NOTES RELATING TO THE FLORA OF BHUTAN: XX

*Lloydia* (Liliaceae)

H. J. NOLTIE

*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 enquiries, 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 Ill. 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.

| Character          | *L. yunnanensis* | *L. serotina var. serotina* |
|--------------------|------------------|----------------------------|
| 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 | +             | never                       |
| flanges present at base of inner tepals | | |
| style              | 8.2–11.5mm (3x length of ovary) | 2.8–4mm (about equaling 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 vii 1959, *Williams* 710 (BM).

SIKKIM: Changu, 12,000ft, 2 vii 1913, *Cooper* 131 (E). Namdee, 10,000ft, v 1885, *Panting ex herb. Clarke* 46327 (K). Phalut, 11,000ft, 3 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: Tara 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 vii 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 vii 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 vii 1913, *Kingdon Ward* 616 & 423 (E). Tehching (Atuntze), Miyetzim, 3500m, 19 vii 1937, *Yu* 8653 (BM). Mt Tsang Shan, au dessus de Tali, 3000m, 16 vii 1884; 3000–3500m, 10 vii 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* Leveillé 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 9795 & 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 4018 (E).
CHINA (YUNNAN): Litang River divide, 14-15,000ft, 14 vi 1921, Kingdon Ward 4018 (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:

| Flower posture | L. delicatula | L. serotina var. parva |
|----------------|--------------|-----------------------|
| Tepal length   | erect        | probably pendent      |
| Tepal shape    | 3.6-5.7mm    | 5-7mm                 |
| 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 Nolte, 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. 2½ 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 dehiscing 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 dehiscing from top into 3 spatulate lobes with waved 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 vii 1964, Mc Cosh 326 (BM). Chumbu [Khumbu], Thummu Khola, 14,000ft, 29 vi 1964, Bowes-Lyon 2170 (BM). Tathbaiya, 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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