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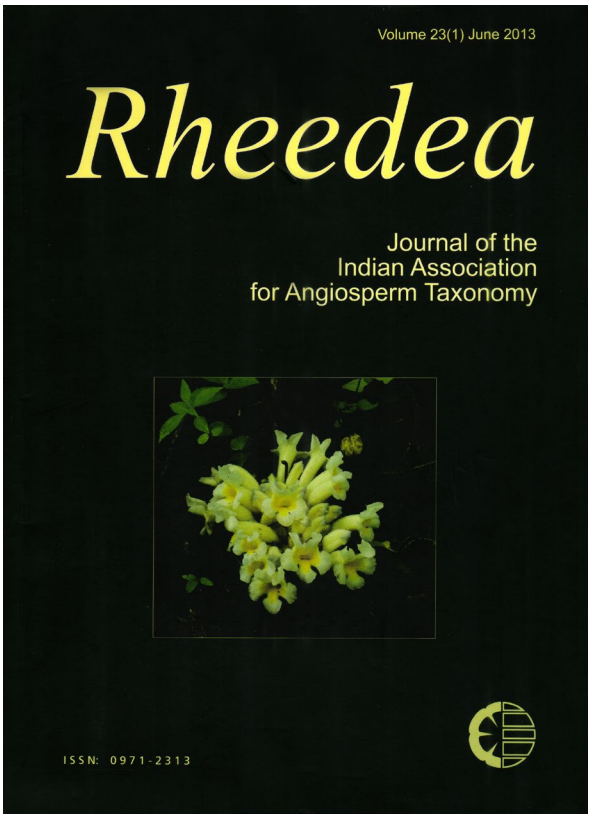

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Lectotypification and notes on the identity of *Christisonia calcarata* (Orobanchaceae)

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Abstract

The root parasitic species of *Christisonia* Gardner (Orobanchaceae) are lectotypified. After screening of herbarium specimens and the results of field expeditions, the morphological characters and distribution of *Chritisonia lawii* are within the range of *C. calcarata*. As a result, it is reduced to *C. calcarata*.

Keywords: *Christisonia*, Orobanchaceae, typification

Introduction

The mostly parasitic and species-rich family Orobanchaceae is recognized worldwide with 90 genera and *c.* 1800 species. Of these the East Asian genus *Christisonia* Gardner (including *Campbellia* Wight) consists of 17 species distributed in India, Sri Lanka, Laos, SW China, Thailand and Malesia (modified after Nickrent, 2012). In India 9 species of *Christisonia* have been recorded (Benniamin *et al.* 2012). During excursions in the Shayadri ranges of the Western Ghats of Maharashtra state [Matheran (Raigad district), Tungar Hills and Vangani (Thane district), Khandala (Pune district) and Kas (Satara district)] the authors collected *Christisonia* specimens from five different populations. It was found that these were neither identical to *C. calcarata* nor to *C. lawii* Wight. However they were apparenly looked as if intermediate between these two species. Therefore, a taxonomic and nomenclature survey was carried out.

Christisonia calcarata and *C. lawii* were first described by Robert Wight (1849), based on the collections made by J. S. Law from Thane near Mumbai and Konkan from Maharashtra. In the protologue, long pedicillate flowers and shortly pedicilate to subsessile flowers, were emphasized to distinguish *C. calcarata* from *C. lawii*. Wight cited specimens of Law without collection number and these specimens are preserved at K. We were able to study photographs of the sheets placed at Kew (**Fig. 3**). These specimens clearly belong to *C. calcarata*, but many apparently have pedicels ranging between 2–10 cm. It is probable that Wight recognized continuous morphological variation as two different species. In a letter, by Law to Hooker (1852, **Fig. 1**), he believed that *C. stocksii* featured in Hooker's Icones Plantarum (1852) was 'evidently identical' with *C. calcarata*, in Wight's Icones Plantarum. Furthermore, he added, "I have got another coloured drawing of it [*C. lawii* Wt. Ic. Pl. t. 1427] better than those from which Dr. Wight's figure was prepared and which shows that the characters he affirm to the flowers of having subsessile is incorrect, the pedicels having as long as in your figure [*C. stocksii* Hook. Ic. Pl. t. 836]"

Law also stated, "the specimen cited by Hooker to describe *Christisonia stocksii* was not collected by Stocks, it found in Scinde [Sindh], Stocks must have been obtained that specimen from Dalzell who, in turn, obtained it from me". Letter revealed that, the specimens which were obtained by Wight from Law were collected from the neighbourhood of Tanna (Thane), Bombay (Mumbai). This shows that both the specimens were collected from single locality. Specimens deposited in Kew [*sh. nos. K000821668*; *K000821669*; *K000821670*; *K000821671*; *K000821672*], were annotated by Wight, Stocks, Dalzell, W. Hooker, but these all were collected by J. S. Law.

Dalzell & Gibson (1861), ten years after Wight's and W. Hooker's, cited *C. stocksii* and *C. lawii* from the Bombay (Salsette) and Ramghat. In addition, they stated *C. calcarata* Wt. as a synonym of *C. stocksii*. This means they were aware of earlier publications of Wight (1849) and Hooker (1852), but have not cited Law's collection neither in *C. stocksii* nor in *C. lawii*. Herbarium sheet placed at Kew, sh. no. *K000821672*, is having specimens of Law from

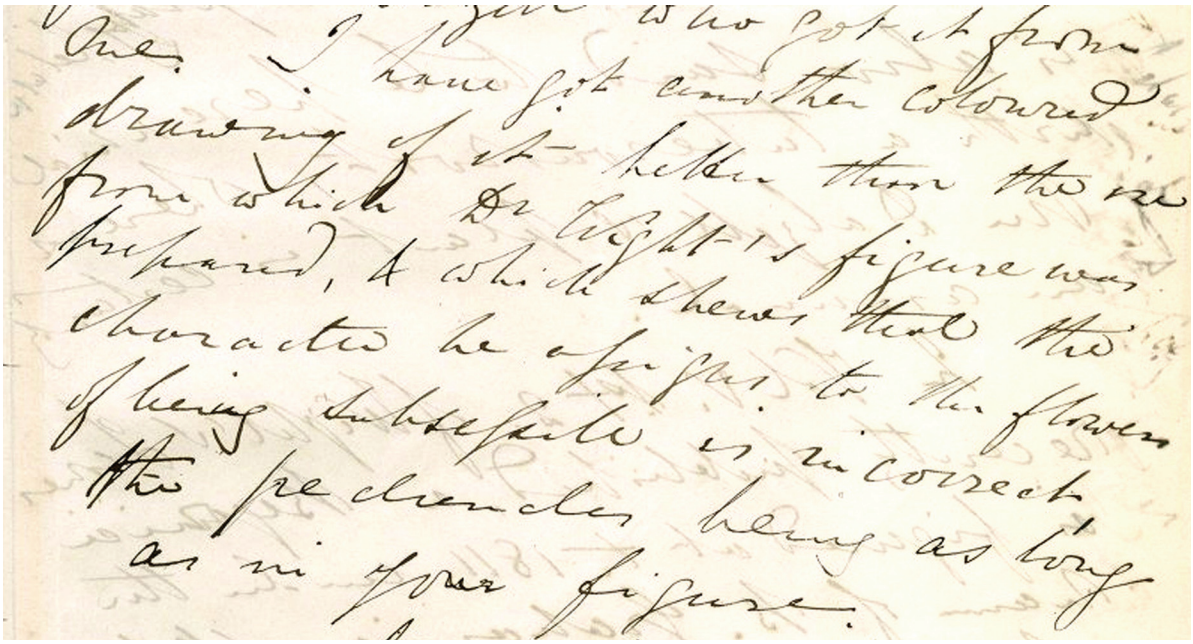

Fig. 1. Letter from J. S. [John Sutherland] Law to [Sir William Jackson Hooker]; from Dharwar [Dharwad], India; 27 Mar 1852; four page letter comprising four images; the magnified part from page 3, paragraph 1. Image reproduced from http://plants.jstor.org/visual/viewer/kdcas601?p=3.

Fig. 2. *Christisonia calcarata* **a.** uprooted individual; **b.** Inflorescence; **c.** Infructescence.

Thane (Bombay) and that of Dalzell's from Salsette and the latter has been identified as *C. stocksii* by Dalzell himself (Kew has tagged the same sheet with two different numbers *K000821671* might be for Dalzell's specimen and *K000821672* for Law's specimens). In addition, sheet nos. *K000821669* and *K000821670* also annotated with two different collectors *viz.* Stocks and Dalzell, possibly annotation was made by Hooker. Surprisingly, the sheet has three different names, one was written

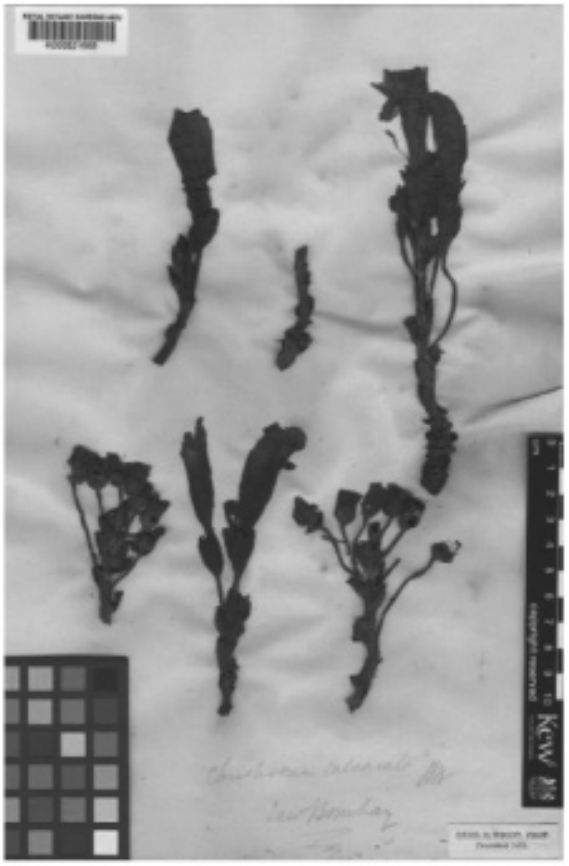

Fig. 3. Lectotype of *Christisonia calcarata* Wight, in Herb. Wight, *Law s.n.* (K, sh. 000821668)

by Stocks as on label *Plelifaea*?, the second was *Christisonia lawii* Dalzell, crossing out *lawii* Dalzell and as *C. calcarata* Wight by Hooker. All the evidences made from the herbarium specimens and letter from J. S. Law to Hooker confirms that, the root parasitic individuals from Thane were collected by J. S. Law, who have travelled long and these collections were well known to Wight, Dalzell, Stocks and Hooker.

Hooker f. (1884) in his flora of British India stated *C. calcarata* which is probably a more fully developed state of *C. lawii*, as affirmed by Cooke (1908). Authors could also examine Woodrow's (1898) specimen from Purandhar (Maharashtra), which was identified as *C. lawii* in his 'the flora of Western Ghats. As in Law's specimen, here also we found glabrous habit apart from the corolla tube and pedicel length. These observations forced us to conduct a critical study on the identity of *C. calcarata* and *C. lawii*.

On examining herbarium specimens and fresh specimens of *Christisonia* obtained from field expeditions in different localities of Western Ghats, we noticed continuous variation in habit, pedicel size, calyx, pubescence, shape and size of corolla lobes and corolla tube and flower colour. Therefore, it become impossible to distinguish between *C. calcarata* and *C. lawii* based solely on morphological characters. Moreover, the data shows that both the species were found in the same geographical locations as root parasite on *Strobilanthes* species. Based on all these facts, it is concluded that both these names are conspecific and *C. lawii* is synonym of *C. calcarata.* The nomenclature is changed accordingly and a revised description is provided.

Christisonia calcarata Wight, Icon. Pl. Ind. Orient. 4(3): 6, t. 1426. 1849; Hook.f., Fl. of Brit. India 4: 322. 1884; Cooke, Fl. Bombay Pres. 2: 312. 1908.

Typus: INDIA, Bombay (Mumbai) *in Herb. Wight, J.S. Law s.n.* (K, lectotype–*sh. 000821668*, designated here). **Fig. 1–3.**

Christisonia lawii Wight, Icon. Pl. Ind. Orient. 4(3): 6, t. 1427. 1849; Hook. f., Fl. of Brit. India 4: 322. 1884; Dalzell & Gibson, Bombay Fl. 202. 1861; Cooke, Fl. Bombay Pres. 2: 312. 1908. **syn. nov.**

Christisonia stocksii Hooker's Icon. Pl. 9: t. 836. 1852; Dalzell & Gibson, Bombay Fl. 202. 1861; Woodrow in J. Bombay Nat. Hist. Soc. 12: 175. 1898.

Parasitic herbs, fleshy, 10–20 cm erect. Stems broader, 2–5 cm, covered with whorled, ovoid-elliptic bracts (uprooting stem looks like bromeliad). Flower and bud yellow–purple, raised on glabrous pedicel which is 2–10 cm long, buds covered with copious, translucent tasteless slime when young. Calyx glabrous, yellow, tubular, 1.5–2.5 cm, 5-toothed; teeth 2–6 mm long. Corolla 4–6 cm long, tubular, companulate, somewhat curved when fresh; corolla lobes 5, equal to unequal; tube covered with white pubescent outside and densely pubescent at base (marginally or basally), bright yellow and glabrous inside; lobes rounded to acute at apex, with undulate margin, creamy white-blue, 1–2 cm long, lower lips smaller than upper ones. Stamen 4, included, didynamous, lower pair half in length of upper pair; filaments white with pubscence; anthers pale to white, 2-celled, one of the cells fertile, ovate to rounded, with acute to acuminate apex, other cell sterile, prominently spurred or beaked, or look like inverted comma, projected upwardly, paired anthers attached laterally to each other in young flowers while detached in mature ones. Ovary one celled; style included, longer than the stamens, white, glabrous; stigma of two ovoid, folded discs, bent downwardly forming a crown on upper pair

of anthers. Capsule globose, or oviod, crowned by the persistent calyx teeth; seeds minute, subglobose to ovoid, testa faintly reticulate–smooth.

Flowering & fruiting: July - September.

Distribution & ecology: India and Pakistan; collected from the roots of *Strobilanthes* species & *Pleocaulis* species, occasional at high to medium altitude slopes and lateritic plateaus.

Specimens examined: INDIA, **Maharashtra**, Kas, Satara district, 16.8.1998, *S.P. Gaikwad* 202; Kas, Satara district, 12.8.2012, *M.D. Nandikar* C01(SUK); Salsette, Thane, *s. d.*, *E. Blatter* 8724; Khandala, Pune, 7.1916, *C. Mc Cann* 22779; Khandala, Pune, 7. 1917, *C. Mc Cann* 22551; Echo point, Khandala, Pune, 25.7.1943, *H. Santapau* 2271; Bhoma hill, Khandala, Pune, 18.8.1945, *H. Santapau* 6957; Bhoma hill, Khandala, Pune, 23.7.1949, *H. Santapau* 10138; Bhoma hill, Khandala, Pune, 6.7.1951, *H. Santapau* 12850; Bhoma hill, Khandala, Pune, 18.8.1957, *H. Santapau* 21905; Bhoma hill, Khandala, Pune, 18.8.1957, *H. Santapau* 21906; Bhoma hill, Khandala, Pune, 18.8.1957, *H. Santapau* 21907; Dasturi point, Matheran, Raigad, 2.7.1959, *N. A. Irani* NI4153; Dasturi point, Matheran, Raigad, 2.7.1959, *N.A. Irani* NI4154; Dasturi point, Matheran, Raigad, 2.7.1959, *N.A. Irani* NI4155; Dasturi point, Matheran, Raigad, 2.7.1959, *N.A. Irani* 4156; Dasturi point, Matheran, Raigad, 13.7.1959, *N.A. Irani* NI4203; Monkey point, Matheran, Raigad, 4.7.1960, *N.A. Irani* NI5024; Usgaon, Thane district, 15.8.1960, *N.Y. Das* NYD1759; Usgaon, Thane district, 15.8.1960, *N.Y. Das* NYD1760; Usgaon, Thane district, 15.8.1960, *N.Y. Das* NYD1700; Usgaon, Thane district, 15.8.1960, *N.Y. Das* NYD1701; Vangni, Thane district, 24.7.2012, *Rajdeo Singh* R102; Vangni, Thane district, 24.7.2012, *Rajdeo Singh* R103; Bhoma Hill, Khandala, Pune district, 26.8.1982, *Rajdeo Singh & M. D. Nandikar* R108; Bhoma Hill, Khandala, Pune district, 26.8.1982, *Rajdeo Singh & M. D. Nandikar* R109 (BLAT).

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