

NOTES RELATING TO THE FLORA OF BHUTAN: XX  
*Lloydia* (Liliaceae)

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*Lloydia himalensis* is confirmed as being synonymous with *L. serotina*; *L. yunnanensis* is reported for the first time from the E Himalaya; *L. delicatula* Noltie *sp. nov.* is described; *L. mairei* and *L. serotina* var. *parva* are discussed.

INTRODUCTION

Until recently our knowledge of this attractive genus of alpine bulbs in the E Himalaya was extremely poor. This was due, at least in part, to the fact that they make poor herbarium specimens. Old specimens frequently lack colour notes, and as both white and yellow tepals fade to a dull brown it can be impossible to distinguish between them after several decades. Even flower posture is difficult to deduce from herbarium specimens in the absence of notes. The most important limitation of dried specimens concerns the nectary, which may be difficult or impossible to observe, and descriptions of presence or absence based only on herbarium material are probably not reliable. Hooker (1892) evidently despaired and included all Himalayan forms (including a perfectly good species he had himself described earlier) in the single species *L. serotina*; by the time he wrote this account, he had evidently forgotten his experience in Sikkim of almost 50 years earlier. Hara (1966) was the first to draw attention to the diversity occurring in the E Himalaya, based on his field experience in Sikkim and E Nepal, though without coming to very firm taxonomic conclusions. It was not until 1974 that he described the highly distinctive E Himalayan, yellow-flowered plants as *L. flavonutans* (having previously identified them as the Chinese *L. delavayi* Franchet). The author was fortunate to be able to study two of the taxa discussed below in W Sikkim on the Edinburgh Expedition to Sikkim and Darjeeling (ESIK) during the summer of 1992.

**A. Large white-flowered species (*L. serotina*, *L. himalensis* and *L. yunnanensis*)**

*L. himalensis* Royle was described and illustrated by Royle (1840) from the NW Himalaya, and distinguished from *L. serotina* (then known as *L. alpina*) on small and insignificant characters; it has, therefore, generally and correctly been included under the latter. The type of *L. himalensis* should be in Royle's herbarium at LIV and was seen by Dasgupta & Deb (1986). Recent enquires, however, have failed to locate it (A. Gunn, pers. comm.). However, the published illustration is of high quality and in Hooker's herbarium at Kew there is what is almost certainly a syntype labelled '*Lloydia himalensis* Royle III. t. 93. NW India. Hb. Royle'. All specimens on this sheet (except one which is *L. longiscapa* Hook. f.) clearly belong to *L. serotina*. In recent years, however, the name *L. himalensis* has been reinstated to cover a rather distinct E Himalayan plant with long tepals and a very long style. Hara (1966) did so informally and was followed (at

least the E Himalayan plants cited) by Dasgupta & Deb (1986), who also noticed the trifid stigma of this taxon. This usage, however, is quite contrary to the description, illustration and specimens of *L. himalensis* and the identity of this taxon must be elucidated.

This proves to be another case where the answer is found by looking east to China, the plant concerned being *L. yunnanensis* Franchet (Fig. 1). This species was described from the Tsang Shan mountains near Tali in Yunnan. The original description is rather inadequate and places great weight on the trifid stigma but does not mention the tepal characters or lengths of anthers and style which are useful and more reliable in distinguishing it from *L. serotina*. Herbarium studies have shown this taxon to occur as far west as E Nepal, apparently favouring acid rocks (granite in China) and occurring from 3000–4200m. The degree of production and revolution of the stigma lobes is in fact variable.

	<i>L. yunnanensis</i>	<i>L. serotina</i> var. <i>serotina</i>
tepal length	(1.5–)1.8–2.2cm	0.9–1.8cm
tepal apex	contracted below apex, sometimes apiculate	rounded
outer tepal shape	oblong	narrowly elliptic
outer tepal width	2.5–4mm	4.2–8mm
inner tepal shape	narrowly oblanceolate	narrowly elliptic to narrowly obovate
inner tepal width	4.5–6.5mm	4–6.2mm
nectary visible when dry	–	+
flanges present at base of inner tepals	sometimes	never
style	8.2–11.5mm (3x length of ovary)	2.8–4mm (about equalling ovary)
stigma lobes	often developed & recurved	never developed
anther length	1.8–2.2mm	1–1.7mm

#### Specimens of *L. yunnanensis* seen:

E NEPAL: Arun Valley, Chhovang Khola, W of Num, 12,500ft, 21 vi 1956, *Stainton* 735 (BM). Kangrang La, 12,500ft, 17 vi 1969, *Williams* 710 (BM).

SIKKIM: Changu, 12,000ft, 2 vii 1913, *Cooper* 131 (E). Namdee, 10,000ft, v 1885, *Pantling ex herb. Clarke* 46327 (K). Phalut, 11,000ft, 13 vi 1891, *Gammie* 60 (CAL). Bikbari, 4000–4200m, 12/13 vii 1992, *ESIK* 300 & 312 (E). Dzongri Pass to Dzongri, 4100m, 16 vii 1992, *ESIK* 406 (E). Onglakthang, 4200m, 24 vii 1992, *ESIK* - field record.

BHUTAN: Tare La, above Ha, 11–14,500ft, 17 vii 1938, *Gould* 1199 (K). Ritang, Tang Chu, 12,500ft, 9 vi 1937, *Ludlow & Sherriff* 3232 (BM). Me La, Cho La Valley, 12,000ft, 2 vii 1949, *Ludlow, Sherriff & Hicks* 20465 (BM).

BURMA: Hpimaw Pass and Ridge, 11–12,000ft, 30 vi 1919, *Farrer* 1075 (E). Chawchi Pass, 13,000ft, 14 vii 1919, *Farrer* 1724 (E). Seinghku Wang, 28°8'N 97°24'E, 11–12,000ft, 27 vi 1926, *Kingdon Ward* 6997 (K, E).

CHINA (YUNNAN): Fu Ch'uan Mt, McLaren 'D' 225 (E, BM). E flank of the Tali Range, 10–11,000ft, vii 1910, *Forrest* 7154 (E). [Do-kar-la], 13,000ft, 30 vi 1913, *Kingdon Ward* 616 & 423 (E). Tehching (Atuntze), Miyetzim, 3500m, 19 vi 1937, *Yu* 8653 (BM). Mt Tsang Shan, au dessus de Tali, 3000m, 16 vi 1884; 3000–3500m, 10 vi 1885, *Delavay* 93 (P: syntypes of *P. yunnanensis*). Tsang shan, au dessus de Tali, 4 vi 1883, *Delavay* 274 (P: syntypes of *P. yunnanensis*).

Handel-Mazzetti (1936) reported *L. mairei* Léveillé from Sikkim on the basis of a Hooker specimen of which I have been unable to locate a duplicate at Kew. Handel-Mazzetti distinguished this species from *L. serotina* in having tepals lacking a nectary; Hara (1966) reported *L. serotina*-like plants similarly lacking a nectary from Sikkim, but doubted if they should be separated from *L. serotina*.

It seems likely that Handel-Mazzetti's record of *L. mairei* should be referred to *L. yunnanensis*, under which species it has, in fact, been sunk by recent Chinese authors (Chen, 1980). Examination of the type of *L. mairei* at E, however, suggests that it is a distinct species and in some ways intermediate between *L. yunnanensis* and *L. serotina*, having the tepal shape, apparent absence of nectaries when dry and long style of the former, but small tepal size, shorter anthers and unlobed stigma of the latter; it sometimes produces two flowers per scape and differs from any material seen from E Himalaya.

### B. Dwarf alpine forms

Hooker (1892) was the first to note 'a very minute tufted state' of *L. serotina* in Sikkim. Examination of his herbarium specimens reveal them to be a mixture of two miniscule taxa which have commonly been confused in the E Himalaya ever since.

#### *L. serotina* var. *parva*

The first taxon is merely a dwarf variety of *L. serotina* (L.) Rchb. which can be referred to var. *parva* (Marq. & Shaw) Hara; a syntype of this variety has been studied (Rong-chu (Tumbatse), SE Tibet, *Kingdon Ward* 5798, E). There has been some confusion as to whether or not nectaries are present on the tepals of this variety. Hara (1971), when raising *parva* from the rank of forma to variety, states that it does not have a transverse fold (i.e. nectary) above the base of the inside of the tepals. This absence would distinguish it from *L. serotina* var. *serotina*, which always has such a fold. However, after examining small specimens of *L. serotina* it seems the absence of nectaries is at least sometimes more apparent than real. The closeness of the nectary to the tepal base makes it often very difficult to observe (virtually impossible in the dry state and scarcely easier in boiled-up material). Nectaries are definitely present in the syntype cited above. Krause evidently thought of treating this taxon at specific rank at some stage since a Chinese specimen (Litang River divide, 14–15,000ft, *Kingdon Ward* 4078, E) bears the manuscript name '*L. wardii* Krause n. sp.' in his hand – but this seems never to have been published.

Given the unreliability of the nectary character, the main difference between var. *parva* and var. *serotina* seems to be one of stature, with the total height of the former (including bulb) never exceeding 7 cm and usually under 4 cm. All its floral part are correspondingly smaller.

Specimens of var. *parva* seen:

INDIA (KUMAON): Rilkot via Martoli to Milum, 11,100–11,600ft, vi 1855, *Schlagintweit* 9875 (BM).

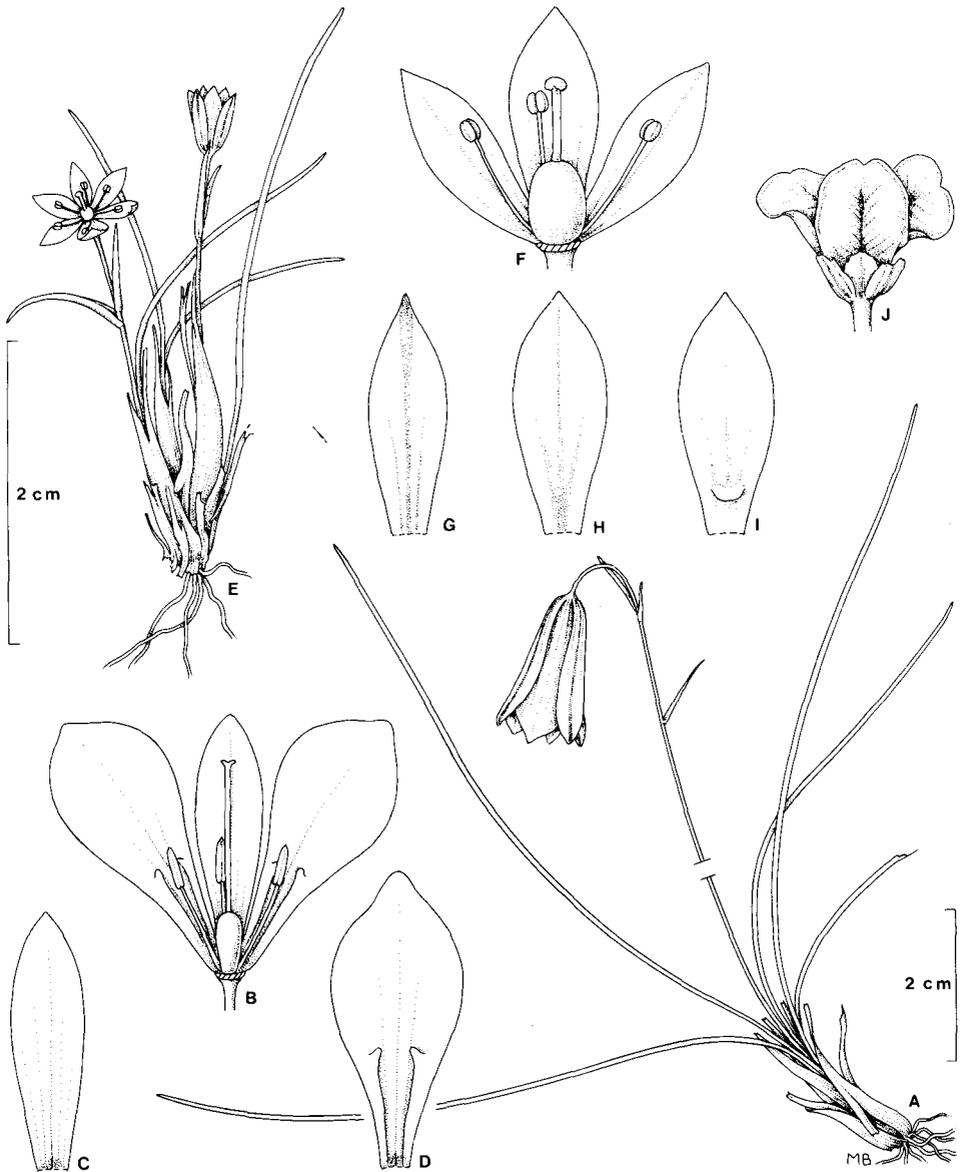


FIG. 1. A–D, *Lloydia yunnanensis* Franchet. A, habit (x 1); B, half-flower (x 2); C, outer tepal from inside (x 2); D, inner tepal from inside (x 2). E–J, *Lloydia delicatula* Noltie. E, habit (x 2); F, half-flower (x 6); G, outer tepal from outside (x 6); H, inner tepal from outside (x 6); I, inner tepal from inside (x 6); J, capsule (x 6).

NEPAL: Namdo, N of Mustang, 15,500ft, 7 viii 1954, *Stainton, Sykes & Williams* 2263 (E, BM)

INDIA (SIKKIM): Behind Tangu Bungalow, 14,800ft, 5 vii 1903, *Younghusband* T53 (K, CAL). Muguthang, Lhonak, 14,500ft, 5 vii 1989, *D.C. Lang* s.n. (E). Lachen, 13-14,000ft, 17 vii 1849/Lama Gingna, 14,000ft, 24 vii 1849, *Hooker* s.n. (K; p.p. mixed with *L. delicatula*).

BHUTAN: Lingshi, 15,000ft, 21 vii 1914, *Cooper* 1642 (E).

CHINA (TIBET): Hills S of Lhasa, 14,500ft, 11 vii 1943, *Ludlow & Sherriff* 9757 (E, BM). Reting, 60 miles N of Lhasa, 14,000ft & 15,500 ft, 12 vii 1944 & 24 vii 1942, *Ludlow & Sherriff* 9975 & 8867 (E, BM). Reting, 60 miles N of Lhasa, 12,500 ft, 1939, *Taring* s.n. (BM). Rong chu (Tumbatse), 14,000ft, 18 vi 1924, *Kingdon Ward* 5798 (K, BM, E: isotypes of var. *parva*)

CHINA (YUNNAN): Litang River divide, 14-15,000ft, 14 vi 1921, *Kingdon Ward* 4078 (E). Bei-ma Shan (2818' N, 9910' E), NW Yunnan, 16-16,500 ft, vii 1921, *Forrest* 19608 (E, K).

Habitat: despite being a slightly more robust plant than *L. delicatula* (see below), it can apparently occur at higher altitudes (to c.5000m).

An interesting specimen at Kew of the Tibetan drug 'Tsa-a-wa', consisting of fragments of leaves and fruiting capsules and collected near Yerpa Monastery (14,000ft, *Kennedy* 15), is almost certainly *L. serotina* var. *parva*.

**L. delicatula**

The second dwarf element, with which var. *parva* has been confused, represents a hitherto undescribed taxon which is apparently widespread in the E Himalaya. It has no doubt been under-collected due to its diminutive stature and was found to be relatively common in W Sikkim and is described below as *L. delicatula*. The two dwarf taxa can be distinguished as follows:

	<b>L. delicatula</b>	<b>L. serotina var. parva</b>
flower posture	erect	probably pendent
tepal length	3.6-5.7mm	5-7mm
tepal shape	narrowly elliptic to narrowly rhombic	oblanceolate
tepal apex	narrow, subacute	broad, rounded
tepal midrib	reaching apex	stopping short of apex
nectary	conspicuous, c. ¼ way up tepals	minute, basal or absent

*Lloydia delicatula* Noltie, **species nova** a *L. serotina* var. *parva* omnibus partibus minoribus, floribus erectis, costa tepalorum lata purpurea apicem subacutum attingenti, nectario prominenti in zona flavescenti circa quartam partem e base tepali sito differt.

**Fig. 1.**

Minute bulbous perennial, growing in dense clumps. *Bulbs* narrowly ovoid, c. 4-5mm diameter; tunics pale fawn, papery. *Lower part of stem* and leaf sheathed with collar (0.5-2.5cm) of papery remains of old leaf-bases. Green part of stem (i.e. part projecting beyond sheath) 0.2-2cm, very slender, bearing usually 3 leaf-like bracts on upper part, the lower 2 usually subopposite; bracts linear-lanceolate with narrow scarious borders, lowest 0.4-1cm. *Leaf* usually 1 per bulb, lower part enclosed by tunic-sheath, free part filiform, 0.7-2.5cm x 0.4-0.5mm, apex rounded, darkened. *Flower* single, erect. *Tepals* 6, oblong, narrowly elliptic or narrowly rhombic, widest c. 2/3 from base, narrowed to base and to subacute apex, 3.6-5.7(-6.5) x 1.1-1.8mm, white, sometimes suffused purplish (especially in older flowers) with prominent purplish midrib which reaches

apex and 1 or more purplish veins on either side of midrib, running upwards from nectary; nectary conspicuous (in boiled up and fresh material), thickened, roundish or laterally elongated, yellowish, c. 1/4 from base of tepals. *Anthers* flattened, circular in outline at maturity (0.4–0.5(–0.8)mm), locules dehiscent laterally, convex (longer and more oblong before dehiscence); filaments glabrous, 2.1–2.9mm. *Ovary* 1.5–2.3 x 0.8–1.4mm, narrowly ellipsoid to oblong-ovoid, top truncate, or narrowed into style; style 1.1–2.2mm; stigma slightly expanded, ± capitate. *Capsule* dehiscent from top into 3 spatulate lobes with wavy margins, c. 2.8 x 1.9mm, surrounded by persistent tepal-bases.

**Distribution:** This species appears to be restricted to the E Himalaya, occurring from C Nepal to NE Bhutan.

**Habitat:** in mossy turf on boulders and exposed ridges; scree and rock ledges; occasionally meadows, c.3600–4600m. Fl. June–July.

**Type:** Bhutan, Me La (S side), 14,500ft, 9 vi 1949, *Ludlow, Sherriff & Hicks* 20347 (holo. BM).

**Other specimens seen:**

C NEPAL: Gusain Kunda, 23 vi 1935, *F.M. Bailey's Coll.* 114 (BM). Rambrong, Lamjung Himal, 13,500 ft, 3 vii 1954, *Stainton, Sykes & Williams* 6076 (BM).

E NEPAL: Inukhu Khola, Naulekh Mathi, 15,000ft, 30 vi 1964, *Mc Cosh* 326 (BM). Chumbu [Khumbu], Thummu Khola, 14,000ft, 29 vi 1964, *Bowes-Lyon* 2170 (BM). Tatbhaiya, 13,500ft, 20 vi 1969, *Williams* 810 (BM). Rato pokhari, 13,500ft, 24 vii 1971, *Shrestha & Joshi* 326 (BM). Khimti Khola, 13,500ft, 10 vii 1964, *Stainton* 2131 (BM). Thame-Taranga, 13,500ft, *Banerjee & Shakya* 5776 (K). Maulekh, 14,000ft, 19 vi 1981, *Stainton* 8358 (E). Arun Valley, Chhoyang Khola W of Num, 13,000ft, 21 vi 1956, *Stainton* 734 (E, BM). Simbua Khola, above Yalung, 4170m, 6 vi 1991, *McBeath* 2501 (E).

INDIA (SIKKIM): Changu, 12,000ft, 2 vii 1913, *Cooper* 132 (E). Lachen, 13–14,000ft, 17 vii 1849/Lama Gingna, 14,000ft, 24 vii 1849, *Hooker s.n.* (K; p.p. mixed with *L. serotina* var. *parva*). Kapoor below Kinchinjunga, vi 1887, *King's Coll s.n.* (CAL). Near Nathui La, 14,000ft, 14 vii 1910, *W.W. Smith* 3468 (CAL). Above Changu, 13,000ft, *W.W. Smith* 3175 (CAL). Chaunrikhiang, 4450m, 15 vii 1992, *ESIK* 385 (E). E of Bikbari, 4300m, 13 vii 1992, *ESIK* 342 (E). Above Thangshing, 4350m, 20 vii 1992, *ESIK* field record. Samiti, 4350m, 21 vii 1992, *ESIK* field record.

Wright Smith evidently noticed the distinctness of this plant, but unfortunately did not produce a valid description, merely giving the name 'var. *sikkimensis minima*' on herbarium sheets at CAL and in his account of the alpine vegetation of Sikkim (Smith, 1913). Hara determined many of the BM specimens cited above as *L. serotina* var. *parva*. Dasgupta & Deb (1986) included several of the above specimens under *L. serotina* along with other dwarf forms stating that such small plants showed 'no qualitative difference'.

Much further work requires to be done on Himalayan and Chinese *Lloydia*, especially on the anatomy of the bulb and nectary, which might have a bearing on generic and sectional limits. Until then, I agree with Hara (1974) in retaining *Lloydia* in a broad sense (see Greuter 1970). In any case the new species would have to be placed closest to *L. serotina* (i.e. in sect. *Eulloydia* subsect. *Nectarobothrium* sensu Engler & Prantl).

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## REFERENCES

- CHEN, S.C. (1980). *Lloydia* Salisb. in F.T. Wang & T. Tang (eds.) *Flora Reipublicae Popularis Sinicae*, 14:79–84. Beijing.
- DASGUPTA, S. & DEB, D.B. (1986). Taxonomic revision of the genus *Lloydia* (Liliaceae) in India and adjoining region. *Indian Journal of Forestry* 9:104–112.
- GREUTER, W. (1970). The taxonomic position of *Lloydia graeca* (Liliaceae) and related species. *Israel Journal of Botany* 19:155–160.
- HANDEL-MAZZETTI, H. (1936). *Lloydia* in *Symbolae Sinicae* 7(2):1201–1202. Vienna
- HARA, H. (1966). The *Lloydia serotina* group in *Flora of Eastern Himalaya*, p 655. Tokyo.
- HARA, H. (1971). Liliaceae in *Flora of Eastern Himalaya, Second Report*, pp. 165–175. Tokyo.
- HARA, H. (1974). *Lloydia flavonutans* Hara, sp. nov. *Journal of Japanese Botany* 49:202.
- HOOKEER, J.D. (1892). *Lloydia* in *Flora of British India* 6:354. London.
- ROYLE, J.F. (1840). *Lloydia* in *Illustrations of the Botany of the Himalayan Mountains* (1833–1840) 1:387–388; 2: pl. 93. London.
- SMITH, W.W. (1913). The alpine and subalpine vegetation of SE Sikkim. *Records of the Botanical Survey of India* 4:323–431.