

NOTES RELATING TO THE FLORA OF BHUTAN: XXX. GENTIANACEAE

E. AITKEN* & D. G. LONG*

Two new species of gentian, *Gentiana wangchukii* E. Aitken & D.G. Long *sp. nov.*, endemic to Bhutan, and *Gentianella urnigera* E. Aitken & D.G. Long *sp. nov.*, from East Nepal, Sikkim, Central and Northern Bhutan and Yunnan, China, are described. Their generic placement and differences from allied species are discussed. The new combination *Lomatogonium himalayense* (Klotzsch) E. Aitken *comb. nov.* is made and this name is applied to plants previously ascribed to *L. carinthiacum* (Wulfen) Reichenbach from the East Himalaya; the basionym *Pleurogyne himalayensis* Klotzsch is lectotypified and epitypified. The genus *Tripterospermum* is reviewed in the *Flora of Bhutan* area and two species are recognized: *T. volubile* (D. Don) Hara and *T. nigrobaccatum* Hara. Within *T. volubile*, two subspecies are recognized: subsp. *volubile* and subsp. *longipes* E. Aitken & D.G. Long *subsp. nov.* *T. luteoviride* (C.B. Clarke) Murata, in the past treated as a distinct species, is placed in synonymy of subsp. *volubile*.

Keywords. *Gentiana*, *Gentianella*, *Lomatogonium*, *Tripterospermum*.

INTRODUCTION

Research on Gentianaceae for the *Flora of Bhutan* has brought to light taxonomic problems in several genera as well as some problems of generic distinction. In the largest genus *Gentiana*, 45 species are recognized from the *Flora* area. Amongst these is one new species, *G. wangchukii*, described below. The related genus *Gentianella*, comprising nine species in the area, is treated in a broad sense for reasons explained in a previous paper (Aitken & Long, 1994). Two of these are new species. The first, *Gentianella griersonii* E. Aitken & D.G. Long, has already been published (Aitken & Long, 1994). The second species, *G. urnigera*, is described below.

Of the smaller genera of Gentianaceae, two presented taxonomic difficulties. The first of these, *Lomatogonium* (comprising five species in our area), contained a taxon to which the European name *L. carinthiacum* had traditionally been applied. As few European species show a range extending to the East Himalaya, this prompted a close examination.

The fourth genus dealt with, *Tripterospermum*, comprises some of the attractive climbing gentians. This genus has in the past been the source of considerable taxonomic confusion. Difficulties were experienced in reliably applying the available names to all plants. This prompted a full reappraisal of the genus in the *Flora of Bhutan* area.

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The previous paper in the *Notes relating to the Flora of Bhutan* series was: Wood, J. R. I. (1994). Notes relating to the Flora of Bhutan: XXIX. Acanthaceae, with special reference to *Strobilanthes*. *Edinb. J. Bot.* 51: 175–273.

GENTIANA

***Gentiana wangchukii* E. Aitken & D.G. Long, sp. nov. Fig. 1a–d.**

G. cuneibarbae H. Smith fauce corollae dense albopilosa similis, sed planta multo minor est, habitu magis compacto caulibus \pm glabris, lobis corolla acuminatis, plicis bifidis.

Similar to *G. cuneibarba* H. Smith in having thick white hairs in the corolla throat, but is a much smaller plant with more compact habit, \pm glabrous stems, acuminate corolla lobes and bifid plicae.

Type: Bhutan, Upper Kuru Chu district, Narimthang, 'Open hillside, flowers deep blue', 13,500ft, 2 viii 1949, *Ludlow, Sherriff & Hicks* 21382A (holo. BM).

Erect, tufted annual to 3.5cm, branched from base and occasionally above. *Stems* glabrous or minutely papillose. *Basal leaves* rosulate, ovate or broadly lanceolate, 3–7 \times 2–2.5mm, stem leaves linear-lanceolate, conduplicate 3–5 \times 1–1.5mm, aristate, petioles forming a tube c.2mm, margins translucent, minutely ciliate, internodes usually shorter than leaves. *Flowers* solitary, terminal. *Calyx* tube 4–5mm, lobes lanceolate, 3–4 \times 0.5–1mm, acuminate, erect. *Corolla* deep blue, plicate, tube 8–9mm, with a thick fringe of white hairs c.1mm at apex, lobes narrowly triangular, 1–2 \times 0.7–1.5mm, acuminate, plicae narrowly triangular, 0.5–1 \times 0.5mm, bifid. *Filaments* 1–1.5mm, widening slightly at base, attached halfway up corolla tube, anthers c.0.5mm. *Ovary* narrowly ellipsoid, 2–3 \times 0.5mm; stipe 1–1.5mm; style c.1mm. *Capsule* obovoid, 3–5 \times 1–2mm, winged at apex, protruding from corolla, stipe elongating to 6mm.

Additional specimens examined. BHUTAN. Tongsa district, Rinchen Chu, Takse La, 15,500ft, 19 viii 1949, *Ludlow, Sherriff & Hicks* 17171 (BM, E).

These specimens had been annotated as *Gentiana pogolema* and *G. faucibarbata* by Harry Smith, but these two names were never published. The two specimens were later (1987) re-determined as *G. cuneibarba* H. Smith by T.N. Ho as part of the revision for *Flora of China*. However, in comparison with the type specimen of *G. cuneibarba* and that of another related species, *G. faucipilosa* H. Smith, both from Yunnan, several differences were found, as summarized in Table 1.

The species name has been chosen to commemorate the late King of Bhutan, H.R.H. Jigme Dorji Wangchuk, amongst whose most notable achievements was the recognition of the richness of Bhutan's fauna and flora and the promotion of their protection.

GENTIANELLA

***Gentianella urnigera* E. Aitken & D.G. Long, sp. nov. Fig. 1e–h.**

A *Gentianella stellariifolia* (Forbes & Hemsley) H. Smith (*Comastoma stellariifolium* (Forbes & Hemsley) Holub) habitu robustiore (sed interdum nano), foliis plerumque

TABLE 1. Differences between *Gentiana wangchukii*, *G. cuneibarba* and *G. faucipilosa*.

	<i>G. wangchukii</i>	<i>G. cuneibarba</i>	<i>G. faucipilosa</i>
Stems	± glabrous, 2-4cm	papillose, 4.5-9cm	papillose, 5-10cm
Stem leaves	closely overlapping, 3-5mm	widely spaced, 6-10mm	overlapping, 3-11mm
Calyx			
tube	4-5mm	4-7mm	6-8mm
lobes	3-4mm	3-6mm	3-5mm
Corolla			
tube	8-9mm	11.5-14.5mm	12-15mm
lobes	1-2 × 0.7-1.5mm, acuminate	3-5 × 2-2.5mm, subacute	3-5 × 3-4mm, entire to 3-dentate
throat hairs	thick fringe	in 5 bundles or tufts	dispersed short hairs
plicate	narrowly triangular, bifid, 0.5-1mm	ovate, obtuse, erose or minutely lacinulate, 1-2mm	ovate, obtuse, entire or denticulate, 1.5-4.5mm
Style	c.1mm	2-3mm	1-2mm
Capsule	3-5mm	5-6mm	7-8mm (not seen, from description only)
Flowering period	August	August-October	June-October
Distribution	C and N Bhutan	NW Yunnan, SE Xizang, Myanmar	NW Yunnan, SE Xizang
Altitude	4120-4720m	2250-3150m	2300-3100m

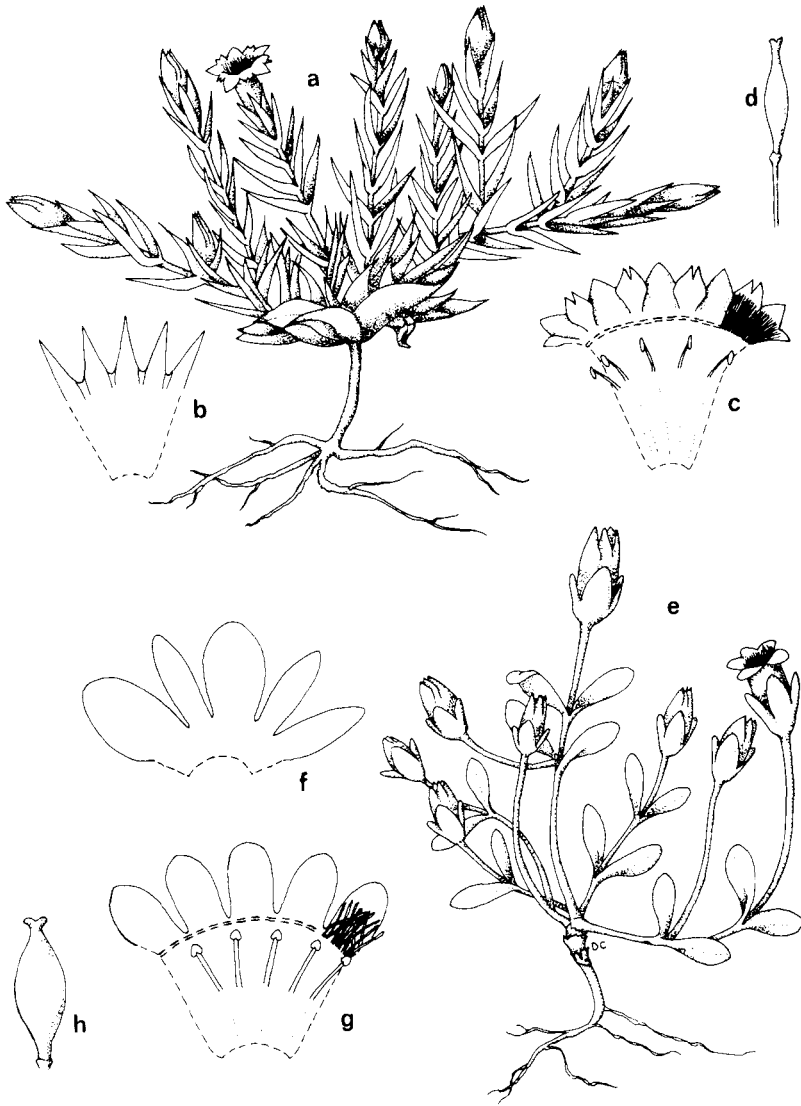


FIG. 1. a–d, *Gentiana wangchukii*: a, habit ($\times 2$); b, calyx; c, corolla, with some hairs removed; d, ovary, style, stigma (all $\times 3$); e–h, *Gentianella urnigera*: e, habit ($\times 2$); f, calyx; g, corolla with some hairs removed; h, ovary, style, stigma (all $\times 4$). a–d drawn from Ludlow, Sherriff & Hicks 21382A (type) and Ludlow, Sherriff & Hicks 17171; e–h drawn from Ludlow, Sherriff & Hicks 17114 and Ludlow & Sherriff 879.

petiolis latis, lobis calycis majoribus latioribusque, lobis corollae magis oblongis differt.

Differs from *Gentianella stellariifolia* (Forbes & Hemsley) H. Smith in its sometimes dwarf but more robust habit; leaves usually with broad petiole; larger and broader calyx lobes and more oblong corolla lobes.

Differs also from *G. pedunculata* (D. Don) H. Smith from East and West Himalaya, Kashmir, Pakistan etc. and *Gentianella cyananthiflora* (Franch.) H. Smith from China in having a longer calyx in relation to the length of the corolla.

Type: E Nepal, Sankhuwasabha district, S side of Lower Barun Glacier, opposite Mera, 27°48'N, 87°07'E, 'Eroding friable soil at foot of calcareous cliffs. Corolla deep blue', 4420m, 3 x 1991, Long *et al.*, *Edinburgh Makalu Expedition (EMAK)* 503 (holo. E).

Decumbent, often dwarf, annual. *Stems* 1.5–5(–9)cm long, diffusely branched from base. *Leaves* spatulate or obovate, 4–10 × 2–4mm, including broad petiole, apex rounded, base attenuate or sometimes narrowing abruptly, stem leaves sometimes ± sessile. *Flowers* 4 or 5-merous, solitary, terminal; peduncles 3–20(–50)mm. *Calyx* tube 0.5–2mm; lobes unequal, ovate or lanceolate, 3–5 × 1–3mm, rounded or acute. *Corolla* without plicae, slaty blue or deep blue-violet, tube 3–6(–7)mm, lobes oblong or ovate, 2–4(–5) × 1.5–2mm, rounded or subacute, throat with a thick fringe of white hairs. *Filaments* 1–2mm; *anthers* 0.5–1mm. *Ovary* ovoid, 3–3.5 × 1–2mm, sessile; *stigma* c.0.5mm. *Capsule* ellipsoid, 5–6 × 2–2.5mm.

Distribution. E Nepal, Sikkim, Bhutan, SW China.

Ecology. Alpine pastures, grassy slopes or stony ground, 4270–4720m. Fl. August–October.

Additional specimens examined. E NEPAL. Sankhuwasabha district, S side of Lower Barun Glacier, opposite Mera, 4420m, 3 ix 1991, Long *et al.*, *EMAK* 500 (E).

INDIA, SIKKIM. Yumthang, 15,000ft, 6 ix 1849, *J.D. Hooker* s.n. (on mixed sheet with type of *G. tenella* var. *sikkimensis*) (K); Kankola, 15,000ft, 21 viii 1849, *J.D. Hooker* s.n. (on mixed sheet with *G. stellariifolia*) (K); 11,000–17,000ft, *J.D. Hooker* s.n. (on sheet with *Ribu* 2939) (BM).

BHUTAN. Tongsa district, Rinchen Chu, Lacha La, 15,500ft, 17 viii 1949, *Ludlow, Sherriff & Hicks* 17139 (BM, E); Tongsa district, Omta Tso, 14,500ft, 12 viii 1949, *Ludlow, Sherriff & Hicks* 17114 (BM); Upper Kulong Chu district, Me La, 14,000ft, 8 viii 1935, *Ludlow & Sherriff* 449 (BM); Upper Kulong Chu district, Me La, 15,000ft, 24 viii 1934, *Ludlow & Sherriff* 879 (BM); Me La (South side), 14,000ft, 1 ix 1949, *Ludlow, Sherriff & Hicks* 21135 (BM, E).

CHINA, YUNNAN. Mekong-Salween divide, Londjrela, 3900m, 2 x 1938, *T.T. Yu* 23210 (E).

This species was first noticed among specimens of *Gentianella stellariifolia* (Forbes & Hemsley) H. Smith at Edinburgh (E), Kew (K) and The Natural History Museum, London (BM). Some of the smaller specimens from Bhutan, and one from Yunnan, had been annotated as *Gentianella divaricata* by H. Smith, but this name was never published. *Ludlow, Sherriff & Hicks* 21135 from NE Bhutan is a much larger plant which has the same characteristics as the typical form. This specimen is for the present included in the description, with the larger measurements in parentheses, although it could possibly be treated as a variety if further material were available for a more extensive study.

TABLE 2. Differences between *Gentianella stellariifolia* and *G. urnigera*.

	<i>G. stellariifolia</i>	<i>G. urnigera</i>
Habit	erect or ascending, weak or flexuose stems	decumbent or ascending, stronger stems
Height	2.5-14cm	1.5-5(-9)cm
Leaves	elliptic to ovate, 2-12 x 1-4mm, stem leaves sessile	spathulate to obovate, 4-10 x 2-4mm, stem leaves usually with broad petiole
Peduncles	7-50mm	3-20(-50)mm
Calyx	tube 1mm, lobes elliptic, 2-4 x 1-2mm	tube 0.5-2mm, lobes ovate or lanceolate, 3-5 x 1-3mm
Corolla	blue	slaty blue or deep violet
tube	3-6mm	3-6(-7mm)
lobes	elliptic, 3-5 x 1.5-3mm	oblong, 2-4(-5) x 1.5-2mm
Filaments	3-5mm	1-2mm
Capsule	narrowly ellipsoid, 9-10 x 2-2.5mm	ellipsoid, 5-6 x 2-2.5mm
Distribution	Nepal, Bhutan, Sikkim, Chumbi, SW China, Myanmar	E Nepal, Bhutan, Sikkim, SW China

The specific epithet derives from the distinctly urn-shaped calyces. There are distinct differences between the new species and *G. stellariifolia*, which are summarized in Table 2.

Some authors have subdivided *Gentianella* Moench into smaller segregate genera, e.g. Ho & Wu (1988) in China and Omer & Qaiser (1992) in Pakistan. Following their narrower generic limits, this species would have been placed under *Comastoma* Toyokuni (as is *G. stellariifolia*) on account of its fimbriate corolla throat. As discussed by Aitken & Long (1994) in describing *Gentianella griersonii*, there is a strong case for retaining *Gentianella* in the broadest sense, as generic limits throughout Gentianaceae require a comprehensive worldwide review.

LOMATOGONIUM

Lomatogonium carinthiacum (Wulfen) Reichenbach was first described from Europe (Wulfen, 1781) in the genus *Swertia*, and the name has frequently been applied (e.g. Chater, 1982; Garg, 1987; Liu & Ho, 1992) to specimens from the Himalaya. While some plants from the NW Himalaya appear to be conspecific with the European plant, others from this area, together with the E Himalayan plants, are clearly different. These differ in being much larger, more branched above, with larger leaves and often longer, narrower calyx lobes. In these characters they agree with the plant described and illustrated by Klotzsch (1862) as *Pleurogyne himalayensis*.

It has not been possible to locate any type specimens of Klotzsch's plant (Himalaya, *Hoffmeister*). The illustration (t. 68) appears to be the only element in the protologue available for typification. Fortunately, it is of high quality and demonstrates that this plant clearly belongs to the genus *Lomatogonium* in characters such as the decurrent stigma. The necessary new combination is made below. Under the new Tokyo edition of the International Code of Botanical Nomenclature (ICBN) (Greuter et al., 1994) it is permissible to supplement such a lectotypification by an interpretive specimen ('epitype'), which serves to unequivocally stabilise the application of the basionym in question. Because *Lomatogonium* includes several critical species, such a step is advisable. The epitype selected below closely matches the protologue and the lectotype illustration, and originates from the NW Himalaya whence the original material was almost certainly collected by Hoffmeister.

***Lomatogonium himalayense* (Klotzsch) E. Aitken, comb. nov.**

Basionym: *Pleurogyne himalayensis* Klotzsch in Bot. Ergeb. Waldem. Reise 91, t. 68 (1862). Lectotype (chosen here): Klotzsch (1862) t. 68. Epitype (chosen here): India, NW Himalaya, Bashahr State, Labrang to Runang Pass, 10,000ft, 19 viii 1890, *J.H. Lace* 539 (E).

Misapplied name: *Lomatogonium carinthiacum* auct. p.p. non (Wulfen) Reichenbach.

Additional specimens examined. INDIA, NW HIMALAYA. Pangi, 1900, *J.H. Lace* s.n. (E).

NEPAL. Sankhuwasabha district, S side of Lower Barun Glacier opposite Mera, 27°48'N, 87°07'E. 4420m, 3 x 1991, *Long et al.*, *EMAK* 495 (E); Chocho, 11,500ft, 3 x 1932, *K.N.*

Sharma E.510 (E); near Ramze, Simbua Khola, 27°36'N, 88°02'E, 4350m, 19 ix 1989, *Kew/Edinburgh Kanchenjunga Expedition (KEKE)* 766 (E).

INDIA, SIKKIM. Above Bikbari, 14,500ft, ix 1983, *S. Macpherson* 77 (E); W of Bikbari, 16 ix 1983, *Starling et al., Alpine Garden Society Expedition to Sikkim (AGSES)* 497 (E, K).

BHUTAN. Upper Mangde Chu district, Passu Sefu, 14,000ft, 5 ix 1949, *Ludlow, Sherriff & Hicks* 17230 (BM, E); Upper Bumthang Chu district, Lhabja, 12,500ft, 22 ix 1914, *R.E. Cooper* 2160 (E); Tolegang, Tsampa, 14,000–14,500ft, 10 ix 1949, *Ludlow, Sherriff & Hicks* 19728 (BM, E); Upper Kulong Chu district, Me La, S side, 13,000ft, 5 ix 1949, *Ludlow, Sherriff & Hicks* 21186 (BM, E); Upper Mo Chu district, hillside above Laya, c.3850m, 28°07'N, 89°44'E, 19 ix 1984, *Sinclair & Long* 5130 (E, K).

Some of the specimens assigned above to *Lomatogonium himalayense* from Bhutan (*Ludlow, Sherriff & Hicks* 21186, 17230 and 19728), and many similar ones from W China, have been determined by Liu Shang-Wu and Ho Ting-Nung (Liu & Ho, 1992) as *L. macranthum* (Diels & Gilg) Fernald. This species was described from Gansu province in N China. Study of the types of this species may well show that it is at most subspecifically distinct from *L. himalayense* in which case *L. macranthum* would be reduced to synonymy.

TRIPTEROSPERMUM

Review of Tripterosperrum in the East Himalaya

Discrimination of the species of *Tripterosperrum* in the East Himalaya was found to be difficult (especially for non-fruiting material), and the extensive material available did not fit into the three species accepted for the region in the revision of Murata (1989). This prompted a more detailed study of the specimens and particularly types, and the treatments of Murata (1989), Hara (1967) and earlier workers.

Murata (1989) recognized three species from the area of the *Flora of Bhutan*: *T. volubile* (D. Don) Hara, *T. nigrobaccatum* Hara and *T. luteoviride* (C.B. Clarke) Murata. *T. nigrobaccatum* we agree is a distinctive species (Table 3) with its calyx unwinged and a short black berry, whereas the other two red-berried taxa are problematic, in that Hara (1965, 1967) had united them both under the name *T. volubile*. The current study of available material suggested that there were nevertheless three distinct entities (Table 3) in Darjeeling, Sikkim and Bhutan, but the two red-berried taxa did not fit Murata's circumscriptions of *T. volubile* and *T. luteoviride*.

Sealy (1949) selected a lectotype for *Gentiana volubilis* D. Don: 'E. Napalia, anno 1818, *Wallich* s.n.' (BM). Significantly this type specimen had also been annotated by C.B. Clarke as *Crawfurdia luteoviridis*, supporting the view of Sealy (1949) that *C. luteoviridis* is not a distinct species, but a synonym of *T. volubile*. Clarke (1875) in describing *C. luteoviridis* did not specify a type but indicated that he included a wide range of material 'In omni Himalaya a Bhotan at Kemaon ad 5000–10,000 ped. alt. frequens'. In K and BM there are at least 15 specimens annotated *C. luteoviridis* by Clarke, including the *Wallich* specimen mentioned above. All of these have been redetermined by Murata as *Tripterosperrum volubile*. This suggests that Murata's concept of *T. luteoviride* might not be in accordance with Clarke's.

TABLE 3. Differences between East Himalayan *Tripterospermum* taxa.

	<i>T. volubile</i> subsp. <i>volubile</i>	<i>T. volubile</i> subsp. <i>longipes</i>	<i>T. nigrobaccatum</i>
Leaves	lanceolate, 1.5-9.5 × 0.6-2(-3)cm	lanceolate to ovate, 2-9 × 1-3cm	lanceolate, 2.5-5.5(-8) × 0.6-1.5cm
Calyx			
tube	winged, 4-10mm	winged, 8-12mm	ribbed, 5-6mm
lobes	6-15 × 0.5-1mm	7-14(-18) × 1mm	5-8 × 0.5-1mm
Corolla			
tube	15-28mm	25-35mm	16-26mm
lobes	2-5 × 3-4mm, pale greenish yellow (purple?)	2-4 × 3-4mm, yellow, white	2-4 × 3-4mm, creamy white or pale greenish streaked purple
Style			
basal part	4-10mm	1.5-4(-8)mm	3-5(-9)mm
branches	1-4mm	3-5mm	1.5-3(-4)mm
Filaments	8-15mm	15-20(-25)mm	9-12mm
Fruit	red, 20-28 × 7-13mm	red, 17-25 × 7-12mm	black, 10-15 × 5-6mm
Stipe of fruit	8-14mm; protruding up to 50% from corolla	15-27mm; fruit protruding almost 100% from corolla	6-10mm; enclosed by corolla or protruding slightly
Distribution	Nepal, Sikkim, Bhutan to China	E Nepal, Darjeeling	E Nepal, Darjeeling, Sikkim, Bhutan
Altitude	1525-3200m	1525-2440(-2740)m	2440-3080m

Hara (1965, 1967) had clearly agreed with Sealy that the two were synonymous, and had (Hara, 1965) in fact lectotypified the name *C. luteoviridis* by the following specimen: 'Darjeeling, 7300ft. (C.B. Clarke, no. 26998, Aug. 15, 1875) in Herb. Kew'. Murata presumably overlooked Hara's lectotypification, as he (1989: 281–282) made no reference to it and selected a different lectotype (*Wallich* 4369), stating 'I choose Wallich 4369 as the lectotype of *Crawfordia luteoviridis* C.B. Clarke, because only this specimen is evidently included in the original description'. In fact, this specimen was *not* cited in the protologue, nor was it annotated as *C. luteoviridis* by Clarke.

This is an unnecessary typification. Under Art. 9.13 of ICBN (Greuter et al., 1994) a choice of lectotype may be superseded if it can be shown that it was not part of the original material used by the author in preparing the protologue, and that original material is available. There is no evidence that Clarke used the specimen selected by Murata, yet there are at least 15 other specimens which he did! Hara's lectotype, on the other hand, (although not found by us at Kew in 1994) was collected by and presumably annotated by Clarke and must be upheld as lectotype.

Murata (1989) also commented on Clarke's description of the fruit of *C. luteoviridis*: 'Capsula baccata, oblonga, stipitem ter superans' and suggested that this agreed with Murata's 'Species C' (i.e. *T. luteoviride* sensu Murata non Clarke). However, many of the specimens annotated by Clarke as *C. luteoviridis* have a stipe 7–10mm and a fruit up to 28mm and in our opinion do not significantly discord with the protologue. Furthermore, our studies of *Wallich* 4369 (K-W, K) suggest that it is the same taxon as *Gentiana volubilis*.

Murata (1989) placed great emphasis on the relative lengths of mature fruit and the stalk of the fruit in relation to the persistent calyx and corolla. We concur with this, but note that in specimens in flower or young fruit, reliance on this character alone can be misleading, as the fruit stipe is not fully elongated. Murata distinguished *T. volubile* as having a fruit 'Type C' (i.e. with a very long stipe 'distinctly longer than calyx-tube') and *T. luteoviride* as having a fruit 'Type E' with a stipe shorter than (occasionally as long as) the calyx tube. Our interpretation of the lectotype of *Gentiana volubilis* is that it is an immature specimen of a taxon with a stipe *intermediate* in length between Murata's 'Type C' and 'Type E'.

This taxon is *Tripterospermum volubile* as circumscribed by Sealy (1949) and Hara (1967), but excluding some plants from Darjeeling, e.g. that illustrated by Hooker (1881). In *T. volubile* the ripe fruit stipe always \pm equals the fruiting calyx, and the fruit itself is only partly (up to 50%) exerted from the persistent corolla. Both Hara and Murata identified numerous such 'intermediate' specimens as *T. volubile*. Thus we conclude, as did Sealy and Hara, that *C. luteoviridis* is a synonym of *Tripterospermum volubile*.

However, a third taxon exists for which there is no name, but was included within *T. volubile* by Murata. This is the plant illustrated by Hooker (1881) as *Crawfordia luteoviridis*, which differs in a number of characters from typical *T. volubile*. Its fruit is exactly that of 'Type C' of Murata (1989), i.e. the ripe stipe is much longer than the fruiting calyx, and the fruit itself is almost totally exerted from the corolla.

Murata's fig. 16A (unfortunately without indication of specimen on which it was based) is of this taxon, clearly showing the exerted capsule. This taxon (which is described here as *Tripterospermum volubile* subsp. *longipes*) can be distinguished in addition (Table 3) by its longer filaments and style which is bifid to the middle. Even immature specimens of *T. volubile* (including *T. luteoviride*) display these two features, having shorter filaments and a long simple style which is not branched below the middle.

Using these characters, the lectotype of *Gentiana volubilis* and specimens annotated by Clarke as *Crawfordia luteoviridis* can be reliably assigned to the same taxon, *Tripterospermum volubile*. Its two subspecies (subsp. *volubile* and subsp. *longipes*) were in fact distinguished by Hara (1967: 650) who recognized the style difference but did not realize that it correlated with other characters and he commented 'it is doubtful if this form merits recognition as a taxonomic unit'. These taxa show quite different geographic ranges: *T. volubile* subsp. *volubile* (as correctly given by Clarke for *Crawfordia luteoviridis*) is found throughout the Himalaya, from Nepal, Sikkim and Bhutan, east to China. *T. volubile* subsp. *longipes*, on the other hand, is highly localized, from E Nepal and Darjeeling district only.

Key to species of Tripterospermum in Darjeeling, Sikkim and Bhutan

1. Calyx ribbed, not winged; fruit a black berry _____ **2. T. nigrobaccatum**
+ Calyx winged; fruit a red berry _____ 2
2. Basal part of style 4–10mm, branches 1–4mm; ripe fruit only partially exerted from corolla with stipe elongating to 8–14mm, \pm equalling persistent calyx _____ **1a. T. volubile** subsp. **volubile**
+ Basal part of style 1.5–4(–8)mm, branches 3–5mm; ripe fruit becoming almost completely exerted from corolla with stipe elongating to 15–27mm, much longer than persistent calyx _____ **1b. T. volubile** subsp. **longipes**

1a. *Tripterospermum volubile* (D. Don) Hara in J. Jap. Bot. 40: 21 (1965) subsp. **volubile**. Fig. 2a–c.

Basionym: *Gentiana volubilis* D. Don, Prodr. Fl. Nepal 126 (1825). Lectotype: East Nepalia, 1818, *Wallich* s.n. (BM, selected by Sealy (1949)).

Syn.: *Crawfordia luteoviridis* C.B. Clarke in J. Linn. Soc., Bot. 14: 443 (1874). Lectotype: Darjeeling, 2250ft, 15 viii 1875, *C.B. Clarke* 26998 (K, selected by Hara (1965)).

For other synonyms see Hara (1967: 258).

Distribution. E Nepal, Darjeeling, Sikkim, Bhutan, S Tibet, Assam, N Burma.

Selected Himalayan specimens examined. E NEPAL. Sankuwasabha district, below Tashigaon, 1970m, 23 ix 1991, *EMAK* 181 (E); above Shidua, 2570m, 28 viii 1989, *KEKE* 40 (E, KATH).

INDIA, W BENGAL, DARJEELING DISTRICT. Rungbee, 5000ft, 1 x 1869, *C.B. Clarke*

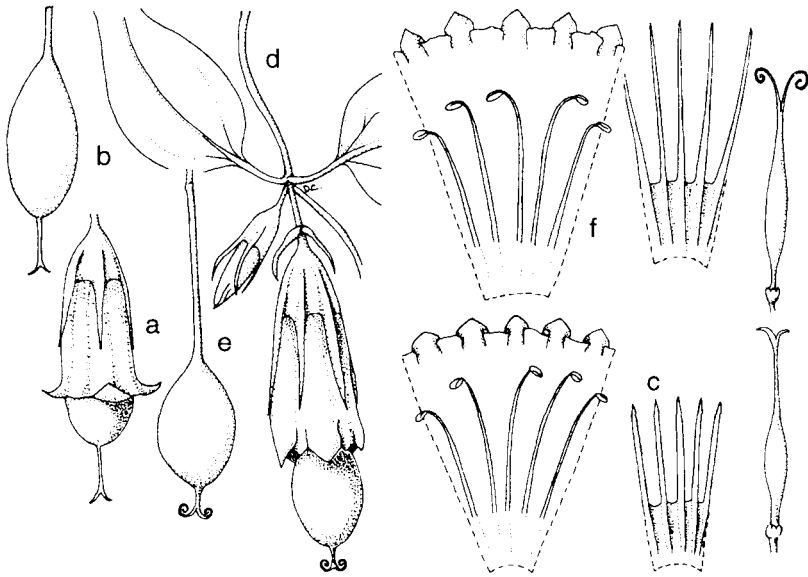


FIG. 2. a-c, *Tripterospermum volubile* subsp. *volubile*: a, corolla with capsule ($\times 1$); b, capsule and stipe ($\times 1$); c, corolla, calyx, ovary (all $\times 1.5$); d-f, *Tripterospermum volubile* subsp. *longipes*: d, fruiting habit ($\times 1$); e, capsule showing elongated stipe ($\times 1$); f, corolla, calyx, ovary (all $\times 1.5$). a-c drawn from Grierson & Long 2368; d-f drawn from Treutler 284 p.p. and Tonglu (collector unknown).

9407c (BM); Kurseong, 2134m, 28 ix 1884, Clarke 36001 (BM); Ghoom, 2100m, 24 xi 1982, L.J.G. van der Maesen 4836 (K); Tonglo, 9000ft, 1913, Ribu & Rohmoo (E); Sinchal, 8000ft, vii 1862, T. Anderson 811 (E).

INDIA, SIKKIM. Above Choka, 10,500ft, ix 1983, S. Macpherson 28 (E); below Bakhim, 6000ft, 11 ix 1983, Starling et al., AGSES 337 (E, K); Lachoong, 9000-10,000ft, x 1849, J.D. Hooker s.n. (K).

BHUTAN. Ha district, Saga La, 10,500ft, 20 x 1949, Ludlow, Sherriff & Hicks 17504 (BM); Tongsa district, Chendebe, 7000ft, 3 viii 1937, Ludlow & Sherriff 3504 (BM); Mongar district, E side of Kori La, 2350m, 30 vi 1979, Grierson & Long 2368 (E); Tashigang district, Bailfa, 1838, Griffith 470 (K).

1b. *Tripterospermum volubile* subsp. *longipes* E. Aitken & D.G. Long, subsp. nov. Fig. 2d-f.

A *T. volubile* subsp. *volubile* calyce longiore, tubo corollae etiam longiore, filamentis longioribus, parte basali styli brevior et ei apice magis profunde bifido, stipe in fructu maturo elongato (fructu e corolla sic \pm toto exserto) differt.

Differs from *T. volubile* subsp. *volubile* in having a longer calyx and corolla tube and longer filaments. Basal part of style shorter and apex more deeply bifid. Stipe on ripe fruit elongating so that fruit protrudes almost completely from corolla. Much narrower geographical distribution than subsp. *volubile*.

Type: India, West Bengal, Darjeeling, 7000ft, 'berry succulent, red', 4 xi 1875, *C.B. Clarke* 26249 (holo. K).

Misapplied name: *Crawfordia luteoviridis* sensu Hook.f. in Bot. Mag. t. 6539 (1881), non C.B. Clarke.

Perennial, twining herb, *stems* terete, glabrous. *Petioles* 5–15(–25)mm. *Leaves* lanceolate to ovate, 2–9 × 1–3cm, acuminate, base rounded or slightly cordate, margins sinuate, entire. *Flowers* 5-merous, in 1–4-flowered cymes. *Pedicels* 1–5mm. *Calyx* tube winged, 8–12mm, lobes linear, 7–14(–18) × 1mm, acuminate. *Corolla* yellowish or white, tube 25–35mm, lobes ovate, 2–5 × 3–4mm, acuminate. *Filaments* 15–20(–25)mm; *anthers* c.1mm. *Stipe* of ovary 4–8mm, *ovary* narrowly ellipsoid 10–15 × 1.5–3mm; basal part of *style* 2–4mm, branches 3–5mm. *Fruit* an ellipsoid, bright red berry, 17–25 × 7–12mm, *stipe* elongating to 15–27mm, ripe fruit becoming almost completely exerted from corolla.

Distribution. Endemic to Darjeeling District of West Bengal, India and adjacent East Nepal.

Ecology. Altitudinal range 1525–2440(–2745)m. Fl. July–October; fr. November.

Additional specimens examined. NEPAL. East Nepal, Nangki, 9000ft, 'fruit exactly like *Capsicum*', *J.D. Hooker* s.n. (K).

INDIA, W BENGAL, DARJEELING DISTRICT. Pankasari Ridge, 7500ft, 12 x 1872, *J.H. Lace* 2402 (E); Rungbee, 6520ft, 25 viii 1869, *C.B. Clarke* 8832A (K); Rungbee, 5000ft, 31 x 1869, *C.B. Clarke* 10298 (K); Sureil, 5000ft, x 1881, *J.S. Gamble* 9921 (K); Senchal, 8000ft, vii 1862, *T. Anderson* 811 (K); Tonglo, no details (K); Darjeeling (mixed sheet), 7000ft, 9 vii 1874, *Treutler* 284 (K); Darjeeling, 7000ft, 26 xi 1875, *C.B. Clarke* 26470 (K).

2. *T. nigrobaccatum* Hara in J. Jap. Bot. 40: 19 (1965).

Type: East Nepal, Minchin Dhap to Mul Pokhari, 2800m, 29 x 1963, *Hara et al.* 6300521 (T1), n.v.

Distribution. East Nepal, Darjeeling, Sikkim and Bhutan.

Specimens examined (additional to those cited by Hara (1965, 1967) and Murata (1989)).

INDIA, W BENGAL, DARJEELING DISTRICT. Mani Bhanjan, 8000ft, 12 viii 1913, *Ribu & Rhomoo* 1229 (E).

INDIA, SIKKIM. Kalipokhri, 10,000ft, 1913, *Ribu & Rhomoo* 6318 (E).

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REFERENCES

- AITKEN, E. & LONG, D. G. (1994). Notes relating to the Flora of Bhutan: XXVII. *Gentianella griersonii*, a new species from Bhutan. *Edinb. J. Bot.* 51: 165–167.

-
- CHATER, A. O. (1982). Gentianaceae. In: HARA, H., CHATER, A. O. & WILLIAMS, L. H. J. (eds) *An Enumeration of the Flowering Plants of Nepal* 3: 90–98.
- CLARKE, C. B. (1875). Notes on Indian Gentianaceae. *J. Linn. Soc., Bot.* 14: 423–456.
- GARG, S. (1987). *Gentianaceae of North West Himalayas (A Revision)*. International Bioscience Monograph 17. New Delhi: Today & Tomorrow's Printers and Publishers.
- GREUTER, W. et al. (1994). *International Code of Botanical Nomenclature (Tokyo Code)*. Königstein: Koeltz.
- HARA, H. (1965). New or noteworthy flowering plants from Eastern Himalaya (3). *J. Jap. Bot.* 40: 19–22.
- HARA, H. (1967). Gentianaceae. In: HARA, H. (ed.) *Flora of Eastern Himalaya*, pp. 254–258, 650–651. University of Tokyo.
- HO, T.-N. & WU, C. J. (1988). Gentianaceae. In: *Flora Reipublicae Popularis Sinicae* Vol. 62. Beijing: Science Press.
- HOOKER, J. D. (1881). *Crawfurdia luteo-viridis*. *Curtis's Bot. Mag.* 37: t. 6539.
- KLOTZSCH, J. F. (1862). Die Botanischen Ergebnisse der Reise seiner Königl. Hoheit des Prinzen Waldemar von Preussen in den Jahren 1845 und 1846. Berlin: Decker.
- LIU, S. W. & HO, T.-N. (1992). Systematic study on *Lomatogonium* A.Br. (Gentianaceae). *Acta Phytotaxon. Sinica* 30: 289–319.
- MURATA, J. (1989). A synopsis of *Tripterospermum* (Gentianaceae). *J. Fac. Science, University of Tokyo, Section III, Botany* 14: 273–339.
- OMER, S. & QAISER, M. (1992). Generic limits in *Gentiana* (Gentianaceae) and related genera in Pakistan and adjoining areas along with a new genus *Kurramiana*. *Pakistan J. Bot.* 24: 95–106.
- SEALY, J. R. (1949). Two confused Asiatic Gentiens. *Kew Bull.* 1949: 311–317.
- WULFEN, F. X. (1781). *Plantae Rariories Carinthiacae* II. In: JACQUIN, N. J. VON, *Miscellanea Austriaca* 2: 25–138. Vienna: Officina Krausiana.

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