, sparsely hairy to hairy outside, glabrous within. Corolla 4.5–6 cm long, tube slightly curved, slightly pouched, 1.5–1.9 cm across the mouth, slightly hairy outside and in, two longitudinal flanges within the dorsal part of the tube, lobes purple-violet, tube orange-yellow with heavy purple-brown markings in the throat. Filaments inserted about 1 cm from the base of the corolla, 1.5 cm long, strongly geniculate 0.5 cm from the point of insertion, glabrous. Anther-thecae divergent, 5 mm across, anthers fused face to face, glabrous. Staminodes 0.8 cm long, slightly hairy. Disc a lobed ring 0.75–1 mm deep. Gynoecium 2.5–3.5 cm long, sparsely hairy, 1.2 mm wide at the base, style 0.7 mm wide, stigma 4.5 mm wide, cleft or almost entire. Fruit 10 cm long; calyx not persistent.

Distribution. India: Assam. Nepal. Sikkim. Bhutan. N Burma. China: Yunnan. Ravines and wet places in undergrowth of forest, 900–2400 m. Fl. 8–10.

INDIA. Darjeeling, Beddome 5812 (BM). Assam, Khasi Hills, below Mawphlang, 4000 ft, 18 ix 1949, Chand 2359A (E). Khasi Hills, Mawphlang, on bushy slope, 6000 ft, 16 ix 1953, Chand 7230 (E). Darjeeling, Rungbee, 13 viii 1869, Clarke 8582 (BM). Darjeeling, 7000 ft, Gamble 3502A (K). *ibid.*, x 1879, Gamble 7217 (K). E Himalaya, Griffith 3822 (C, K, P). Assam, Mawphlang, thicket, 6000 ft, 15 ix 1952, Koelz 31280 (E).

NEPAL. Nannding, 1600 m, 8 ix 1954, Bernardi 1110 (K). Thankot, 8 miles west of Katmandu, 7000 ft, 1956, Codrington 214 (BM). Kakani, 8 miles west of Katmandu, 6–7000 ft, 1956, Codrington 288 (BM). Chaturaley,

5000 ft, *Lal Dhoj* in *Manners Smith* 92 (K). Between Bokajhunda and Chunch, east side of Trisuli river, 1900 m, 16 ix 1966, *Nicolson* 2391 (BM). Mangning, 5000 ft, 13 viii 1935, *Polunin* 165 (BM). Gangja La-Palchok Danda, cultivated, 5500 ft, 10-17 ix 1949, *Polunin* 1941 (BM). Sheopuri, north of Katmandu, 7250 ft, 3 ix 1965, *Schilling* 638 (K). Patibhanyang, 7500 ft, 6 ix 1965, *Shrestha & Shakya* 3702 (BM). Tamur valley, Mewa Khola, on steep bank beneath trees, 7000 ft, 8 viii 1956, *Stainton* 1299 (BM, E). Arun valley, Sabhaya Khola, north of Chainpur, 6500 ft, 7 ix 1956, *Stainton* 1561 (BM). Tiru Danda, south of Ganesh Himal, 7000 ft, 13 ix 1965, *Stainton* 5093 (BM). Katmandu, Sheopuri Lekh, among shrubs, 5000 ft, 19 viii 1954, *Stainton, Sykes & Williams* 6914 (BM, E). Pokhara, 3500 ft, 7 ix 1954, *Stainton, Sykes & Williams* 7144 (BM). Ghabung Khola, forest ravine, 3000 ft, 4 xi 1954, *Stainton, Sykes & Williams* 9281 (BM, E). Nepal, 1821, *Wallich* [List] 800 (E, P). Nepal, 1829 & 1830, *Wallich* [List] 800 (K). Nepal, *Wallich* s.n. (BM), mixed with *Chirita pumila*. Nepal, 1927, *Wigram* 82 (E). Khani Khola, 8500 ft, *Nepal Medicinal Herb.* 7405 (BM). SIKKIM. 4000 ft, 1 x 1884, *Clarke* 36114 (BM). Chongtong forest, vii 1889, *Haines* 121/2739 (K). Sine loc., 7-8000 ft, *Hooker* s.n. (E, K, P). Jelapahar, viii 1902, *Lace*, s.n. (E). Gangtok, 6-8000 ft, 1 ix 1942, *Ludlow & Sherriff* 10111 (BM). Sikkim Himalaya, trailing herb in wet places, 7500 ft, 4 viii 1874, *Treutler* 439 (E). BHUTAN. Kurm Chu Valley, moist shady undergrowth, 27 viii 1915, *Cooper* 4635 (BM). CHINA. SE Yunnan, Mengtze, in very moist place in ravine, flowers purplish-pink, 5000 ft, *Henry* 9161 (E, K). CULTIVATED MATERIAL. From Darjeeling, grown Royal Botanic Garden, Edinburgh, C.2673 (E).

The typification of this species is a problem; it is also important, in that *Chirita urticifolia* is the lectotype for the genus.

Don's protologue refers to collections of Hamilton and Wallich. I have seen no material of Hamilton, the originator, in manuscript, of the generic name and the specific epithet. The Wallich specimens used by Don as a basis for some of the species in the Prodr. Fl. Nep. were in Lambert's herbarium. There is an account by Prain (in Ann. R. Bot. Gdn Calcutta 8:328) of the loss of this herbarium.

Also included in the protologue is the name '*Didymocarpus speciosa* Wall. in litt.'. There is a sheet so named in Herb. BM but unfortunately it is a mixture of *Chirita urticifolia* and *Chirita pumila*.

I have taken as a lectotype a specimen from the Wallich herbarium at Kew. As an isosyntype this qualifies as a lectotype although it was probably not seen by Don at the time he described the species.

A plant in cultivation at the Royal Botanic Garden, Edinburgh, has very inconspicuous flowers, held below the foliage. The low position of the flowers may be related to the unusual corolla colour for a species of *Chirita*. The same plant also showed what appeared to be a deformed stigma and a disc deeply divided into segments. Deviant floral features have been seen in other species of *Chirita* in cultivation, possibly as a result of abnormal growing conditions.

The locality in SE Yunnan represents a distribution gap of about 1500 km from the Assam and E Himalayan area.

56. *C. speciosa* Kurz in J.Bot., Lond. 11:195 (vii 1873). C.B.Cl. in A.DC., Monogr. Phan. 5:120 (1883).

Type: China, Yunnan, Khakyen Hills, Ponline, 5 iii, Anderson s.n. (holo. CAL, not seen; iso. K).

Syn.: *Roettlera speciosa* (Kurz) O. Kuntze, Rev. Gen. 2:477 (5 xi 1891).

Didymocarpus speciosus (Kurz) Hand.-Mazz., Symb. Sin. 7:883 (1 ii 1936).

Chirita brevipes C.B.Cl. in A.DC., Monogr. Phan. 5:120 (1883). Pellegrin in Lecomte, Fl. Gen. Indo-Chine 4:536 (viii 1930). Lectotype: [India, Assam] Khasiya, Griffith 3828 (K, also P).

Roettlera brevipes (C.B. Cl.) O. Kuntze, Rev. Gen. 2:476 (5 xi 1891).

Didymocarpus brevipes (C.B. Cl.) Hand.-Mazz., Symb. Sin. 7:883 (1 ii 1936).

Chirita trailliana Forrest & Smith in Notes R. B. G. Edinb. 9:95 (ii 1916). Curtis's Bot. Mag. 143:t.8706 (iv 1917). Lectotype: China, Yunnan, Shweli valley, moist shady situations on ledges of cliffs and humus covered boulders, 5-6000 ft, v 1912, Forrest 7976 (E, also K).

Didymocarpus traillianus (Forrest & Smith) Hand.-Mazz., Symb. Sin. 7:883 (1 ii 1936).

Herbaceous perennial, acaulescent or shortly caulescent, stem, leaves, inflorescence and calyx with red-brown hairs. *Rhizome* horizontal, about 0.4 cm wide. *Internodes* up to 1 cm, densely hairy. *Leaves* alternate, ovate to orbicular, $7 \times 3 - 18 \times 12$ cm, obtuse to acuminate, serrate or crenate, base rounded to cordate, oblique, sparsely to densely hairy, evenly so on the upper surface, predominantly on the veins of the lower surface, lower surface often a deep purple, lateral veins 8-10, 2-3 more on one side than on the other; petiole 3-29 cm, sparsely to densely hairy with long and short hairs. *Inflorescence*, peduncles up to 7 on a stem, each 2-4-flowered, 1-2 in each leaf axis, 0.6-17 cm, sparsely to densely hairy. *Bracts* paired, free, narrowly elliptical, $0.4 \times 0.1 - 1.5 \times 0.4$ cm, entire or serrate, sparsely to densely hairy. *Pedicels* 0.3-2.5 cm hairy to densely hairy, with some glandular hairs. *Calyx* 1-2.5 cm, tube 0.5-1.3 cm, cleft to the base dorsally, teeth narrowly triangular, $6 \times 2.5 - 14 \times 3.5$ mm, pubescent to densely pubescent outside with glandular and eglandular hairs, inside sparsely pubescent. *Corolla* 5-7 cm long, tube funnel-shaped, straight, slightly pouched, 1.6-2 cm wide at the mouth, sparsely hairy outside, lobes blue-lilac, tube pale lilac, two yellow stripes in the floor of the throat, two patches of glandular hairs laterally inside, sparsely hairy outside. *Filaments* inserted 1.4 cm from the base of the corolla, about 1.3 cm long, geniculate below the mid-point, glabrous proximally, with a dense tuft of hairs distally. *Anther-thecae* divergent, 4 mm across, anthers fused face to face, densely hairy from the lower surface. *Staminodes* inserted 0.6 cm from the base of the corolla, 0.4-0.7 cm long, curved, sparsely to densely hairy. *Disc* a lobed ring 0.7 mm deep. *Gynoeceium* 3-4 cm long, ovary about 2 mm wide, pubescent, narrowing to a sparsely glandular hairy style about 1 mm wide, stigma 2-lobed, 5 mm wide. *Fruit* 12 cm long by 2-3 (-4.5) mm wide, pubescent; calyx and disc not persistent.

Distribution. India: Assam. Burma. China: Yunnan. Thailand. Vietnam: Tonkin. On wet rocks and cliff ledges in the shade, 200-2500 m. Fl. 2-9, 11. INDIA. Assam, Kilomi, Naga Hills, gregarious on banks in evergreen forest, 6000 ft, Bor 4482 (K). Assam, Cherrapunjee, cliff in forest, 4000 ft, 15 iv 1952,

Chand 5351 (E). Khasia, 3000 ft, 14 ix 1871, *Clarke* 14605 (BM, K). Khasia, Mowpoot, 2500 ft, 16 xi 1871, *Clarke* 14708D & 14714B (BM). Khasia, Cheira Khind, 4000 ft, 13 v 1886, *Clarke* 43844 (BM).

BURMA. Valley of the Taping, 24°30'N, moist shady situations on rocks by streams, ii 1914, *Forrest* 12150 (E). Burma, 25°58'N, 98°29'E, on ledges and cliffs and humus covered boulders, 8000 ft, iv 1925, *Forrest* 26513 (E, K, P). Hills around Kan-kuei, 26°14'N, 98°25'E, *Forrest* 26522 (E, K, P). N'Maikha-Salwin divide, 26°30'N, *Forrest* 29736 (E). Myitkyina, Tam-Chipwi New Road, 700 ft, 25 iii 1938, *Kermode* 16647 (K). Myitkyina, near Pawte, rocks in wet, shady valley, flowers vary from deep blue-purple to quite pale, 4 v 1938, *Kermode* 17285 (K). Myitkyina, near Htawgaw, 6000 ft, 9 v 1938, *Kermode* 17349 (K). Bhamo, Lapyeka to Lweje, 3-5000 ft, 7 iv 1912, *Lace* 5758 (E, K). Kachin Hills, v 1898, *Mokim* s.n. (BM). Kachin Hills, 2-3000 ft, 8 iv 1913, *Ward* 203 (K). Nwai valley, on wet rocks in complete shade, 6-8000 ft, 10 v 1914, *Ward* 1534 (E).

CHINA. Yunnan: Tengyueh, 25°N, ledges of cliffs and on rocks in shady situations, flowers purplish blue, 6-7000 ft, vi 1912, *Forrest* 8124 (syntype of *Chirita trailliana*, BM, E, K); western flank of the Tali Range, 25°40'N, on moist shady rocks, flowers deep purplish blue, *Forrest* 15539 (E, K); Shweli-Salwin divide, 25°40'N, flowers purple-blue, yellow towards the base of the tube, 9000 ft, viii 1919, *Forrest* 18365 (BM, E, K); hills south of Tengyueh, 24°30'N, 6000 ft, vii 1919, *Forrest* 18428 (E, K); hills south of Tengyueh, 7000 ft, vi 1925, *Forrest* 26748 (BM, E, K, P); Salween Valley, 25°20'N, 98°00'E, *Forrest* 29391 (BM, E); hills north-west of Tengyueh, 7000 ft, v 1931, *Forrest* 29599 (BM, E, K); Szemao, 4500 ft, *Henry* 11789A (K); Tsang Yuan, ravine, rock crevice, 1450 m, iv 1936, *Wang* 73227 (A); Lau-Tsang Hsien, 1500 m, v 1936, *Wang* 76575 (A); Ti-ka-ho, 23°50'N, 99°20'E, on limestone rocks in dry situations, 24 iv 1921, *Ward* 3771 (E).

THAILAND. Chiangmai, Doi Sootip, on rocks by stream, 3000 ft, 2 v 1910, *Kerr* 1164 (BM, K).

VIETNAM. Tonkin, Dien Bien Phu, 29 iii 1892, *Henri d'Orléans* s.n. (P). Tonkin, Hôi xây to Mt. Cha, 400 m, 21 iv 1936, *Poillane* 25821 (P).

CULTIVATED MATERIAL. Royal Botanic Garden, Edinburgh, from *Forrest* 26522, vi 1962, C.3768 (E). Cult. Royal Botanic Gardens, Kew, Bot. Mag. 8706, 24 vi 1915, (K).

The main flowering period given above, February to September, masks the predominantly spring flowering period. Of 26 dated collections 19 were from the three months April, May and June.

57. *C. monophylla* C.B.Cl. in A.DC., Monogr. Phan. 5:121 (1883). C.B.Cl. in Hook. f., Fl. Brit. Ind. 4:360 (i 1884).

Type: Bengal, Mishmee, *Griffith* 3832 (holo. K; iso. BM).

Syn.: *Roettlera monophylla* (C.B.Cl.) O. Kuntze, Rev. Gen. 2:476 (5 xi 1891).

Herbaceous perennial. Stems erect to 10 cm from a long rhizome. Leaves, one or more scale-like leaves present, about 5 × 1 mm and apically one larger, sessile leaf, at the flowering stage ovate, 2 × 1-4.5 × 2.5 cm, acuminate, serrate, base rounded to cordate, with red-brown multicellular hairs, enlarging in the fruiting stage to become sub-orbicular, up to 17 × 17 cm, obtuse,

shallowly serrate, cordate, glabrous on the upper surface, pubescent beneath, lateral veins 8-10 on each side. *Inflorescence* 2-flowered, inserted at the base of the apical leaf, one flower developing before the other, peduncle less than 1 mm. *Bracts* paired, free, with red-brown hairs, 3×0.5 mm, pedicels up to 1.2 cm, glabrescent. *Calyx* tube 1.5 cm, teeth narrowly triangular, 8-13 \times 3.5 mm, red-brown eglandular hairy outside, glabrous inside. *Corolla* 5-6 cm long, tube narrowly funnel-shaped, slightly curved, slightly pouched, 2 cm wide at the mouth, sparsely hairy inside, more densely hairy towards the base of the tube inside, colour not known. *Filaments* inserted 1.3 cm from the base of the corolla, 1 cm long, slightly geniculate at the mid-point, hairy proximally. *Anther-thecae* divergent, 3 mm across, anthers fused face to face, slightly hairy from the lower surface. *Staminodes* inserted 1.1 cm from the base of the corolla, 0.4 cm long, glabrous. *Disc* a shallowly lobed ring 0.6 mm deep. *Gynoeceum* 3 cm long, 1.4 mm wide, pubescent, stigma 2-lobed, 7 mm wide. *Fruit* 9 cm \times 2.5 mm, sparsely pubescent; calyx not persistent. Distribution. India: Assam. Known only from the type collection.

The habit is very unusual: from the poor material available it appears that the apical leaf remains small during flowering and later enlarges greatly. This large single leaf does not correspond to the single leaf produced initially by, for example, *Chirita hamosa*. In *Chirita monophylla* there are several small scale leaves on the stem below the terminal leaf, which appears never to be opposed by a marcescent leaf.

58. *C. asperifolia* (Blume) B. L. Burtt in Notes R. B. G. Edinb. 24:41 (29 iii 1962).

Type: [Java] Prov. Tjanjor (holo. L, not seen).

Syn.: *Agalmyna asperifolia* Blume, Bijdr. 767 (1826).

Busea asperifolia (Blume) Miq., Fl. Ind. Bat. 2:733 (8 iv 1858).

Dichrotrichum asperifolium (Blume) Benth. in Benth. & Hook. f., Gen. Pl. 2:1015 (v 1876).

Tetradema asperifolium (Blume) Schlechter in Notizbl. Bot. Gart. Mus. Berl. 7:361 (15 i 1920).

Didymocarpus asperifolius (Blume) Bakh. f. in Blumea 6:394 (1950), Backer & Bakhuizen, Fl. Java 521 (1965).

Tromsdorffia speciosa Blume, Bijdr. 763 (1826), nom. gen. illeg.

Mortsdorffia speciosa Steud., Nom. (Edn 2) 2:162 (iii 1841).

Chirita blumei C.B.Cl. in A.D.C., Monogr. Phan. 5:122 (1883), non *Chirita speciosa* Kurz.

Chirita horsfieldii R. Br. in Bennett & Brown, Pl. Jav. Rar. 117 (v 1840), C.B.Cl. in A.D.C., Monogr. Phan. 5:123 (1883). Type: Java, 1814, *Horsfield* (?BM, not seen).

Roettlera horsfieldii (R. Br.) O. Kuntze, Rev. Gen. 2:475 (5 xi 1891).

Chirita scaberrima R. Br. in Bennett & Brown, Pl. Jav. Rar. 117 (v 1840). Lectotype: Java orientalis, *Horsfield* 5 (K).

Chirita horsfieldii R. Br. var. *scaberrima* (R. Br.) C.B.Cl. in A.D.C., Monogr. Phan. 5:124 (1883).

Liebigia bracteosa Zoll. & Mor., Nat. en Geneesk. Archipel. Neêrl. Indie 2:574 (1845). Lectotype: Java, *Zollinger* 2637 (P).

Chirita bracteosa (Zoll. & Mor.) Miq., Fl. Ind. Bat. 2:728 (8 iv 1858).

Chirita glabra Miq., Fl. Ind. Bat. 2:729 (8 iv 1858). Type: Sumatra, Teysmann 2007 (?U, not seen).

Roettlera glabra (Miq.) O. Kuntze, Rev. Gen. 2:476 (5 xi 1891).

Bilabium limans Miq., Fl. Ind. Bat. 2:730 (8 iv 1858). Type: Sumatra, Teysmann 2002 (?U, not seen).

Roettlera limans (Miq.) O. Kuntze, Rev. Gen. 2:476 (5 xi 1891).

Chirita bilabium C.B.Cl. in A.DC., Monogr. Phan. 5:127 (1883), nom. illeg. based on *Bilabium limans* Miq.

Chirita limans (Miq.) B.L. Burt in Notes R. B. G. Edinb. 21:196 (28 i 1954).

Chirita forbesii S. Moore in J. Bot., Lond. 37:175 (iv 1899). Type: Sumatra, Forbes 1830 (holo. BM, iso. P).

Chirita forbesii Ridley in J. Straits Brch R. Asiat. Soc. 43:60 (1905), nom. illeg., non S. Moore. Type: Sumatra, Lintang River, 900 ft, Forbes 2579 (lectotype BM).

Chirita ridleyana S. Moore in J. Bot., Lond. 63 (suppt): 74 (iv 1925) (= *Chirita forbesii* Ridley non S. Moore).

Chirita alba Ridley in J. Fed. Malay St. Mus. 8:68 (1917). Type: Sumatra, Siolak Daras, 3000 ft, Robinson & Kloss 26 (holo. SING, not seen; iso. BM, K).

Chirita blumei C.B.Cl. var. *cordifolia* S. Moore in J. Bot., Lond. 63 (suppt): 74 (iv 1925). Type: Sumatra, base of Mt. Dempo, 3200 ft, Forbes 2244 (holo. BM).

Herbaceous perennial. *Stem* to 60 cm (probably more), younger parts hairy, older parts glabrescent, internodes up to 9 cm. *Leaves* opposite, ovate or narrowly ovate, 5×2.5 – 19×8 cm, acuminate, shallowly serrate or crenate, base obliquely decurrent to cordate, upper surface sparsely hispid or papillose, lower surface softly eglandular hairy or glabrous, lateral veins 8–12 on each side; petiole 1–4 cm, slightly channelled, hairy. *Inflorescence*, peduncles 1–2-flowered, solitary in the leaf axils, stout to slender, 1.5–4 cm long, sparsely to densely hairy, (very short floriferous axillary shoots may be present, giving the appearance of many-flowered inflorescences). *Bracts* paired, connate, 0.4–1.0 (–1.6) cm long, obtuse to rounded, forming a cup up to 1.5 cm across, or free, linear, 0.5 cm long, sparsely eglandular hairy. *Pedicels* 0.6–1.2 cm long, sub-glabrous. *Calyx* narrowly funnel-shaped, very sparsely hairy, dark purple-red, tube 0.8 cm long, irregularly 5-toothed, teeth 0.2 cm long, acute to obtuse, rarely calyx 2-lipped, lobes 0.4–0.6 cm long. *Corolla* 3–3.5 cm long, tube straight, slightly pouched, 1.2–1.4 cm wide at the mouth, narrowly funnel-shaped, sub-glabrous outside and inside, lobes white, tube white or a rich, shining purple outside, faint yellow markings in the throat. *Filaments* inserted about 1 cm from the base of the corolla, 1 cm long, straight, glabrous proximally, densely bearded with grey-purple hairs below the anthers. *Anther-thecae* not divergent, about 1.5 mm wide, anthers fused face to face, white hairy along the line of fusion. *Staminodes* 0.6 cm long, tipped with a brush of hairs. *Disc* a shallowly lobed ring 1.6 mm deep. *Gynoecium* 2.5 cm long, about 0.7 mm wide, sparsely glandular hairy, stigma about 1 mm across, shallowly 2-lobed. *Fruit* 7–10 cm long, 1.4–1.8 mm wide, sometimes slightly stipitate; calyx not persistent.

Distribution. Sumatra. Java. 360–2100 m. Fl. 1–3, 5, 6, 8–11.

SUMATRA. Takgeum, Lake Tawar, 6 i 1932, *Bangham* 686 (K). Mt. Singalan, *Beccari* 37 (BM, K). Mt. Singalan, 1000 m, 1878, *Beccari* 72 (K). Ayer Mancior, Padan, 360 m, viii 1878, *Beccari* 518 (K). *ibid.*, *Beccari* 746 (BM), 779 (BM, K). Toetoeupan District, Tapianoeli, Toba, xi 1933, *Boeed* 5995 (K). Mt. Marapi, west side, 2000 m, 22 vi 1953, *Borssum* 2154 (K). Umbilin, 24 vi 1953, *Borssum* 2281 (K). Sumatra, *Forbes* 2244 (BM). N Sumatra, 800 m, 23 ix 1927, *Lörzing* 12075, 12076 (K). Merapi, 7000 ft, i 1914, *Matthew* s.n. (K). Mt. Sago, Pajakumbuh, 1000 m, 6 v 1957, *Meijer* 150 (K). Sibolanget, Bukit-Kluang, 4 viii 1921, *Nor* 7436 (K). Battah village, Berastagi, ii 1921, *Ridley* s.n. (K). Songei Kumliang, Korichini, 18 v 1914, *Robinson & Kloss* s.n. (BM). Barongbaru, 6 vi 1914, *Robinson & Kloss* s.n. (K). Gajolanden, 800 m, 26 ii 1937, *van Steenis* 9323 (K). East Coast, *Yates* 1181 (K). Mt. Singalon, 4500 ft, *Yates* 2509 (K). Bengkoeloe, Liwa, *de Voogd* 40 (K).

JAVA. Pasir Kareh, 600 m, i 1911, *Backer* s.n. (K, P). Mt. Pingger, 400 m, *Buysman* 20 (BM). West Java, *Forbes* 418 (BM, K). Java, *Horsfield* 9 (BM), *Horsfield* 433 (BM). Java, *Kollmann* 703 (BM). Madiun, 1300-1400 m, 27 v 1896, *Kooders* 23283B (K). Telomojo, 14 vi 1897, *Kooders* 27747B (K). Semarang, Sepakoeng, 10 ii 1898, *Kooders* 29673B (K, P). Madiun, 1200 m, 15 iii 1898, *Kooders* 29829B (K, P). Prov. Banjumao, Prngoror, 800 m, 27 viii 1901, *Kooders* 39181B (K). Java, *Lanjouw* 189 (K). Sarangon, 1400 m, 9 i 1930, *van Leeuwen* 13083 (K). *Lobb* 238 (K). Tretes, x 1844, *Zollinger* 611 (P). *Zollinger* 911 (BM, K, P). *Zollinger* 2637 (BM).

CULTIVATED MATERIAL. Cornell, Ithaca, G-760, 13 ix 1964, *Clark* s.n. (E). Malay Isles, comm. Veitch, 1897, *Curtis* 117 (K). Cornell, Ithaca, source unknown, *Moore* 7659 (E). Royal Botanic Garden, Edinburgh, from Tjibodas Woods 1071, fl. iv 1970, C.6570 (E).

This is a very variable species. However, in most cases the variation is more or less continuous and no sub-specific taxa are recognized. A particularly confusing feature is the form of the inflorescence. The simplest arrangement is for each leaf axis to have a single 2-flowered peduncle. In many specimens the inflorescence is replaced by a very short axillary flowering shoot, which gives the appearance of an axillary fascicle of pedicels.

The genus *Bilabium* was described as having a 2-lobed calyx. The calyx lobing can vary even in individual plants, for example, cultivated *Chirita asperifolia* at Edinburgh had plants with 3 or 5 lobed calyces.

The wide variation of this species, coupled with a diverse taxonomic treatment in the past, has produced a number of synonyms. I have not seen the type specimens for all of these and in this respect the account of *Chirita asperifolia* is probably the least satisfactory in this revision. The affinity of this species with others in the section is obscure.

59. *C. bifolia* D. Don, Prodr. Fl. Nep. 90 (1 ii 1825). Royle, Illustr. Bot. Himal. t. 70/2 (v 1836). C.B.Cl., Comm. et Cyrt. Beng. t. 77 (1874). C.B.Cl. in A.D.C., Monogr. Phan. 5:113 (1883). C.B.Cl. in Hook. f., Fl. Brit. Ind. 4:357 (i 1884).

Lectotype: Nepal, in monte Sheopare, *Wallich* [List] 806(i) (K-W, also E, P).

- Syn.: *Bonnaya bifolia* (D. Don) Spreng., Syst. Veg. 4, 2:15 (1827).
Henckelia bifolia (D. Don) Dietr., Sp. Pl. 1:574 (1831).
Roettlera bifolia (D. Don) O. Kuntze, Rev. Gen. 2:476 (5 xi 1891).
Calosacme amplexens Wall., List 806 (1829), nom. nud.
Chirita amplexens Steud., Nom. Bot. (Edn 2) 1:351 (1840), nom nud.
Chirita scabra Royle ex C.B.Cl. in A.DC., Monogr. Phan. 5:113 (1883), nom. illeg. pro syn.

Herbaceous perennial. *Rhizome* short, up to 8 mm wide, densely hairy. *Stem* erect (5-)10-22(-30) cm high, hairy. *Leaves*, a small, marcescent, bract-like leaf in the lower part of the stem, terminal leaves 2 (rarely 1, very rarely 3, whorled, or 4, in two pairs,) opposite, or the smaller leaf inserted up to 3 cm below the larger, evenly hairy, or slightly more hairy on the veins beneath, the larger leaf sessile, broadly elliptical to orbicular, serrate, often obscurely so, obtuse, $5 \times 3.5-14 \times 10.5$ cm, base truncate to cordate, lateral veins 6-11 on each side, the smaller leaf narrowly obovate, $1.75 \times 1-6 \times 3$ cm, obtuse, shallowly serrate, base cuneate to truncate, lateral veins 3-6 on each side, shortly petiolate. *Inflorescence* terminal, inserted between the leaves, very many minute hairy gemmae (?formed from sterile flowers) and 1 (-2) glandular and eglandular hairy peduncles, flowers solitary or paired, very rarely in threes, if solitary, peduncle 1-4.5 cm, bracts 2, rarely 1, narrowly ovate to narrowly triangular, $2 \times 0.5-4.5 \times 1.5$ mm, entire, inserted at or slightly above the mid-point of the peduncle, hairy, if 2-3-flowered, peduncles 2-4.5 cm long with paired narrowly ovate to linear bracts, $3.5 \times 1.5-11 \times 2.5$ mm, pedicels 0.5-1.5 cm long, bracteoles rarely present, 2.5×1 mm, entire, hairy, inserted about the mid-point of the pedicel. *Calyx* 1.2-2.2 cm long, narrowly funnel-shaped, teeth triangular, about 5×3.5 mm, glandular and eglandular hairy, often with an outwardly curving tip. *Corolla* 3-5 cm long, tube narrowly funnel-shaped, slightly pouched ventrally towards the mouth, 1.1-2 cm wide at the mouth, glabrous outside, slightly hairy inside, lobes violet, tube white, with two dark orange stripes ventrally. *Filaments* inserted 5-10 mm from the base of the corolla, 10-12 mm long, strongly geniculate at the mid-point. *Anther-thecae* divergent, 2.5 mm across, anthers fused face to face, bearded. *Staminodes* 3 mm long, sparsely hairy apically. *Disc* a ring 0.5 mm deep. *Gynoecium* 2.2-2.9 cm long, very hairy, 1-1.5 mm wide at the base, narrowing to 0.3-1.1 mm below the shallowly cleft stigma which is 2.5-4 mm wide. *Young fruit* 2.7 cm long, 1.1 mm wide. *Disc* persistent; calyx not persistent. Distribution. India: Himachal Pradesh, Uttar Pradesh. Nepal. Bhutan. Shady cliffs and open glades in forest, 900-2250 m. Fl. 6-9.

INDIA. Himachal Pradesh, Simla, 4 viii 1831, *Lady Dalhousie* 223 (E). Punjab, Kálká to Run ka Tál, *Drummond* 22687 (K). Chamba, 4000 ft, 16 viii 1896, *Lace* 1767 (E). Simla, 7040 ft, vii-viii 1847, *MacLagan* 503 (E). Simla, below the cemetery, 3 viii 1916, *Rich* 316 (K). Uttar Pradesh, Dehra Dun, 6000 ft, ix 1891, *Gamble* 23231 (K). Tehri-Garhwal, 1952, *Huggins* A12 (BM). Mussoorie, 2000 m, viii 1957, *Rau* 3317 (E). Charmagarb, Kumaon, 4000 ft, 7 vii 1886, *Reid* s.n. (E). Ranibagh Road, Naini Tal, 5500 ft, *Reid* s.n. (E). Kumaon, Harara, 5500 ft, *Strachey & Winterbottom* 1 (K, P).

NEPAL. Katmandu, 4500 ft, 16 vii 1935, *Bailey's collector*, s.n. (BM). Lamduali, 4450 ft, 23 iii 1921, *Shristha & Bista* 1729 (BM). Wallich [List] 806B (E, P).

BHUTAN. Saleng-Mongw, southern slope, 4000 ft, 30 vi 1969, *Bowes Lyon* 15117 (BM). Tilagong Punakha, 6000 ft, 19 viii 1914, *Cooper* 2436 (E). Angduphorang, Djong, vii 1915, *Cooper* 4216 (BM). Shonga, 4000 ft, 28 viii 1925, *Cooper* 4703 (BM). Kuru Chu near Lingtsi, 7500 ft, 20 vii 1933, *Ludlow & Sherriff* 301 (BM, E). Khumanaggiri, Diwangiri-Trashigong Road, open glades in forest, 3000 ft, 26 vi 1934, *Ludlow & Sherriff* 563 (BM, E). Wangdipotrang, on shady overhanging cliff, 4000 ft, 7 viii 1949, *Ludlow, Sherriff & Hicks* 19587 (BM). Ungar, deciduous forest, 5500 ft, 24 vii 1949, *Ludlow, Sherriff & Hicks* 20943 (BM).

A further 30 specimens from the same general area have been seen but not cited.

This species is well represented in collections from the West Himalayan hill stations of Simla and Mussoorie, and eastwards to Nepal and Bhutan but there is a curious lack of specimens from Darjeeling.

Part of the inflorescence is adapted as vegetative buds. Vegetative reproduction by gemmae may explain the absence of ripe fruit on all except two of the specimens seen (*Bowes Lyon* 15177, *Ludlow & Sherriff* 301, both from Bhutan). The habit, with one large and one small leaf, is quite characteristic. A specimen at Kew from Mussoorie shows an additional, lower, pair of leaves.

This species stands apart from other species in the section.

SECTION MICHROCHIRITA

60. *C. caliginosa* C.B.Cl. in A.DC., Monogr. Phan. 5:122 (1883). C.B. Cl. in Hook f., Fl. Brit. Ind. 4:360 (i 1884). Ridley in J. Straits Brch R. Asiat. Soc. 43:58 (1905). Fl. Malay Penins. 2:524 (1923).

Type: Malaya, Selangor, Klang, *Beccari* 73 (holo. ?FI, not seen; iso. K).

Syn.: *Roettlera caliginosa* (C.B. Cl.) O. Kuntze, Rev. Gen. 2:476 (5 xi 1891).

Chirita fusca C.B. Cl. in A.DC., Monogr. Phan. 5:129 (1883). Type: in saxis Sarawak, *Lobb* (holo. K).

Roettlera fusca (C.B. Cl.) O. Kuntze, Rev. Gen. 2:476 (5 xi 1891).

Chirita parvula Ridley in J. Fed. Malay St. Mus. 10:149 (1920).

Lectotype: Malaya, Pahang, Kota Tongkat, 10th mile Benta-Kuantan road, *Evans* (K).

Herbaceous ?annual. Stem up to 60 cm, shortly decumbent at the base, internodes up to 9 cm, glabrescent. Leaves opposite, narrowly elliptical, $6 \times 2.5 - 17 \times 5.5$ cm, acuminate, serrulate, base narrowly cuneate, lateral veins 5-9 on each side, both surfaces with glandular and eglandular hairs; petiole 0.3-3 cm, glandular and eglandular hairy. Inflorescence axillary, 1-3(-5) flowered. Bracts absent. Pedicels shortly fused to the petiole, 0.5-3 cm long, glandular and eglandular hairy. Calyx divided to the base, lobes narrowly triangular or very narrowly ovate, acuminate, $8 \times 1.1 - 10 \times 1.5$ (-20 \times 2.3) mm, outer surface glandular and eglandular hairy, glabrous within. Corolla 2.8-3.1 cm, tube slightly curved, narrow, not pouched, 1.2 cm wide at the mouth, very sparsely hairy outside and inside except for a semicircle of clavate, glandular hairs in the mouth of the tube above the anthers, lobes blue or violet, throat yellow. Filaments inserted 0.8-1.2 cm from the base of the corolla, 5 mm long, curved, glabrous. Anther-thecae

divergent, 2.2 mm across, anthers fused apically, with long reflexed hairs on the lower surface. *Staminodes* inserted 0.9 cm from the base of the corolla tube, about 2 mm long, glabrous. *Disc* a shallowly lobed ring 0.2 mm deep. *Gynoecium* glandular hairy, 1.8–2.5 cm long, 0.5 mm wide at the base, narrowing to 0.3 mm below the deeply 2-lobed stigma, which is up to 1.5 mm wide. *Fruit* 5 cm × 0.7 mm–7.5 cm × 1 mm, sparsely hairy; calyx persistent.

Distribution. Malaya. Sarawak. Limestone rocks and overhanging cliffs, 70–360 m. Fl. 2–4, 6, 8–12.

MALAYA. Selangor, Batu Caves, 19 xi 1916, *Burkill* 2253 (K). Ipoh, *Burtt & Woods* 1656 (E). Kuala Lumpur, ii 1890, *Curtis* 2359 (BM). Perak, Kuala Diping, x 1894, *Curtis* 3109 (K). Selangor, Batu Caves, 12 viii 1937, *Franck* 1127 (C). Pahang, Bukit Chintaniani, 4 x 1931, *Henderson*, Singapore 25033 (BM). Pahang, Bukit Cheras, wet places on limestone, 10 x 1931, *Henderson*, Singapore 25223 (BM). Batu Caves, limestone, 800 ft, 14 x 1966, *Kepong FRI* 1629 (K). Selangor, Bukit Takun, Kanching, limestone, 500 ft, 3 xi 1937, *Nur* 34389 (K). Batu Caves, xii 1920, *Ridley*, s.n. (K). Selangor, Batu Takun, Kanching Forest Reserve, Templer Park, south side of huge limestone rock, corolla pale blue with yellow throat, 20 xi 1962, *Sinclair* 10732 (BM, E, K). Selangor, Batu Caves, limestone cliffs, corolla pale blue outside, darker blue inside with yellow throat, 4 xi 1953, *Sinclair* 40066 (E, K).

SARAWAK. Bidi, *Anderson* 87 (K). Bukit Daya, limestone, in shelter of exposed rocks, corolla very pale blue, 20 iv 1957, *Anderson* 7767 (K). Serian district, Gunong Selabor, Ulu Kedup, rubble and soil beneath limestone overhang on hill, 29 ix 1964, *Anderson* S 20822 (E). Bukit Angob, Padawan Road, 38 miles from Kuching, on limestone scree, corolla light violet on the inside, outside white, 650 ft, 6 iii 1969, *Anderson* S 27504 (E). Bau, flower pale mauve, almost blue, 24 iv 1955, *Brooke* 9877 (BM). Bidi Cave, flower purple, throat pale or white, 17 x 1929, *Clemens* 20647 (K). Mt. Kown, limestone, ix 1892, *Haviland* 1729 (K). Mt. Braang, limestone cliff, *Haviland* s.n. (K). Serian District, Bukit Selabor, Lobang Mawang, Tebakang Road, limestone cliff, 850 ft, 26 ix 1968, *Paie* S 28043 (E). *ibid.*, limestone cave, dry yellowish sandy soil, 1200 ft, 30 ix 1968, *Paie* S 28116 (E). Bau, limestone rocks, leaves iridescent in dark places, corolla pale mauve-blue, 200 ft, 15 ix 1955, *Purseglove* P 4484 (E, K). Jambusan Caves, flowers pale lavender, ix 1905, *Ridley* 12370 (K).

CULTIVATED MATERIAL. Royal Botanic Garden, Edinburgh, from *Burtt & Woods* 1819, Malaya, Gunong Kanda, C.4209 (E).

Species 60–64, from the Malay Peninsula and Sarawak, are found on limestone cliffs. In the majority of species in sect. *Microchirita* the anthers are joined by an apical ligature: in contrast, the anthers of species 60–64 are lightly connate at the tip or fused face to face. An unusual feature of the group is the presence of hairs with swollen tips on the upper surface of the throat of the corolla.

61. *C. sericea* *Ridley* in J. Straits Brch R. Asiat. Soc. 43:59 (1905). *Ridley*, Fl. Malay Penins. 2:525 (1923).

Type: Malaya, Perak, Ipoh, limestone rocks, *Curtis* 3131 (not seen).

Syn.: *Chirita sericea* var. *scortechinii* Ridley in J. Straits Brch R. Asiat. Soc. 43:59 (1905). Lectotype: Malaya, Perak, *Scortechini* 112b (K).

Stem, leaves and inflorescence densely hairy with eglandular white hairs; root monopodial, woody. Stem woody, apparently perennial, up to 25 cm long, internodes up to 3.5 cm. Leaves opposite, narrowly elliptical or narrowly ovate, $3.5 \times 1.1-6 \times 2$ cm, acuminate, obscurely serrulate, base attenuate, both surfaces with soft, appressed hairs, lateral veins 5-8 on each side; petiole 0.2-1 (-1.5) cm. Inflorescence (1-) 2-3-flowered. Bracts absent. Pedicels 2-3 cm, shortly fused to the petiole, persisting after leaves have fallen. Calyx divided to the base, lobes narrowly triangular, $6-10 \times 1.3$ mm, acute, densely hairy on the outer surface, glabrous within. Corolla 3 cm long, narrowly tubular, 0.2 cm wide below, tube slightly curved, not pouched, 0.9 cm wide at the mouth, lobes blue with a yellow spot in the throat, tube pale blue, outside of corolla hairy, inside sparsely hairy except for a semicircle of large, clavate, glandular hairs above the position of the anthers. Filaments inserted 1.1 cm from the base of the corolla, 0.4 cm long, slightly geniculate proximally, sparsely hairy and glandular distally. Anther-thecae divergent, 2-2.5 mm across, anthers fused apically, with reflexed hairs on the lower surface. Staminalodes inserted 1.1 cm from the base of the corolla, 2 mm long, glabrous. Disc an entire ring 0.3 mm deep. Gynoecium densely eglandular hairy, 1.3-1.5 cm long, ovary $6-7 \times 0.7$ mm, style 0.2 mm wide, stigma 2-lobed, 1-1.6 mm wide. Fruit hairy, straight or slightly curved, $2.5-3.5 \text{ cm} \times 1.5 \text{ mm}$; calyx persistent.

Distribution. Malaya. Limestone rocks near Ipoh. Fl. 2, 7, 8, 10, 12.

MALAYA. Perak, Ipoh, on limestone hills, 18 xii 1950, Allen s.n. (E). *ibid.*, limestone cliffs, 19 vii 1917, Burkill 2552 (K). *ibid.*, Gunong Panjong, dry places at foot of limestone cliffs, often under overhang, Burt 1660 (E). *ibid.*, near the caves, viii 1898, Curtis s.n. (K). *ibid.*, limestone rocks, flowers pale blue, ii 1904, Ridley 11952 (K). *sine loc.*, *Scortechini* 102b (syntype of var. *scortechinii*, K). Perak, Perak Tong temple, Chemor, 4 miles N of Ipoh, limestone cave to right of temple, 23 x 1958, Sinclair 9844 (E, K).

Although I have not seen the type there are sufficient collections from the type locality at Ipoh to confirm the identity of this species. One difficulty is that the species was described by Ridley as having alternate leaves. The specimens seen by me have opposite leaves.

62. *C. mollissima* Ridley in J. Linn. Soc. (Bot.) 32:517 (2 xi 1896).

Type: Malay Peninsula, Pungah, Curtis 2944 (holo. SING, not seen, iso. K).

Syn.: *Didymocarpus mollissimus* (Ridl.) Williams in Bull. Herb. Boissier ser. 2, 5:433 (30 iv 1905).

Perennial (?); stem, leaves and inflorescence densely hairy. Stem 2-9 cm, woody at the base, internodes up to 1 cm. Leaves alternate, narrowly elliptical, $5 \times 1-16 \times 5$ cm, acuminate obscurely and minutely serrate, base attenuate, lateral veins 5-13 on each side; petiole 0-0.7 cm. Inflorescence axillary, fused to the petiole, 3-4-flowered. Bracts absent. Pedicels up to 2 cm long. Calyx divided to the base, lobes narrowly triangular, $1-1.3 \text{ cm} \times 1.2 \text{ mm}$, acute, with slightly scarious margins, densely eglandular hairy on outer surface, glabrous within. Corolla up to 3 cm long, tube narrow in the lower part, slightly curved downwards, slightly pouched, about

0.9 cm wide at the mouth, hairy on the outer surface, sparsely hairy on the inner surface with a hanging fringe of glandular hairs positioned above the anthers, lobes purple or blue, tube white. *Filaments* inserted 1.5 cm from the base of the corolla, 6 mm long, geniculate near the point of insertion, glabrous. *Anther-thecae* divergent, 3.4 mm across, anthers fused apically, hairy on the lower surface. *Staminodes* inserted 1.5 cm from the base of the corolla, 3 mm long, glabrous. *Disc* a ring 0.2 mm deep. *Gynoecium* densely eglandular hairy, 2.5 cm long, 0.5 mm wide at the base, widening to 0.9 mm, narrowing to 0.2 mm below the shallowly 2-lobed stigma, which is 2 mm wide. *Fruit* curved, hairy, 5 cm \times 2 mm; calyx persistent.

Distribution. Thailand. Limestone rocks. Fl. 2.

THAILAND. Kao Panj-nga, on limestone rocks, 200 m, 27 ii 1929, Kerr 17265 (BM, K).

CULTIVATED MATERIAL. ix 1894, Veitch s.n. (K).

The type locality is given as Poongah by Curtis and Pungah by Ridley. This locality is possibly the same as Kerr's Kao Panj-nga, which I take to be the present-day Phangnga (8°25'N, 98°40'E). This is within 450 km of the localities of the closely related species *Chirita sericea*, *C. elata* and *C. viola*, also in the west of the Malay peninsula.

63. *C. elata* Ridley in J. Linn. Soc. (Bot.) 32:518 (2 xi 1896). Ridley in J. Straits Brch R. Asiat. Soc. 43:57 (1905). J. Asiat. Soc. Beng. 74:730 (v 1909). Fl. Malay Penins. 2:524 (1923).

Lectotype: Malaya, Perak, Maxwell's Hill, Ridley 2911 (BM).

Annual? *Stem* more than 35 cm, glabrescent, hispid at the nodes with red-brown reflexed hairs, internodes up to 7.5 cm. *Leaves* opposite, ovate, up to 10 \times 5 cm, acuminate, serrulate, rounded to slightly decurrent at the base, eglandular hairy, evenly so on the upper surface, predominantly on the veins of the lower surface, lateral veins 10-14 on each side; petioles up to 4 cm, with dense red-brown reflexed hairs. *Inflorescence* 2 in the axis of a leaf, each up to 6-flowered, peduncles up to 2 cm, with reflexed red-brown hairs, not fused to the petiole. *Bracts* paired, opposite, free, narrowly triangular, 5 \times 0.5 mm, hairy. *Pedicels* 0.5-1.2 cm, hairy. *Calyx* divided to the base, lobes narrowly triangular, 4 \times 0.8 mm, acute, hairy on the outer surface, glabrous within. *Corolla* 3.5-4 cm long, tube narrow in the lower part, slightly curved, not pouched, 1.3 cm wide across the mouth, slightly hairy outside, purple. *Filaments* inserted 1.2 cm from the base of the corolla, 1.1 cm long, curved. *Anther-thecae* divergent, 2.5 mm across, anthers fused face to face, glabrous. *Staminodes* not seen. *Disc* a shallowly lobed ring 2.5 mm deep. *Gynoecium* densely pubescent with predominantly eglandular hairs, 2.5 cm long, 0.5 mm wide at the base, narrowing to 0.1 mm below the flattened, entire, stigma, which is 1.8 mm wide. *Fruit* (young only seen) 2 cm long, 0.8 mm wide; calyx persistent.

Distribution. Malaya, Taiping Hills. Fl. 3, 10.

MALAYA. Perak, Birch's Hill, 3800 ft, 3 iii 1924, Burkill 12990 (K). Perak, Maxwell's Hill, x 1900, Curtis s.n. (K). sine loc., Scortechini 311 (K).

The anthers in this species appear to be fused face to face, in contrast to the apical fusion found in related species. The disc is unusually deep.

64. *C. viola* Ridley in J. Linn. Soc. (Bot.) 32:516 (2 xi 1896). Ridley in J. Straits Brch R. Asiat. Soc. 43:58 (1905). Fl. Malay Penins. 2:525 (1923).

Type: Thailand, Bangtaphan, in recesses of the rock, Buddhists' Cave, Keith s.n. (syntype, not seen). Malaya, Lankawi, Curtis 2570 (syntype, not seen).

Syn.: *Didymocarpus viola* (Ridl.) Williams in Bull. Herb. Boiss. ser. 2, 5:434 (30 iv 1905).

Herbaceous annual, with a short, curved, fleshy tap-root. Stem to 12 cm, purple-green, internodes up to 6 cm, hairy, axillary branches sometimes present. Leaves opposite, ovate, $2.8 \times 1.7-1.3 \times 0.5$ cm, acute, serrate, base rounded or slightly cordate, sparsely hairy on both surfaces, lateral veins 9-20 on each side; petiole 2.5-7.5 mm, sparsely hairy. Inflorescence, up to 6 paired flowers in a vertical plane in each leaf axis. Bracts absent. Pedicels up to 2 cm, fused to the petioles for 2-4 mm, glandular and eglandular hairy. Calyx divided to the base, lobes narrowly ovate, about 8×1.5 mm, acuminate, ciliate. Corolla 1.7 cm long, tube sharply curved downwards 0.3 cm from the base, 0.5 cm wide at the mouth, sparsely hairy outside with a cluster of apically swollen hairs in the mouth of the tube above the anthers, lobes red-purple, tube paler, throat with dark and pale lines. Filaments inserted 8 mm from the base of the corolla, 1.5 mm long, slightly geniculate at the point of attachment, slightly hairy. Anthers cordate, very sparsely hairy, lobes of thecae deep purple, filament inserted at the sinus, a short connective joining the anthers apically. Stamens inserted 6 mm from the base of the corolla, 2 mm long, glabrous. Disc a shallowly lobed ring 0.6 mm deep. Gynoecium eglandular hairy, 9 mm long, 0.5 mm wide at the base, narrowing to 0.2 mm below the shallowly 2-lobed stigma. Fruit about 4 cm long, 1.3 mm wide, glabrescent; calyx persistent.

Distribution. Thailand. Malaya. Limestone rocks near the sea. Fl. 8, 11. MALAYA. Pulau Langkawi, Batu Ayam, Selat Panchor, on limestone, 50 ft, 21 xi 1934, Henderson 28931 (K). Kedah, Pulau Tunum, Langkawi, on limestone by the sea, 26 viii 1925, Holttum 17433 (BM).

CULTIVATED MATERIAL. Royal Botanic Garden, Edinburgh, from Burtt & Woods 1815, Langkawi Is., shore SE of Kuah, fl. xi 1962, C.3967 (E). *ibid.*, from Burtt & Woods 1760, Langkawi, fl. ix 1962, C.4157 (E).

65. *C. tubulosa* Craib in Kew Bull. 1922:173 (25 vii 1922). Pellegrin in Lecomte, Fl. Gén. Indo-Chine 4:536 (viii 1930).

Type: "described from living plants grown from seed collected by Dr A. F. G. Kerr." Fl. October 1921 (lectotype specimen in ABD).

Herbaceous annual. Stem to 35 cm, green, fleshy, sparsely eglandular hairy, internodes to 16 cm. Leaves, lowest solitary, others paired, elliptical to narrowly elliptical, $5.5 \times 1.5-1.9 \times 10.5$ cm, acuminate, entire or minutely serrulate, base attenuate, sparsely hairy to hairy on both surfaces, lateral veins 10-19 on each side; petiole 0.6-1.0 (-3) cm, sparsely eglandular hairy. Inflorescences axillary, 1-10-flowered, fused to the petiole for 1-1.5 cm, axillary flower-bearing shoots often present in addition to the inflorescences. Bracts absent. Pedicels 0.5-3 cm, usually paired, in one plane, with eglandular white hairs. Calyx divided to the base, lobes narrowly elliptical, 10×1.6 mm, acute, hairy along the midrib with ciliate, membranous

margins. *Corolla* 2.5–3 cm long, tube slightly pouched, reflexed downwards about 0.6 cm from the base, 1 cm wide across the mouth, sparsely hairy outside, glabrous inside, lobes white, a yellow streak in the throat and two purple spots distal to the insertion of the filaments. *Filaments* inserted about 1.2 cm from the base of the corolla, 0.6 cm long, geniculate in the lower third, glabrous. *Anther-thecae* divergent, 2.5 mm across, anthers joined apically by a yoke-shaped ligature, densely hairy from the lower surface. *Staminodes* inserted 0.9 cm from the base of the corolla, 1 mm long, glabrous. *Disc* shallowly lobed, 0.7 mm deep, cleft dorsally. *Gynoeceum* 1.7–2 cm long ovary 6×0.6 mm, glabrous proximally, hairy distally, style 0.2 mm wide, sparsely hairy, stigma deeply 2-lobed, 1.1–2 mm wide. *Fruit* 4 cm \times 1.8 mm, slightly curved, glabrescent; calyx persistent, appressed. Distribution. Thailand. Limestone rocks, 50–300 m. Fl. 8–12.

THAILAND. Kao Sŭng, limestone rocks, flowers white, 60 m, 9 xii 1913, *Kerr* 3019 (K). Nakon Sawan prov., Kao Sang, Ban Den, crevices in limestone rocks, flowers white with yellow and purple markings in the throat, 100 m, 8 xi 1920, *Kerr* 4542 (ABD, K). Saraburi, 100 m, 3 ix 1924, *Kerr* 9127 (K). Ayuthia, Saraburi, Muak Lek, limestone rocks on hill, 300 m, 11 xi 1924, *Marcan* 1885 (ABD, K). Ban Takli, 22 x 1929, *Put* 224 (ABD, K). Saraburi, Ban Nawng Bua, 1 x 1927, *Put* 1116 (K). Saraburi, Hin Lap, 19 viii 1929, *Put* 2410 (K). Lapburi, growing on old brick wall, 22 x 1927, *Smith* s.n. (K). Mēnan Pasak, Kēng Koi, in crevices on limestone hill, 50 m, 9 xii 1923, *sine coll.* 7961 (K).

CULTIVATED MATERIAL. Royal Botanic Garden, Edinburgh, fl. 1921, from *Kerr* 4542 (E). Cult. Bangkok, 28 ix 1930, *Kerr* 19720 (ABD, E, K).

66. *C. hamosa* R. Br. in Bennett & Brown, *Pl. Jav. Rar.* 117 (v 1840). C.B.Cl., Comm. Cyrt. Beng. t. 78 (1874). C.B.Cl. in A.D.C., Monogr. Phan. 5:128 (1883). C.B.Cl. in Hook. f., *Fl. Brit. Ind.* 4:360 (i 1884), Cooke, *Fl. Pres. Bombay* 322 (1908). Pellegrin in Lecomte, *Fl. Gén. Indo-Chine* 4:527 (viii 1930).

Type: Burma, Trogla in Martabania, 1827, *Wallich* [List] 788 (K).

Syn.: *Roettlera hamosa* (R. Br.) O. Kuntze, *Rev. Gen.* 2:475 (5 xi 1891).

Didymocarpus cristatus Dalzell in Hooker's *J. Bot. Kew Gdn. Misc.* 3:225 (viii 1851). Type: India, Parwarghāt, *Dalzell* s.n. (K).

Chirita cristata (Dalzell) B. L. Burtt in *Notes R. B. G. Edinb.* 23:96 (11 viii 1960).

Didymocarpus pygmaeus C.B.Cl. in A.D.C., Monogr. Phan. 5:82 (1883). Lectotype: Ormanjee, Chota Nagpore, 2000 ft, 28 xi 1874, *Clarke* 2507 (K).

Chirita hamosa R. Br. var. *finlaysoni* C.B.Cl. in A.D.C., Monogr. Phan. 5:128 (1883). Type: Cochinchina? *Finlayson* 463 (LINN, not seen).

Chirita hamosa R. Br. var. *unifolia* C.B.Cl. in A.D.C., Monogr. Phan. 5:129 (1883), in Hook. f., *Fl. Brit. Ind.* 4:361 (i 1884). Lectotype: *Chirita* no. 31, *Hooker* (K).

Herbaceous annual. *Stem* to 30 cm, green sparsely eglandular hairy, unbranched, internodes to 20 cm. *Leaves*, lowermost solitary, others, if present, paired, ovate, 2.7 \times 1.9–21 \times 13.5 cm, acute to obtuse, entire, cordate,

sparsely hairy to hairy on both surfaces, lateral veins 4-22 on each side; petiole 0.3-0.9 cm, sparsely hairy. *Inflorescence* axillary, 2-18-flowered, fused to the petiole for up to 0.9 cm. *Bracts* absent. *Pedicels* 0.3-1.7 cm, paired, in one plane, eglandular hairy. *Calyx* divided to the base, lobes very narrowly elliptical, $5 \times 0.6-7 \times 1.2$ mm, acute, eglandular hairy on the outer surface and towards the tip on the inner surface. *Corolla* 0.7-1.1 cm long, tube slightly curved, not pouched, 0.4 cm wide across the mouth, very sparsely hairy outside, glabrous within, lobes dull white, yellow in the throat. *Filaments* inserted 7-9 mm from the base of the corolla, 3 mm long, curved, glabrous. *Anther-thecae* divergent, 1.5-1.8 mm across, cream or with purple markings, anthers apparently free, glabrous or hairy from the lower surface. *Staminodes* inserted 6 mm from the base of the corolla, 1.5 mm long, glabrous. *Disc* a shallowly lobed ring 0.5 mm deep. *Gynoeceum* 0.5-1 cm long, ovary 3.5×0.5 mm, hairy, style 0.2 mm wide, hairy, stigma entire to 2-lobed, up to 1.2 mm wide. *Fruit* (0.5-) 1.4-5 cm \times 0.8-1 mm, straight or slightly curved, hairy or glabrous; calyx persistent.

Distribution. India. Burma. China: Yunnan. Vietnam: Tonkin. Laos. Thailand. Malaya. Limestone rocks and cliffs, old walls, 15-1500 m. Fl. 8-12.

INDIA. Andhra Pradesh, Bison Hill, Godavari, 3 xii 1902, *Barber* 5063 (K). Gujerat State, Patan Mata, 8 x 1962, *Bedi* 3430 (K). Bombay, *Dalzell* s.n. (K). S Lushai, 20 miles east of Lungleh, moist rock and steep banks, 2000 ft, x 1931, *Wenger* 391 (K). Madhya Pradesh, Nimar District, Khandwa, 1889, *Duthie* 8366 (K). E Bengal, Khasia, *Griffith* 3833 (K, P). Madhya Pradesh, Pachmarhi, x 1911, *Haines* 185P (K). Khasia, reg. trop., 4-5000 ft, *Hook. f. & Thomson* s.n. (BM, C, P). Khasia, above Chela, 4 ix 1850, *Hook. f. & Thomson* s.n. (K). Rajasthan, Kota, *Maheshwari & Singh* 74719 (E). Uttar Pradesh, Mirzapur District, Katra Pahaz, on overhanging rock wall, 200 m, 5 x 1969, *Panigrahi* 12231 (E). Andhra Pradesh, Visakha District, Panyagiri, S Kota taluq, *Rao* s.n. (E). Orissa, west Sambalpur, 2000 ft, 3 x 1949, *Mooney* 3698 (K). *ibid.*, Narsinghnath, Gardamardan Hill, 12-1300 ft, 5 x 1949, *Mooney* 3700 (K). Andhra Pradesh, Visakhapatnam district, Srungavarapu Kota, 150 m, 21 x 1964, *Subbarao* 21819 (E). Central Province, Rewah, *Vicary* s.n. (syntype of *Didymocarpus pygmaeus*, K).

BURMA. N Shan States, Gokteik, 2000 ft, 7 x 1911, *Lace* 5452 (E). Moulmein, 1857, *Parish* 2 (K).

CHINA. Yunnan, Sisa in Weiznan district, 4500 ft, *Henry* 12443A (E, K).

THAILAND. Dai Tam Tup, near Chiengrai, on limestone rocks, 390 m, 14 ix 1924, *Garrett* 198 (ABD, K).

MALAYA. Pulau Langkawi, Selat Panchor, on limestone, 50 ft, 23 xi 1934, *Henderson* 29185 (K).

LAOS. *Poilane* 15951 (K).

VIETNAM. Tonkin, roches calcaires de Notre-Dame, en face de Tu-Vu, viii 1887, *Balansa* 4292 (K). Tonkin, Prov. Hoa Binh, Canton de Ke Son, sol argilo-calcaire, entrée d'une grotte, 50 m, *Colani* s.n. (P). Hoa Binh, xii 1926, *Pételot* s.n. (C).

CULTIVATED MATERIAL. Utrecht, 19 viii 1964 (from Göttingen, 1962) 62.1556 (ABD). Cult. Edinburgh, ix 1959, from Pavagadh Hill, Baroda, on walls of old fort, C. 3012 (E). Cult. Botanic Garden, Glasgow, 2 viii 1962, (from Göttingen) D. 4763 (K).

This species is confusingly variable. Some of the variation is due to the ability of *Chirita hamosa* to flower at a very early, unifoliate, stage of growth. Exceptionally small specimens are the basis of the description of *Didymocarpus pygmaeus*. In these the leaves are less than 2×1.5 cm, the capsule is about 5 mm long and the anthers less than 0.3 mm. Intermediates connect these very small specimens with the more commonly collected larger plants. Under suitable growing conditions plants that flower at a very early stage may grow on to produce large, many-leaved plants.

The degree of development of the corolla also varies. In very small plants the corolla lobes are reduced and inturned, giving an apparently cleistogamous flower. The anthers are free and self-fertilization is usual.

Another interesting pattern of variation is found in the form of the anthers. In one state the anther-thecae are rounded and uncoloured, with the capsules of these plants tending to be long and glabrous: in the contrasting state the anther-thecae are pointed, with purple marking round the margin, and tend to be found with short, hairy capsules. As these correlations are not absolute, and as there seems to be no difference in distribution between the forms, I have not given them taxonomic recognition.

There are probably many other specimens of *Chirita hamosa* present in herbaria, especially from Indo-China. However, without notes on the colour of the corolla none but the best material can be distinguished from several other species in this section, which centres on Indo-China.

67. *C. marcanii* Craib in Kew Bull. 1926:171 (20 iv 1926). Gard. Chron. Ser. 3, 80:343, fig. 154 (30 x 1926). Curtis's Bot. Mag. 154:t.9344 (8vii 1931). Pellegrin in Lecomte, Fl. Gén. Indo-Chine 4:528 (viii 1930). Type: "Plants raised from seed of the above collection [*Marcan* 1872] flowered at Aberdeen in 1925 and formed the basis for the description." Thailand, Muak Lek, clefts of limestone rock on hill, flower terra cotta, 250 m, 10 xi 1924, *Marcan* 1872 (lectotype ABD, also K).

Herbaceous annual. Stem up to 30 cm, green in the upper parts, purple below, very sparsely hairy, internodes up to 10 cm. Leaves, lowest leaf solitary, upper leaves paired, ovate, elliptical or oblong, $7 \times 3-19 \times 12$ cm, acuminate to acute, entire or obscurely serrulate, cordate, sub-glabrous to hairy with white eglandular hairs, lateral veins 11-15 on each side; petiole up to 2 cm, sparsely hairy. Inflorescence axillary, 2-13-flowered, peduncle fused to the petiole. Bracts absent. Pedicels in one plane, paired, up to 2 cm, becoming strongly curved, eglandular hairy. Calyx divided to the base, lobes very narrowly ovate-acuminate, 10×3 mm, hairy along the midrib and tip, margins membranous. Corolla 3-4 cm long, narrowly funnel-shaped, tube reflexed downwards about 1 cm from the base, slightly pouched, 1.5 cm across the mouth, slightly hairy outside, glabrous within, lobes and tube deep orange. Filaments inserted 1.5 cm from the base of the corolla, 0.6 cm long, geniculate at the mid-point, glabrous. Anther-thecae divergent, 3.2 mm across, anthers joined apically by a stout connective, hairy along the lower margin. Staminodes 3, inserted 1 cm from the base of the corolla, 2.5 mm long, glabrous. Disc an irregularly lobed ring 0.8 mm deep. Gynoeceum $2.5-3.2$ cm long, eglandular hairy, 1 mm wide at the base, narrowing to

0.4 mm below the stigma, which is deeply 2-lobed, 2 mm wide. *Fruit* slightly curved, 3.5 cm \times 2 mm, glabrescent; calyx persistent, appressed.

Distribution. Thailand. On limestone, 250–400 m. Fl. 9–11.

THAILAND. Saraburi, Muak Lek, 3 ix 1928, *Put* 1854 (K). Saraburi, Khao Sawng Phi Nawng, limestone hill, flowers orange, throat yellow with dark strips, 400 m, 4 x 1963, *Smitinand & Sleumer* 1348 (E).

CULTIVATED MATERIAL. Bangkok, from Muang Ngoi, flowers orange, 2–18 x 1931, *Kerr* 20571 (ABD). Cult. Kew, Bot. Mag. t.9244, xi 1926, (K).

The deep orange colour and the form of the corolla of this species suggests that it may be bird pollinated.

68. *C. micromusa* B. L. Burtt in J. R. Hort. Soc. 85:28 (1 ii 1960).

Type: Thailand, cult. in Montreal Botanic Garden ref. 106/59 from seed of *Raymond & Smitinand*, Nakhon Nayok, 90 km NE of Bangkok, at the base of a cliff, xii 1957 (holo. E).

Herbaceous annual. *Stem* to 40 cm, fleshy, green, sub-glabrous, internodes up to 16 cm. *Leaves*, lowermost solitary, others paired, ovate, 9 \times 5–22 \times 12 cm, acuminate, entire or obscurely serrate, base rounded or cordate, very sparsely hairy to hairy on both surfaces, 9–17 lateral veins on each side; petiole 0.2–2.5 cm, very sparsely eglandular hairy. *Inflorescence* axillary, 6–16-flowered, peduncle fused to the petiole, axillary flower-bearing shoots also present. *Bracts* usually absent (type shows aberrant fused cupular bract enclosing 2 flowers). *Pedicels* 0.3–2.1 cm, paired, in one plane, very sparsely hairy, recurved in fruit. *Calyx* divided to the base, lobes narrowly triangular, 12 \times 1.5 mm, acute, sparsely hairy at the tip, margins membranous. *Corolla* 2.5 cm long, tube slightly pouched, reflexed downwards about 0.7 cm from the base, about 0.8 cm across the mouth, sparsely hairy outside, glabrous within, lobes and tube orange with a deeper orange spot in the throat. *Filaments* inserted 1.1 cm from the base of the corolla, 3 mm long, geniculate at the base, glabrous. *Anther-thecae* divergent, 1.9–2.1 mm across, anthers joined apically by a yoke-shaped ligature, with inward pointing white hairs and long, outward pointing purple hairs from the lower margin. *Staminodes* not seen. *Disc* a shallowly lobed ring 0.4 mm deep. *Gynoeceum* 1.9 cm long, ovary 7.5 \times 1.2 mm, covered with minute glands, hairy apically, style 0.2 mm wide, sparsely hairy, stigma deeply 2-lobed, 1 mm wide. *Fruit* 4.5–6 cm \times 1.3 mm, straight, glabrous; calyx persistent.

Distribution. Thailand. Fl. 10, 12.

THAILAND. Central Nakhawn Nayok, Nang Rawnh, waterfall, succulent herb common on rocks, flowers yellow turning orange with dark orange patch in the throat, 100 m, 22 x 1960, *Smitinand* 6984 (K).

CULTIVATED MATERIAL. Cornell, from Montreal, 23 x 1958, *Moore* 7685 (E). Cult. Edinburgh, received from *Smitinand* 1961, C. 3797 (E). Cult. Utrecht from Montreal, 19 viii 1964, 61–70 (E). Cult. Edinburgh, ix 1964, C. 4327 (E).

69. *C. oculata* Craib in Kew Bull. 1930:174 (22 v 1930).

Type: Cult. Aberdeen from seed of *Kerr* 9750 [Thailand] (holo. ABD).

Herbaceous annual. *Stem* to 35 cm, green, sparsely eglandular hairy, internodes to 14 cm. *Leaves*, lowermost solitary, others paired, elliptical,

7.5 × 4–11 × 6 cm, acuminate, entire, base attenuate to cordate, both surfaces hairy, midrib and veins of lower surface more densely hairy, lateral veins 8–12 on each side; petiole 1–1.5 cm, sparsely hairy. *Inflorescence* axillary, up to 11-flowered, peduncle fused to the petiole for 0.8–1.5 cm, additional axillary flower-bearing shoots often present. *Bracts* absent. *Pedicels* 0.1–1 cm, usually paired, in one plane, white eglandular hairy. *Calyx* divided to the base, lobes very narrowly triangular, 1.3 cm × 1.4–1.6 mm, densely hairy except near the base on the inner surface. *Corolla* 2 cm long, tube 1 cm long, slightly reflexed downwards in the lower part, about 0.4 cm wide at the mouth, sparsely hairy outside, glabrous within, lobes rotate, golden yellow, mouth of tube encircled by a deep-purple-brown ring, tube white. *Filaments* inserted about 9 mm from the base of the corolla, 2 mm long, geniculate at the point of insertion, glabrous. *Anther-thecae* divergent, 1.8 mm across, anthers joined apically by a yoke shaped ligature, lower surface with a fringe of glandular hairs and longer, purple, clavate hairs. *Staminodes* inserted 6 mm from the base of the corolla, 1.6 mm long, glabrous. *Disc* 0.7–0.9 mm deep with a short dorsal cleft. *Gynoeceum* 1–1.2 cm long, ovary 4 × 1.5 mm, glabrous at the base, hairy distally, style 0.3–0.4 mm wide, glabrous, stigma deeply 2-lobed, up to 1 mm wide. *Fruit* 12 × 2 mm, densely hairy, straight or slightly curved; calyx persistent. *Distribution.* Thailand, only known from one wild collection. *THAILAND.* Krabin, Kao Sakam, limestone rocks, corolla yellow with dark red throat, 50 m, 24 xii 1924, *Kerr* 9750 (ABD, BM, K).

70. *C. elphinstonia* Craib in Kew Bull. 1932:149 (9 v 1932).

Type: Cult. in Hort. Aberdeen from seeds of *Marcan* 2561, coll. Thailand, Krabin, Ban Kêng (lectotype K, also E).

Herbaceous annual. *Stem* to at least 35 cm, fleshy, green tinged with purple, glabrous, internodes to 13 cm. *Leaves* lowermost solitary, upper leaves paired, ovate, 5.5 × 3–15 × 10 cm, acute or acuminate, entire or obscurely serrulate, cordate, both surfaces sparsely hairy, lateral veins 12–18 on each side; petiole 0.4–0.8 cm, sparsely hairy or glabrous. *Inflorescence* axillary, 3–13-flowered, peduncles fused to the petiole and midrib for 0.3–1.2 cm, lowest leaves with axillary flowering shoots. *Bracts* absent. *Pedicels* 0.5–2.2 cm, glabrous or very sparsely hairy, in one plane, recurved to the axis after flowering. *Calyx* divided to the base, lobes very narrowly elliptical, 10 × 1.5 mm, acuminate, slightly hairy along the midrib, margin ciliate, membranous. *Corolla* 2–2.2 cm long, tube reflexed downwards about 0.5 cm from the base, 0.8–1 cm wide across the mouth, very sparsely hairy outside, glabrous within, lobes orange yellow, tube yellow with 2 dark purple-brown spots at the base of the stamens. *Filaments* inserted 0.9 cm from base of the corolla, 0.5 cm long, geniculate 1 mm from the point of insertion, dark brown below the anthers, glabrous. *Anther-thecae* divergent, 2 mm across, anthers joined apically by a ligature, hairy from the lower margin. *Staminodes* inserted 7 mm from the base of the corolla, 1 mm long, glabrous. *Disc* a ring 0.6 mm deep, cleft dorsally. *Gynoeceum* 1.7–2 cm long, ovary 6 × 1.5 mm, glabrous at the base, slightly hairy above, style 0.2 mm wide, stigma deeply 2-lobed, 1 mm wide. *Fruit*

4.5-7.5 cm \times 0.8-1.2 mm, slightly curved, glabrescent; calyx persistent, appressed.

Distribution. Thailand. On limestone, 30-50 m. Fl. 11.

THAILAND. Prachinburi, Krabin, Kao Singta, on limestone rocks in evergreen forest, 50 m, 10 xi 1930, *Marcan* 2561 (ABD, BM, K). *ibid.*, Ban K  ng, limestone hill, prostrate on rock face, 30 m, 9 xi 1930, *Marcan* 2561 (ABD, E).

Of the two collections under *Marcan* 2561 the latter was the source of seed for the type material.

71. *C. bimaculata* D. Wood in Notes R. B. G. Edinb. 31:368 (iv 1972).

Type: Thailand, Maeklang Falls, c. 50 km north-west of Chiangmai, granite rock, under overhang, orange yellow flowers brown marked in throat, c. 430 m, 3 xi 1967, *Burtt* 5611 (holo. E).

Herbaceous annual. *Stem* up to 20 cm, fleshy, green, glabrous, internodes up to 5 cm. *Leaves*, lowermost solitary, upper leaves paired, ovate, 6.5 \times 4-14 \times 8.5 cm, acuminate, entire, cordate, sparsely hairy on both surfaces, lateral veins 7-19 on each side; petiole 0.5-0.8 cm, glabrous. *Inflorescence* axillary, 7-10-flowered, peduncle fused to the petiole. *Bracts* absent. *Pedicels* 0.3-1 cm, paired, sparsely hairy, in one plane, recurved to the axis after flowering. *Calyx* divided to the base, lobes narrowly elliptical, 5 \times 1 mm, acute, often slightly recurved at the tip, midrib, tip and margins hairy. *Corolla* 1.6-1.8 cm long, tube 1.5 mm wide, slightly reflexed downwards 0.5 cm from the base, 0.8 cm wide at the mouth, sparsely hairy outside, glabrous within, lobes and tube orange yellow, 2 deep purple-brown spots in the mouth. *Filaments* inserted 1 cm from the base of the corolla, 2.5 mm long, geniculate, glabrous. *Anther-thecae* divergent, 1.3 mm across, anthers joined apically by a ligature, densely hairy from the lower margin. *Staminodes* inserted 7 mm from the base of the corolla, 1 mm long, glabrous. *Disc* an entire ring, 0.4 mm deep. *Gynoecium* 1.3-1.5 cm long, ovary 4 \times 0.8 mm, glabrous, style 0.2 mm wide, eglandular hairy, stigma deeply 2-lobed, 1.5 mm wide. *Fruit* 2.5 cm \times 1.2 mm, slightly curved, glabrous; calyx persistent.

Distribution. Thailand. Granite and damp limestone rocks and slopes, 430-1000 m. Fl. 8-11.

THAILAND. Chiangdao, steep slopes above Ban Tam, on limestone rocks, plants vary greatly in size, 600-650 m, 20 viii 1935, *Garrett* 1002 (ABD, K, P). Dai Chiangdao, steep rock face above caves, 580 m, 30 viii 1949, *Garrett* 1280 (K). Doi Sootik, on damp rocks by stream, 2400 ft, 25 ix 1910, *Kerr* 1422 (K). Doi Chiangdao, on rocks, 13 x 1926, *Put* 306 (ABD, K). Doi Sutep, on humid rock wall in open evergreen forest, 1000 m, 5 ix 1958, *S  rensen* et al. 4751 (C). *ibid.*, on rocks along the margin of bog, 1000 m, 8 ix 1958, *S  rensen* et al. 4829 (C).

CULTIVATED MATERIAL, Edinburgh, from *Burtt* 5611, vi 1968, C. 5927 (E).

Burtt 5611 is unusual in that it was found on granite. The usual substrate for related species is limestone.

72. *C. barbata* Sprague in Curtis's Bot. Mag. 134: t. 8200 (vi 1908).

Lectotype: Cult. Kew, May & July 1907, Bot. Mag. t. 8200 (K).

Syn.: *Chirita hamosa* auct. non R. Br. André in Rev. Hort. 1895:492.

Herbaceous annual. *Stem* up to 50 cm, fleshy, purple below, eglandular hairy, internodes up to 7 cm. *Leaves*, lowermost solitary, upper leaves paired, ovate, 4×2.5 – 13.5×10 cm, acute, entire, base rounded to cordate, hairy to densely hairy on both surfaces, with appressed eglandular hairs, lateral veins 6–10 on each side; petioles 0.3–1.5 cm, hairy. *Inflorescence* axillary, 2–7-flowered, peduncle fused to the petiole for 0.5–1.5 cm, axillary shoots often present in addition to the inflorescences. *Bracts* absent. *Pedicels* 0.8–2.5 cm, usually paired, in one plane, white eglandular hairy. *Calyx* divided to the base, lobes narrowly obovate, rounded at the tip, 1.2×0.4 cm, densely hairy on both surfaces. *Corolla* 3–3.3 cm long, tube slightly pouched, slightly reflexed downwards 0.3 cm from the base, 1.8 cm wide across the mouth, hairy outside, glabrous within, blue with a yellow streak in the throat. *Filaments* inserted 1 cm from the base of the corolla, 0.6 cm long, geniculate 0.2 cm from the base, glabrous. *Anther-thecae* divergent, 2.5 mm across, anthers joined apically by a yoke-shaped ligature, densely hairy. *Staminodes* inserted 0.6 cm from the base of the corolla, 0.1 cm long, glabrous. *Disc* a shallowly lobed ring 0.8 mm deep, cleft dorsally. *Gynoeceum* 2 cm long, ovary 5×1.5 mm, densely eglandular hairy, style 0.5 mm wide, sparsely hairy, stigma deeply 2-lobed, 1.5–2.5 mm wide. *Fruit* 4 cm \times 1.8 mm, slightly curved; calyx persistent.

Distribution. Known only from cultivation. Probably originating from Indochina.

CULTIVATED MATERIAL. "Brought into cultivation by Sallier of Neuilly as *C. hamosa*" (E).

Specimens at Geneva were collected by G. Beauverd from 'Les Serres de la Pierrière,' the earliest being dated 1899.

73. *C. aratrifomis* D. Wood in Notes R. B. G. Edinb. 31:367 (iv 1972).

Type: Vietnam, Tonkin, prov. Langson, Khaumoi, fl. violet bleu, Eberhardt 3332 (holo. P).

Herbaceous annual. *Stem* to 60 cm, sparsely hairy, glabrescent, green or purple, curved and rooting at the base. *Leaves* lowermost solitary, upper leaves paired, ovate, up to 11×9 cm, acute, entire, cordate, sparsely hairy on both surfaces, lateral veins up to 12 on each side; petioles about 0.3 cm long, hairy. *Inflorescence* axillary, up to 8 flowers in each axis, axillary shoots also present, peduncles about 2 mm long, arising from the petiole, sparsely hairy. *Bracts* absent. *Pedicels* 1–3.1 cm long, with glandular and eglandular hairs. *Calyx* divided to the base, lobes narrowly elliptical, $1.2 \text{ cm} \times 1.2 \text{ mm}$, acute, margins membranous, ciliate distally, midrib hairy. *Corolla* 2.8 cm long, tube slightly pouched, curved downwards, 1.2 cm wide across the mouth, hairy outside, sparsely hairy within, lobes lilac-blue, tube pale lilac with a yellow patch ventrally in the throat. *Filaments* inserted 0.8 cm from the base of the corolla, 0.6 cm long, slightly geniculate in the lower part, sparsely hairy. *Anther-thecae* divergent, 2.5 mm across, anthers joined apically by a stout ligament, long hairy from the lower

surface. *Staminodes* inserted 0.5 cm from the base of the corolla, 0.1 cm long, straight, glabrous. *Disc* a ring 0.3 mm deep. *Gynoeceum* 1.5 cm long, ovary 6×0.8 mm, eglandular hairy, style 9×0.2 mm, sub-glabrous, stigma deeply 2-lobed, 0.7 mm wide. *Fruit* $7 \text{ cm} \times 1.7 \text{ mm}$, very sparsely hairy; calyx persistent.

Distribution. Known only from the type collection.

The name derives from the plough-like form of the lower part of the stem.

74. *C. lavandulacea* Stapf in Curtis's Bot. Mag. t. 9047 (1925). Gard. Chron. Ser. 3, 91:307, fig. 134 (23 iv 1932). Burtt in Notes R. B. G. Edinb. 23:98 (11 viii 1960).

Type: Cult. Kew (K).

Herbaceous annual. *Stem* to 50 cm, green, fleshy, very sparsely hairy, often curved slightly at the base, very shallowly rooted. *Leaves*, lowermost often solitary, upper leaves paired, elliptical, $4.5 \times 2.5 - 14.5 \times 8.5$ cm, acute to obtuse, serrate to serrulate, slightly oblique, cordate to sub-cordate, sparsely eglandular hairy on both surfaces, more hairy on midrib and veins of lower surface, lateral veins 8-13 on each side; petiole 0-11 cm, sparsely glandular and eglandular hairy. *Inflorescence* axillary, 1-6-flowered, shortly fused to the petiole. *Bracts* absent (although short axillary flowering shoots with small leaves may give the appearance of a bracteate inflorescence). *Pedicels* 0.2-2.5 cm, glandular hairy. *Calyx* divided to the base, lobes narrowly elliptical, 6.5×1.5 mm, tips glandular hairy, often slightly recurved. *Corolla* 3-3.5 cm long, narrowly funnel-shaped, tube slightly curved, pouched beneath, 1.2-1.5 cm across the mouth, sub-glabrous outside and inside, lobes lilac, tube paler with a yellow patch in the throat. *Filaments* inserted 1.2 cm from the base of the corolla, 0.6 cm long, curved or slightly geniculate at the base, glabrous. *Anther-thecae* divergent, 2.6-2.8 mm long, anthers with an apical connective, hairy around the anterior and lower margins. *Staminodes* inserted some 3 mm below the fertile filaments, 1 mm long, well developed apically, glabrous. *Disc* a ring 0.3 mm deep. *Gynoeceum* 2 cm long, ovary 10×1.5 mm, densely glandular hairy, style 0.2 mm wide, sparsely hairy, stigma deeply 2-lobed, 1.8-2.2 mm wide. *Fruit* $4-5 \text{ cm} \times 2-2.5 \text{ mm}$, sparsely hairy, dry corolla often remaining attached distally; calyx persistent.

Distribution. Vietnam: Annam. 400-1500 m. Fl. 3.

VIETNAM. Annam, prov. Thua-thien, Col des nuages, au bord des cascades, Eberhardt 2600 (P). Annam, [prov. Quangnam], Ba-Na, près Tourane, sol granitique très mauvais, 14-1500 m, 2 iii 1939, Poilane 29182 (P).

CULTIVATED MATERIAL. Copenhagen, 23 v 1925, s.n. (C). Cult. Royal Botanic Garden, Edinburgh, C.1702 (E), C.1703 (E), C.3795 (E).

The two collections from Annam are from localities within 30 km of each other.

In cultivation, and presumably in the wild, self-pollination is usual, leading to copious seed production. In cultivation the plant may depart from a strictly monocarpic habit by the production of suckers at ground level. These grow to flowering shoots following the death of the axis of the previous season.

75. *C. involucrata* Craib in Gard. Chron. Ser. 3, 83:140 (25 ii 1928).

Type: Cult. Hort. Bot. Aberdeen, 17 xi 1927 from seed collected in Surat on Kaw Tao by A. F. G. Kerr, 30 xii 1926 (holo. ABD).

Syn.: *Chirita involuclata* Craib in Gard. Chron. Ser. 3, 83:140 (25 ii 1928). Type: Cult. Hort. Bot. Aberdeen, 17 xi 1927 from seed collected at Tako, on limestone, 8 ii 1927 (ABD).

Chirita capitis Craib in Kew Bull. 1930:173 (22 v 1930). Type: Cult. Hort. Bot. Aberdeen, xi 1928 from seed collected in Bangkok by A. F. G. Kerr (holo. ABD; iso. K).

Chirita geoffrayi Pellegrin in Lecomte, Fl. Gén. Indo-Chine 4:529 (viii 1930). Type: Cambodia, Kampot, roches calcaires de Kabal-Roméas, 18 x 1903, *Geoffray* (P).

Herbaceous annual. Stem to 45 cm, sub-glabrous, green, often purple at the nodes and towards the base, internodes to 14 cm, axillary branches often present. Leaves, lowermost often solitary, upper leaves paired, orbicular to ovate, $2.1 \times 1.5 - 10.5 \times 7$ cm, acute, entire or minutely serrulate, base rounded to cordate, both surfaces sub-glabrous except the hairy margin, midrib and veins of the lower surface, lateral veins 5-7 on each side; petiole 1.5-6 cm long, sparsely hairy. Inflorescence axillary, peduncle not fused to the petiole, 0.2-4 cm long, sparsely hairy with glandular and eglandular hairs. Bracts paired, opposite, free, leaf-like, 2×1 mm - 2.9×2.3 cm, sparsely glandular and eglandular hairy. Pedicels 0.4-2.7 cm, sparsely glandular hairy. Calyx divided to the base, lobes narrowly elliptical, 4.5×1 mm, acute, sparsely glandular hairy on the midrib and margins. Corolla 1.7-2.2 cm long, tube slightly pouched, slightly curved, 0.7 cm wide at the mouth, sparsely hairy outside, glabrous within, lobes blue, mouth purple-blue, tube paler towards the base. Filaments inserted 9 mm from the base of the corolla, 3-4 mm long, curved, glabrous. Anther-thecae divergent 1.6-2.1 mm across, anthers joined apically, glabrous or hairy from the lower surface. Staminodes inserted 8 mm from the base of the corolla, 2 mm long, glabrous. Disc a lobed ring 0.4 mm deep. Gynoecium 1.1-1.5 cm long, glabrous, ovary $6 \times 1.5 - 8 \times 2$ mm, style 0.4 mm wide, stigma deeply 2-lobed, up to 1.2 mm wide. Fruit 5-7 cm \times 1 mm, slightly curved, glabrous; calyx persistent, appressed.

Distribution. Thailand. Cambodia. Malaya. Limestone rocks, rocky ground; wet rocks in evergreen forest; old walls, 5-700 m. Fl. 1-4, 7-12.

THAILAND. Luang Suan, Blüten blau, an einem Kalkfelsen wachsend, 23 iii 1971, *Bogner* 424 (E). Hill near Tong Tam Nkeo, 800 ft, 15 xi 1926, *Collins* 1277 (K). Hoop-Bo-Sriracha forest, near stream, 400 ft, 25 x 1927, *Collins* 1694 (K). Krungtep, Bangkok, old wall, 5 m, 16 x 1919, *Kerr* 3820 (ABD, K). *ibid.*, *Kerr* 3820A (K). *ibid.*, 3 i 1923, *Kerr* 6717 (ABD, K). Patchaburi, in crevices of limestone rocks, 10 m, 7 xi 1926, *Kerr* 11064 (K). Surat, Kaw Tao, 10-30 m, rocky ground in evergreen forest, 30 xii 1926, *Kerr* 11172 (ABD, K). *ibid.*, 14 iv 1927, *Kerr* 11172A (ABD, K). Surat, Ban Kawp Kep, 100 m, 5 viii 1927, *Kerr* 13179 (ABD, K). Tan Saka, N Sritamarat, on limestone rocks, 100 m, 25 iv 1928, *Kerr* 15391 (K). Kao Changlor, on limestone rocks in evergreen forest, 50 m, 24 vii 1918, *Kerr* 15894 (K). Lat Bua Kao, 30 miles west of Korat, x 1916, *Kloss* C13K (K). Bangkok, on wall, 5 xii 1920, *Marcan* 482 (K). Sriracha, on rocks, 14 xi 1926, *Put* 444 (ABD, K). Chumpawn, 9 ix 1927, *Put* 1021 (K). Bang Son, Chumpawn, 10 ix 1927, *Put* 1035 (K). *ibid.*, *Put* 1042 (K). Hui Yang, Prachuap, 6 x 1930, *Put* 3234 (ABD, K). Yala, 31 i

1931, *Put* 3685 (ABD, K). Nakawn Sritamarat, lower elevations of Khao Luang, on wet rocks in open place only, 100–700 m, 17 i 1966, *Tagawa et al.* 4546 (E). Kau Hoa Kwai, Tassateng, Surat, rain forest, 30 m, 3 i 1935, *Seidenfaden* 2134 (C).

MALAYA. Kedah, Gunang Priang, ii 1910, *Ridley* 14913 (BM, K). Kelantan, rocks on Gunung Kota Bharu, 17 ii 1917, *Ridley* s.n. (K). Pulau Penang, waterfall, introduced from Langkawi (as *C. viola*), 10 xii 1915, *Burkill* 1381 (BM, K). Kasoom, variable at different ages and in different situations, xi 1896, *Curtis* 3221 (K).

CULTIVATED MATERIAL. Aberdeen, from Patalung, Kao Oktalu, flowers purple to almost pure white, on rocky limestone ground, 21 iv 1928, *Kerr* 15349 (ABD, K). Cult. Aberdeen, from *Kerr* 15391 (ABD, K).

This species is very similar to *C. caerulea*, but differs from it in having free bracts, glabrous fruits and glandular pedicels (usually eglandular in *C. caerulea*). There is some variation in the hairiness of the anthers—for example, *C. capitata* was described as differing from *C. involucreata* by having glabrous anthers. A similar variation is found in the anthers of *C. hamosa*.

The preference for “old walls”, which have lime-rich mortar, is in accord with the calcicole habit of the species.

76. *C. caerulea* R. Br. in Bennett & Brown, *Pl. Jav. Rar.* 117 (v 1840). C.B.Cl. in A.D.C., *Monogr. Phan.* 5:127 (1883).

Type: Java, 1814, *Dr Horsfield* (K).

Syn.: *Roettlera caerulea* (R. Br.) O. Kuntze, *Rev. Gen.* 2:476 (5 xi 1891).

Chirita zollingeri C.B.Cl. in A.D.C., *Monogr. Phan.* 5:125 (1883).

Type: Java, *Zollinger* 2748 (holo. BM; iso P).

Didymocarpus zollingeri (C.B.Cl.) Backer & Bakhuizen van den Brink, *Fl. Java* 521 (1965).

Chirita kerrii Craib in *Kew Bull.* 1914:129 (1 v 1914). Pellegrin in Lecomte, *Fl. Gén. Indo-Chine* 4:527 (viii 1930). Type: Thailand, Mê Ping Rapids, Fa Man, in crevices of damp rock, 180 m, 23 x 1911, *Kerr* 2194 (holo. K; iso. BM).

Herbaceous annual. *Stem* to 13 cm, curved at the base, green, sparsely hairy, internodes up to 6 cm. *Leaves*, lowest leaf solitary, others, if present, paired, ovate, 3.5 × 2–12 × 7 cm, acute or acuminate, entire or minutely serrulate, base rounded to sub-cordate, both surfaces slightly hairy to hairy, lateral veins 7–11 on each side; petiole 0.1–1.8 cm, eglandular hairy. *Inflorescence* axillary, 1–6-flowered, peduncle 0.2–3 cm long, fused to the petiole for about 1 mm, hairy. *Bracts* paired, connate into a cup up to 1.3 cm deep, 2.2 cm wide. *Pedicels* 0.5–1.1 cm, hairy, sometimes glandular hairy. *Calyx* divided to the base, lobes very narrowly triangular, 5–6.5 × 1 mm, acute, hairy on the mid-rib and margins, sometimes glandular hairy. *Corolla* 1 cm long, tube slightly bent downwards, slightly pouched, 0.4 cm wide across the mouth, sparsely hairy outside, glabrous within, lobes lavender, tube white. *Filaments* inserted 5–6 mm from the base of the corolla, 2.5–3 mm long, slightly geniculate at the mid-point, glabrous. *Anther-thecae* divergent, 1–1.5 mm across, anthers joined apically, with a few long hairs from the lower surface. *Staminodes* inserted 5 mm from the base of the corolla, 1 mm long, glabrous. *Disc* an entire or lobed ring, 0.3–0.5 mm deep. *Gynoecium* 0.8–1 cm long, ovary

5 × 1 mm, glabrous basally, hairy above, style 0.2 mm wide, sparsely hairy, stigma deeply 2-lobed, 1.5 mm wide. *Fruit* 3–5 cm × 0.5–0.9 mm, glabrescent to eglandular hairy; calyx persistent.

Distribution. Thailand. Java. Lesser Sunda Is. Crevices of damp rock, 30–180 m. Fl. 3, 4, 9, 10.

THAILAND. Chumphon, vertical rock wall, 24 iii 1971, *Bogner* 434 (E). Klawng Kloi, Kaw Chang, 30 m, 30 ix 1924, *Kerr* 2960 (ABD, E).

JAVA. G. Kidoel, Kermadang, Djepitoe, 200 ft., 11 iv 1912, *Backer* 2754 (K).

Java, *Horsfield* 537 (K). Java, *Leschenault* 191 (P). Java, *Zollinger* 1964 (P).

LITTLE SUNDA IS. North west Bali, Darapatagueng, 100 m, 2 iv 1936, *van Steenis* 7616 (K). Sumba, 18 iv 1925, *Iboet* 316 (K).

The Sumba locality is the most southerly recorded for *Chirita*.

77. *C. rupestris* Ridley in J. Straits Brch R. Asiat. Soc. 43:59 (1905). *Curtis's Bot. Mag.* 136: t. 8333 (ix 1910). Ridley, *Fl. Malay Penins.* 2:525 (1923).

Type: Malaya, Lankawi, on damp rocks, *Curtis* 2120 (not seen).

Herbaceous annual. *Stem* to 35 cm, glabrous or sparsely hairy, slightly curved at the base. *Leaves* opposite, or the lowermost solitary, ovate, 3 × 2–12 × 7 cm, obtuse, shallowly serrate, base rounded, both surfaces sparsely hairy, lateral veins 7–10 on each side; petiole 1–8 cm, glabrous or sparsely hairy. *Inflorescence* axillary, up to 2 peduncles in each axis, each up to 7-flowered, short, inflorescence-like axillary shoots also present between the peduncles and the axis, peduncles 0.4–4 cm, hairy. *Bracts* paired, margins of opposing bracts fused to form a cup 0.5 × 0.5–2.5 × 2.5 cm, bracts up to 4.5 cm long, serrate, hairy on both surfaces. *Pedicels* 0.2–1.5 cm, very sparsely hairy or glabrous. *Calyx* divided to the base, lobes narrowly triangular, 8 × 1.2 mm, acute, glabrous or very sparsely hairy towards the tip. *Corolla* 1.6–1.8 cm long, lilac, tube not pouched, curved, narrow at the base, about 0.7 cm wide at the mouth. *Filaments* inserted 7 mm from the base of the corolla, 3 mm long, geniculate, glabrous. *Anther-thecae* divergent, 2.8 mm across, rather angular, slightly hairy from the lower surface. *Staminodes* inserted 6 mm from the base of the corolla, 2 mm long, glabrous. *Disc* a ring 0.5 mm deep. *Gynoeceum* 1.2 cm long, sparsely hairy towards the base, 0.8 mm wide, narrowing to 0.3 mm below the shallowly 2-lobed stigma which is 1 mm wide. *Fruit* 8 cm × 1.3 mm, glabrous; calyx persistent.

Distribution. Thailand. Malaya. Limestone cliffs and rock crevices, 300–450 m. Fl. 1, 10, 12.

MALAYA. Perlis, base of Bukit Logi, limestone cliff, 16 x 1929, *Henderson* 22848 (K). Biserat Jalor, Bukit Tapang, mouth of cave, *Vaughan* 489 (K).

CULTIVATED MATERIAL. Kew, "Bot. Mag. 8333", Cult. K.415.05 (K). Cult. Copenhagen, from Ban Keng Liang, dry limestone rocks, 26 i 1962, 450 m, *Larsen* 9695 (C). *ibid.*, form, Sai Yok, in rock crevices, 9 xii 1961, 300 m, flowering Copenhagen xi 1962, *Larsen* 9701 (C).

I have seen no authentic material of this species but I think it only doubtfully distinct from *C. caerulea*. The great variation in growth form and possibility for taxonomic confusion within species of this group is shown by *Kerr* 9260 from Thailand: small specimens of this are very like *C. caerulea*, while larger specimens are similar to what I consider to be *C. rupestris*.

EXCLUDED NAMES

Most of these species were originally described as *Chirita* and have been transferred or referred to other genera by B. L. Burtt, either formally or in manuscript. An exception is *Chirita subacaulis* (Hand.-Mazz.) B. L. Burtt. I consider this to be a *Hemiboea*, as originally described.

- Chirita acaulis* Merrill—*Opithandra acaulis* (Merrill) B. L. Burtt.
C. bicornuta Hayata—*Hemiboea bicornuta* (Hayata) Ohwi.
C. chanetii Lévl.—*Rehmannia glutinosa* (Gaertn.) Fisch. & Mey.
C. chlamydata W. W. Sm.—*Didissandra begoniifolia* Lévl.
C. dalzielii W. W. Sm.—*Opithandra dalzielii* (W. W. Sm.) B. L. Burtt.
C. humilis Miq.—*Didymocarpus humilis* (Miq.) B. L. Burtt.
C. kurzii (C.B.Cl.) C.B.Cl.—*Briggsia kurzii* (C.B.Cl.) W. E. Evans.
C. lilacina Lemaire—*Monopyle*.
C. macrosiphon Hance—*Loxostigma*?
C. primuloides (Miq.) Ohwi—*Opithandra primuloides* (Miq.) B. L. Burtt.
C. sericea Lévl. & Vant.—*Oreocharis sericea* Lévl.
C. subacaulis (Hand.-Mazz.) B. L. Burtt—*Hemiboea subacaulis* Hand.-Mazz.
C. uniflora Ridley—*Didymocarpus*

The following invalid names can also be referred to other genera.

- C. griffithii* C.B.Cl.—*Loxostigma griffithii* (Wight) C.B.Cl.
C. martinii Lévl. & Vant.—*Didymocarpus martinii* Lévl. & Vant.
C. polycarpa Steud.—*Lysionotus serrata* D. Don
C. ternifolia D. Don—*Lysionotus serrata* D. Don.

NAMES OF UNCERTAIN APPLICATION

I have seen type material of none of the following species and I am otherwise uncertain as to their position. The Chinese species described as *Didymocarpus* by Chun (who included *Chirita* as a sub-genus of *Didymocarpus*) from their excellent descriptions appear to belong to *Chirita* Sect. *Gibbosaccus*. I have refrained from making the transfers in case they should prove to be conspecific with existing species of *Chirita*.

- Chirita ceratoscyphus* B. L. Burtt in Notes R. B. G. Edinb. 21:212 (28 i 1954)
 based on *Ceratoscyphus caeruleus* Chun, non *Chirita caerulea* R. Br.
C. communis Gardner in Calcutta J. Nat. Hist. 6:481 (1846).
C. glasgowii Ridley in J. Straits Brch R. Asiat. Soc. 44:60 (1905).
C. pinnatifida (Hand.-Mazz.) B. L. Burtt in Notes R. B. G. Edinb. 23:99
 (11 viii 1960) based on *Didymocarpus pinnatifidus* Hand.-Mazz.
C. mollis Miq., Fl. Ind. Bat. 2:728 (8 iv 1858).
C. polyneura Miq., loc. cit.
C. spectabilis Miq., Fl. Ind. Bat. Suppl. 564 (xii 1861).
C. spectabilis var. *pedicellata* C.B.Cl. in A.DC., Monogr. Phan. 5:125 (1883).
Didymocarpus cruciformis Chun in Sunyatsenia 6:296 (xi 1946).
D. hedyotideus Chun, op. cit. 291.
D. polycephalus Chun, op. cit. 299.
D. salviiflorus Chun, op. cit. 294.
D. secundiflorus Chun, op. cit. 293.
D. sinohenryi Chun, op. cit. 290.
D. swinglei Merrill in Philipp. J. Sci. 13:156 (v 1918).
D. verecundus Chun in Sunyatsenia 6:297 (xi 1946).

ACKNOWLEDGMENTS

Chirita was suggested as a subject by Mr B. L. Burtt. I am very grateful for the benefit of his extensive knowledge of the group. This revision resulted from my tenure of a Civil Service Senior Research Fellowship in the Department of Agriculture and Fisheries for Scotland at the Royal Botanic Garden, Edinburgh.

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 — (1967) Chromosome numbers in the Gesneriaceae III. *Notes R. B. G. Edinb.* 27:205-209.

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