A REVISION OF THE INDO-BURMESE SPECIES OF *LINDERNIA* ALLIONI

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The species properly referable to this genus have received different treatments from different taxonomists and have been placed under 2, 3 or even 4 separate genera, *viz.*, *Lindernia*, *Vandellia* Brown ex Linn., *Ilysanthes* Raf. and *Bonnaya* Link and Otto. The authors in most cases differ in their opinion in placing the species under these genera and many of them, realising that the line of demarcation is too fine between these artificial genera, have freely confessed their difficulties in trying to keep them separate. The character, on which the taxonomists who are in favour of keeping the four genera separate mostly depend, is the number of fertile stamens, 4 in some cases, and 2 in others with 2 staminodes. These staminodes show transitional stages and vary in different specimens of the same species. Cases are recorded where species which should have all the stamens fertile, have in some specimens two barren stamens.

Lindernia and *Vandellia*, both having 4 fertile stamens, are treated as separate by Linnæaus, Urban and few others, but have been combined by Bentham* and many others, and the generic name used, was *Vandellia* Linn., *Lindernia* All., or *Pyxidarsia* Hall. *Ilysanthes* and *Bonnaya* have 2 fertile stamens and 2 staminodes. In *Ilysanthes*, the fertile stamens are posterior and the staminodes anterior, while in *Bonnaya* the arrangement is just the reverse. For this reason, these two have been treated as distinct by Bentham, J. D. Hooker, Urban and a few others but have been united by Wettstein, Otto Kuntze, Hemsley and Skan, Hutchinson and Dalzell and most of the subsequent authors.

Thus we find that most of the taxonomists agree that there should be 2 genera instead of 4. Haines in his *Botany of Bihar and Orissa* (pp. 630–635), has also reduced the 4 genera into 2 but in a different manner. He has united *Bonnaya* with *Vandellia* and *Ilysanthes* with *Lindernia*. In reducing *Bonnaya* to *Vandellia* he makes the following remarks :—*"The genus *Bonnaya* differs from *Vandellia* as defined in the *Genera Plantarum* of Bentham and Hooker only by two of the stamens not bearing fertile anthers. But in view of the following considerations the separation of these two genera on this character alone appears

* Bentham at first treated *Vandellia* as distinct from *Lindernia* in DC. Prod. X, 418, but later combined the two under *Vandellia* in his *Scroph. Ind.* and in *Genera Plantarum*.

to me artificial and untenable. In *V. molluginoides*, Hooker found in some specimens 2 filiform staminodes hooked near the top, and I have a specimen of *V. Crustacea* in which the two anterior filaments appear to be without anthers. Some species of *Vandellia* can only be separated from species of *Bonnaya* by this one sexual character, *e.g.*, forms of *V. angustifolia* and *V. verbenæfolia*. Finally the character of the barren stamens themselves differs and shows transitional stages. In *Bonnaya verbenalfolia*, the anterior stamens in some specimens bear anthers but these are small and unfertile. In *B. veronicæfolia* there are no anthers, but the filaments are long and curved or hooked as in the case of some *Vandellia molluginodes*. In *Bonnaya brachiata* the barren stamens are short pubescent scales. I have therefore united the two genera."

For the separation of his *Vandellia* and *Lindernia* Haines depends only on one point, *i.e.*, the nervation of leaves as suggested by J. D. Hooker. It would have been more appropriate for him to go one step further and combine the four into a single genus, but this was to be done by Pennell, who in his Scroph. of East Temperate North America (*Monographs, Academy of Natural Sciences of Philadelphia*, No. 1, 1935) reduced *Vandellia*, *Ilysanthes* and *Bonnaya* into *Lindernia*. Pennell's remarks in this connection are worth quoting : "By the union of the four-anthered *Lindernia* All. and *Vandellia* L. with the two-anthered *Ilysanthes* Raf. and *Bonnaya* Link and Otto. is formed a large and natural genus. It is characterised by the remarkably uniform corolla (with narrow posterior lip much shorter than the widely spreading anterior lip), by similar curiously recurving anterior filaments (the proximal portion of each projecting as if it were an appendage and the filament forked although actually the process is formed by the sharp inbending of the filament) and by similar septicidal dehiscence of the capsule (that nearly always leaves the entire septum persisting as a median plate)."

The total number of species under *Lindernia* in its new and amplified form would be about 70, of which 28 are found within the boundaries of India and Burma. These are enumerated below. A modified description of the genus with a key to the species found in our area is also given.

LINDERNIA ALLIONI

Herbs, usually annual, slender, creeping or erect, branched, glabrous or pubescent, often growing in marshy places. Leaves opposite, entire or toothed, penninerved or parallel-nerved. Flowers small, sessile or pedunculate, solitary in the axils of leaves in terminal racemes, bracteolate, often deflexed in fruit. Calyx 5-toothed or 5-partite with linear segments, scarcely imbricating. Corolla-tube cylindric or somewhat enlarged above ; upper lip erect, broad, concave, emarginate or sharply 2-fid, lower lip larger, spreading, with 3 broad, subequal lobes. Stamens 4, all perfect or the posticous or the anticous pair reduced to staminodes ; filaments filiform, the posticous pair affixed to the corolla tube, the anticous pair affixed to the throat, with a tooth-like or subulate appendage at the base ; anthers subcoherent

or coherent ; cells divaricate, often confluent at the apex. Style bilamellate at the apex. Ovules numerous in each cell. Capsule globose, ovoid, oblong to linear, septicidal ; valves slender, entire. Seeds numerous, foveolate, rugose.

A. Capsule about equalling the calyx or shorter.

B. Leaves penninerved.
C. Flowering calyx cleft to the middle or less.
D. Pedicels about 4 times as long as the fruiting calyx .. .. .. crustacea.
D. Pedicels twice as long as the fruiting calyx or shorter.
E. Leaf blade 1·5 cm. long or less, glabrous. molluginoides.
E. Leaf blade 2–2·5 cm. long, hairy on both surfaces .. .. Hookeri.
C. Flowering calyx cleft to the base or nearly so.
D. Flowers 3–4 mm. long.
E. Non-succulent herbs, leaves petioled .. elata.
E. Succulent herbs, leaves (at least the upper) sessile.
F. Glabrous ; sepals shorter than capsule. multiflora.
F. Pubescent with spreading hairs ; sepals longer than capsule .. .. hirsuta.
D. Flowers 8–12 mm. long.
E. Herbs not succulent ; racemes, sub-umbellate, or flowers solitary.
F. Leaves 1–1·5 cm. long, sparsely hairy.
G. Fruiting calyx equalling the capsule. hirta.
G. Fruiting calyx twice as long as the capsule .. .. .. laxa.
F. Leaves 2·5–3·5 cm. long villous on both surfaces .. .. .. mollis.
E. Herbs succulent ; racemes elongate .. punctata.
B. Leaves parallel-nerved.
C. Perfect stamens 4 .. .. .. pyxidaria.
C. Perfect stamens 2.
D. Erect herb, very small and slender ; corolla thrice as long as calyx .. .. minima.
D. Diffuse or creeping herb ; corolla twice as long as calyx .. .. .. rotundifolia.

A. Capsule twice as long as calyx or longer.

B. Perfect stamens 4.
C. Flowering calyx cleft to the middle.
D. Flowers pedicelled .. .. .. numularifolia.
D. Flowers sessile .. .. .. sessiliflora.
C. Flowering calyx cleft almost to the base.
D. Leaves ovate, shortly petioled .. .. cordifolia.
D. Leaves linear or linear-lanceolate, sessile angustifolia.

B. Perfect stamens 2.
C. Leaves parallel-nerved.
D. Corolla 3–4 times as long as calyx .. hyssopioides.
D. Corolla twice as long as calyx or shorter. parviflora.
C. Leaves penninerved.
D. Corolla white or red.
E. Staminodes present.
F. Staminodes hairy.
G. Leaves sessile, corolla 6–7 mm. long, fruit 12–15 mm. long .. ciliata.
G. Leaves petioled, corolla 18–20 mm. long, fruit 25–30 mm. long .. ruelloides.
F. Staminodes glabrous.
G. Leaves very sharply spinous-serrate, teeth 1–1·5 mm. apart .. bractioides.
G. Leaves shallowy serrate, teeth about 3 mm. apart .. .. .. quinqueloba.
E. Staminodes absent .. .. .. estaminodiosa.
D. Corolla blue or violet.
E. Corolla 12 mm. or more long.
F. Capsule linear-subulate, leaves broadly elliptic to ovate-oblong .. .. anagallis.
F. Capsule narrowly cylindric ; leaves linear or narrowly lanceolate .. verbenæfolia.
E. Corolla 6 mm. long or shorter.
F. Leaves distantly and shallowly toothed, oblong .. oppositifolia.
F. Leaves entire or nearly so, linear .. tenuifolia.

1. **Lindernia crustacea** (Linn.) F. Muell. Cens. Austral. Pl. p. 97; Pennell in Acad. Nat. Sc. Phil. Monogr. 5, (1943), p. 29.
Caparia crustacea Linn. Mant. 87.
Vandellia crustacea Bth. Scroph. Ind. 35, and in DC. Prod. X, p. 413. Hk. f. Fl. Brit. Ind. IV, 279.
Torenia varians Roxb. Fl. Ind. 111, p. 96.
Throughout India, up to 1,600 m. in the Himalayas ; tropics of Old World, introduced into tropical parts of America.

2. **L. molluginoides** (Bth.) Wettst. in Nat. Pflanzen. f. iv. 3b., p. 80.
Vandellia molluginoides Bth. Scroph. Ind., p. 35 and in DC. Prod. X., p. 413. Hk. f. *loc. cit.* 279.
Burma.

3. **L. Hookeri.** (Cl.) Wettst. *loc. cit.*, p. 79 ; Pennell *loc. cit.* 39.
Vandellia Hookeri Cl. ex. Hk. f. *loc. cit.*, 280.
V. stemonoides Prain Bengal Pl., p. 762 ; Haines Bot. Bihar and Orissa, 631 ; non Miq.
Bihar, Chotanagpur, N. Bengal, Khasia Mts., Pegu.
L. Hookeri subsp. **kumaunensis** Pennell, *loc. cit.*, p. 30.
Kumaon.

4. **L. elata** (Bth.) Wettst. *loc. cit.*, p. 79.
Vandellia elata Bth. Scroph. Ind., p. 36 and in DC. Prod. X, p. 414 ; Hk. f., *loc. cit.*, 280.
Burma.

5. **L. multiflora** (Roxb.) Mukerjee Comb. nov.
Vandellia multiflora G. Don. Gen. Syst. IV, 549 ; Bth. in DC. Prod. X, p. 414. Hk. f. *loc. cit.*, 280.
V. erecta Bth. Scroph. Ind., p. 36, in part.
Torenia multiflora Roxb. Fl. Ind. 111, p. 96.
Bengal.

6. **L. hirsuta** (Bth.) Wettst. in Nat. Pflanzen. f. IV, 36, p. 79.
Vandellia hirsuta Bth. Scroph. Ind., p. 36, and in DC. Prod. X., p. 44. Hk. f. Fl. Brit. Ind. IV, 280.
S. India, Sikkim Terai and Bengal to Burma ; Ceylon and eastwards to Phillippine Islands.

7. **L. hirta** (Cham. and Schl.) Mukerjee comb. nov.
L. scabra (Bth.) Wettst. *loc. cit.*, 79.
Torenia hirta Cham. and Schl. in Linnæ 11, p. 571.
Vandellia scabra Bth. Scroph. Ind., p. 36, and in DC. Prod. X, p. 414, Hk, f. *loc. cit.*, p. 281.
Columnea minuta Roxb. Fl. Ind. 111, p. 98.
Southern and eastern parts of India ; S. Africa, Madagascar and tropical parts of Asia.

8. **L. laxa** (Bth.) Mukerjee comb. nov.
Vandellia laxa Bth. Scroph. Ind., p. 36 and in DC. Prod. X., 414, Blatter and Hallb. in Bomb. Nat. Hist. Soc. XXV (1918), p. 416.
V. scabra var laxa Hk. f. *loc. cit.*, p. 281.
Vingrola-Konkan ; High wavy mts.-Madura Dist., Guindy Madras (Prov.).

9. **L. mollis** (Bth.) Wettst., *loc. cit.*, p. 79.
Vandellia mollis Bth. Scroph. Ind., p. 37 and in DC. Prod. X., p. 414, Hk. f., *loc. cit.*, p. 281.
Sikkim, Assam, Burma, S. China.

10. **L. punctata** (Prain) Mukerjee comb. nov.
Vandellia punctata Prain in Journ. Roy. As. Soc. Bengal LXXII (1903), p. 19.
Shan Hills, Port, Stedman, Taungyi.

11. **L. pyxidaria** All. in Misc. Taurin 3 (1766) 178, tab. 5 ; Linn. Mant. Pl. 2 ; (1771) 252 ; Pennell in Acad. Nat. Sc. Phil. Monograph, 5 (1943), p. 25.
L. erecta Botanii ?
Vandellia erecta Bth. Scroph. Ind. 36, and in DC. Prod. X., p. 415, Hk. f. *loc. cit.*, 281.
Gratiola integrifolia Roxb. Fl. Ind. i, 137.
Throughout India upto 1,700 m. in the Himalayas ; eastwards to Polynesia, and westwards to Europe.

12. **L. minima** (Bth.) Mukerjee comb. nov.
Ilysanthes minima Bth. in DC. Prod. X, p. 420, Hk. f. Fl. Brit. Ind. IV, p. 284.
S. India.

13. **L. rotundifolia** (Linn.) Mukerjee comb. nov.
Gratiola rotundifolia Linn. Mant., p. 274 ; Roxb. Cor. Pl. iii, 3, t. 204, and Fl. Ind., p. 137.
Ilysanthes rotundifolia Bth. in DC. Prod. X, p. 420 ; Hk. f. *loc. cit.*, 254.
S. India, Ceylon, Mauritius and Madagascar.

14. **L. numularifolia** (Don) Wettst. in Nat. Pflanzenf. IV, 3b, p. 97, Pennell in Acad. Nat. Soc. Phil. Monogr. 5, (1943), p. 29.
Vandellia numularifolia Don. Prod. Fl. Nep., p. 86 ; Bth. in DC. Prod. X, p. 416 ; Hk. f. *loc. cit.*, p. 282.
Subtropical Himalayas from Kashmir to the Mishmi Hills, S. India, Chotanagpur, Assam and hills of Burma.

15. **L. sessliflora** (Bth.) Wettst. *loc. cit.*, p. 79.
Bonnaya micrantha Blat. and Hallb. in Journ. Bomb. Nat. Hist. Soc., XXV (1918), p. 417.
Vandellia sessiliflora Bth. Scroph. Ind., p. 37 and in DC. Prod. X, p. 416, Hk. f. *loc. cit.*, 282.
Subtropical Himalayas, Assam, Burma, S. Ind ia.

16. **L. cordifolia** (Colsm.) Merrill Enum, Phillp. Pl. III, p. 437 ; Pennell, *loc. cit.*, p. 30.
Gratiola cordifolia Colsm. Prod. Desc. Grat., p. 15.
Vandellia pedunculata Benth Scroph. Ind. 37 and in DC. Prod X, 416, Hk f., *loc cit.* 282.
Vandellia cordifolia G. Don, Gen. Syst. IV, p. 549 ; Haines Bot. Bihar and Orissa, p. 633.
V. cerastoides Collet and Hemsl. in Journ. Linn. Soc., Vol. XXVIII (1890), p. 100.
Throughout India, Ceylon, Malaya and eastwards to Australia.

17. **L. angustifolia** (Bth.) Wettst., *loc cit.*, 79, Pennell, *loc. cit.*, p. 31.
Vandellia angustifolia Bth. Scroph. Ind., p. 37, and in DC. Prod. X, p. 417, Hk, f., *loc. cit.*, p. 282.
V. verbenaefolia Haines Bot. Bih. and Orissa, p. 634, in part.
Subtropical Himalayas, Kumaon, Nepal, Sikkim, Chotanagpur, Assam, Burma.

18. **L. hyssopioides** (Bth.) Haines, *loc. cit.*, p. 635.
Ilysanthes hyssopioides Bth. in DC. Prod. X, p. 419 ; Hk. f., *loc. cit.*, p. 283.
S. India, Chotanagpur (Sarguja), Assam, Burma (?) ; Ceylon, Malaya, China.

19. **L. parviflora** (Roxb.) Haines., *loc. cit.*, p. 635, Pennell, *loc. cit.*, p. 29.
Gratiola parviflora, Roxb. Cor. Pl. III, p. 3, t. 204 and in Fl. Ind., I, p. 140.

Ilysanthes parviflora Bth. in DC. Prod. X, p. 419, and Scroph. Ind. 34 ; Hk. f., *loc. cit.*, 283.

Throughout India upto 1800 m. in the Himalayas ; Siam, Malaya peninsula ; Trop. Africa.

20. **L. ciliata** (Colsm.) Pennell in Journ. Arn. Arb. Vol. 24 (1943), p. 253 ; et. in Monog. Acad. Nat. Soc. Phil. No. 5, p. 32.
Gratiola ciliata Colsm. Prod. Desc. Grat., p. 14.
Bonnaya brachiata Link and Otto, Icon. Pl. Select. 25, t. 11 ; Hk. f., *loc. cit.*, p. 284.
Vandellia brachiata Haines, *loc. cit.*, p. 632.

Throughout India, up to 1,600 m., in the Himalayas ; Ceylon, Malaya and eastwards to the Philippine Islands.

21. **L. ruelloides** (Colsm.) Mukerjee comb. nov.
Gratiola ruelloides Colsm. Prod. Desc. Gratiola 12, Roxb. Fl. Ind., p. 140.
Bonnaya reptans Spr. Syst. 1, p. 410 ; Hk. f., *loc cit.*, p. 284.
Ilysanthes reptans Urban Berl. Deutsch. Bot. Ges. 11, p. 436.
L. ruelloides O. Ktze Gen. Pl., p. 462.

Nepal, Sikkim, Assam and Burma ; South Ind a, Java, Phillipine Islands.

22. **L. bracteoides** (Blat. and Hallb.) Mukerjee Comb. nov.
Bonnaya bractoides Blat. and Hallb. in Journ. Bomb. Nat. Hist. Soc. XXV (1916), p. 416.

Common in Abu Mts.

23. **L. quinqueloba** (Blat. and Hallb.) Mukerjee comb. nov.
Bonnaya quinqueloba Blatt. and Hallb. in Journ. Bomb. Nat. Hist. Soc. XXV (1918), p. 417.

24. **L. estaminodiosa** (Blat. and Hallb.) Mukerjee comb. nov.
Bonnaya estaminodiosa Blat. and Hallb. in Journ. Bomb. Nat. Hist. Soc. XXV (1918), p. 416.

Mahim, Bombay Island.

25. **L. anagallis** (Burm.) Pennell in Journ. Arn. Arb. Vol. 24 (1943), p. 252.
Ruellia anagallis Burm. Fl. Ind., p. 135.
Bonnaya veronicæfolia Spr. Syst. 1. 14 ; Hk. f. *loc. cit.* 285.
Vandellia veronicæfolia Haines, *loc. cit.*, 633.
L. antipoda Alston in Trim. Handb. Fl. Ceylon VI ; suppl., p. 214.

Throughout India ; eastwards to the Philippine Islands.

Var grandiflora (Spr.) Mukerjee comb. nov.
B. grandiflora Spr., *loc. cit.*, p. 41.
B. veronicæfolia var *grandiflora* Hk. f., *loc. cit.*, 285.

Throughout India.

26. **L. Verbenæfolia** (Colsm.) Pennell, *loc. cit.*, p. 131.
Gratiola verbenæfolia Colsm. Prod. Desc. Grat., p. 8·
Bonnaya verbenæfolia Bth. in DC. Prod. X, p. 421.
B. veronicæfolia var. verbenaefolia Hk. f., *loc. cit.*, p. 295.
Vandellia verbenæfolia Haines, *loc. cit.*, p. 634.

Upper Gangetic Plain, Bengal, Burma, S. E. Asia.

27. **L. oppositifolia** (Linn.) Mukerjee comb. nov.
Gratiola oppositifolia Linn. Sp. Pl. ed. Willd., Vol. I, p. 105; Roxb. Cor. Pl. II, p. 30, t. 155.
Bonnaya oppositifolia Spr. Syst. 1, p. 41, Benth. in DC. Prod. X, p. 421 ; Hk. f., *loc. cit.*, 286.
Vandellia oppositifolia Haines Bot. Bihar and Orissa, p. 634.
Ilysanthes oppositifolia Urban in Berl. Deutsch. Bot. Ges. II (1884), p. 435.
S. India, Manbhum.

28. **L. tenuifolia** (Vahl.) Alston in Trim. Fl. Ceylon, VI, Suppl., p. 214.
Gratiola tenuifolia Vahl. Enum. 1, p. 95.
Bonnaya tenuifolia Spr. Syst. 1, p. 42 ; Bth. in DC. Prod. X, p. 422 ; Hk. f., *loc. cit.* 286.
Ilysanthes tenuifolia Haines Bot. Bihar and Orissa, p. 634.
Bengal to Burma, S. India ; Ceylon and China.