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First report of *Torenia concolor* (Linderniaceae) from India and notes on typification of associated names

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Summary. *Torenia concolor* is a Southeast Asian species, originally described from Hong Kong, and is known to be distributed in China (incl. Taiwan), Laos, Myanmar, and Vietnam. As a result of material revision at different herbaria, collections of *T. concolor* from Indian borders were found at CAL and GUBH, and therefore this species is reported from India for the first time. Lectotype of *T. concolor* is also designated here, along with typification of some associated names. *Torenia rubens* is synonymized as a junior synonym of *T. diffusa*.

Первое сообщение о нахождении *Torenia concolor* (Linderniaceae) в Индии и заметки по типификации связанных с ним названий

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Ключевые слова: Восточные Гималаи, лектотипификация, наука о растениях, систематика, Южная Азия.

Аннотация. *Torenia concolor* – это вид из Юго-Восточной Азии, первоначально описанный из Гонконга и распространённый в Китае (в т. ч. на Тайване), Лаосе, Мьянме и Вьетнаме. В результате изучения ряда гербарных коллекций образцы этого вида, собранные в пределах Индии, были впервые обнаружены в Гербариях CAL и GUBH. Также в данном сообщении обозначен лектотип *T. concolor* и приведена типификация некоторых названий, связанных с этим видом. *Torenia rubens* синонимизирован с *T. diffusa*.

Introduction

Torenia concolor Lindl. (Lamiales, Linderniaceae) was described from Hong Kong, China, and distributed in China, Laos, Myanmar, Taiwan, and Vietnam (Lindley, 1846; POWO, 2024). It is characterized by glabrous to sparsely pubescent, perennial, prostrate habit, leaf serrations 7–9 pairs, pseudo-axillary, solitary, or in pairs, or fascicled pedicels, bi-lipped, 5-winged, decurrent calyx, wings ca. 1 mm, corolla 25–40 mm long, exceeding calyx by 15–20 mm and appendaged staminal filoaments (Yamazaki, 1985; Hong et al., 1998).

Torenia rubens Benth. was described from Assam, Indiaas a closely related species to *T. diffusa* D. Don (Bentham, 1846). Bentham (1846) distinguished the former from latter by the presence of shorter and obtuse staminal appendages and calyx often with reddish apex. Later, Bentham (1861) described variety '*grandiflora*' in *T. rubens*, from Hong Kong,

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China, with reference to *T. concolor*, and therefore a superfluous and illegitimate name (see Art. 52.2; Turland et al., 2018).

Hooker (1884) synonymized *Torenia rubens*, *T. diffusa*, and *T. hians* Roxb. under *T. vagans* Roxb. and reduced *T. concolor* as a variety of *T. asiatica* L. Later, Hooker (1884: 734) corrected his treatment of *T. concolor* under *T. asiatica* and stated: "This I have since seen growing, and think it may be a different species; see Bot. Mag. t. 6797 A; it is *T. rubens* Benth. FI. Hongk., and a native of China." Hooker (1884: 734) implied "*T. rubens* Benth. Fl. Hongk." as *T. rubens* var. *grandiflora* Benth. Furthermore, Yamazaki (1955, 1985) also accepted *Torenia concolor* as distinct species and cited *T. rubens* var. *grandiflora* as its synonym.

Li (1964: 4) misinterpreted Hooker's (1884: 734) comment, considering "*Torenia rubens* Benth. FI. Hongk." as "*Torenia rubens* Benth." and treated *T. rubens* as a synonym of *T. concolor*. Different taxonomic resources (Hong et al., 1998; POWO, 2024) followed Li (1964) and treated *T. rubens* as synonym of *T. concolor*. Based on the Indian specimens of *T. rubens*, Li (1964) also reported distribution of *T. concolor* from India, which is erroneous.

Consultation of relevant literature revealed that *T. concolor* was hitherto unreported from India, except the Li's (1964) mention of *T. concolor* from India (Hooker, 1884; Hong et al., 1998; Gierson and Long, 2001; Fischer et al., 2013; POWO, 2024). Therefore, we report *T. concolor* for the first time from India, along with discussion on taxonomic identities of *T. concolor* and related names as well as its typification.

Materials and methods

Original materials of all concerned taxa, at different herbaria (CAL, E, GH, K, M, and P), were examined virtually. Additionally, we examined herbarium sheets of *Torenia concolor* from Assam and Meghalaya at CAL and GUBH, in-person. Field photographs of *T. concolor* from India were also studied through "Global Biodiversity Information Facility" (GBIF. URL: https://www.gbif.org/), as well as from personal communication with fellow researchers. Fresh materials of *T. diffusa* were collected from Darjeeling and Kalimpong districts of West Bengal. Taxonomic and bibliographic information of different plant names were accessed through "International Plant Names Index" (IPNI. URL: https://ipni.org/), "Plants of the World Online" (POWO. URL: http://www.plantsoftheworldonline.org/), and "Tropicos" (URL: https://www.tropicos.org/). Typifications of names follow Turland et al. (2018).

Taxonomy

Comparative study of the original materials of *Torenia concolor*, *T. diffusa*, and *T. rubens*, show that *T. rubens* is morphologically similar to *T. diffusa*, rather than to *T. concolor*. Leaves of *T. diffusa* (3–13 × 5–20 mm) and *T. rubens* (3–8 × 6–20 mm) are much smaller, compared to *T. concolor* (12–20 × 18–32 mm). Similarly, the narrowly triangular (broadest at base) flowering calyx in *T. diffusa* (10.5–15 mm) and *T. rubens* (8.5–12 mm) are also smaller compared to the ovate-lanceolate (broadest at middle) flowering calyx of *T. concolor* (16–17 mm).

Bentham (1846) used the characters: shorter obtuse staminal appendages and calyx often with reddish apex, describing *Torenia rubens*, which seems only variation of *T. diffusa*. In several stress conditions, calyx, leaves, and stems of different *Torenia* become reddish. Based on our fresh specimens we found that the staminal appendages of *T. diffusa* are short and vary from 0.7–0.8 mm. Therefore, the diagnostic characters seem insignificant. Furthermore, the original materials of *T. diffusa* and *T. rubens* show no variation in the calyx characteristics. Hence, *T. diffusa* and *T. rubens* are conspecific names.

During herbarium consultations at CAL and GUBH, for the taxonomic studies on the Linderniaceae of Eastern Himalayas, we found four herbarium specimens (three at CAL and one at GUBH), which were wrongly identified as *T. vagans*. The specimen CAL0000214444 was collected from Akha hills, Assam (Fig. 1), the second specimen without any barcode no. was from Khasi hills, Meghalaya, the third specimen CAL0000224083 was without any collection information, and fourth one from Darrang district of Assam (GUBH, no barcode). Based on the critical studies of these herbarium specimens, which resulted in close affinity to the diagnostic characters of *T. concolor*, all these specimens were identified as *T. concolor*. Furthermore, we also came across with field photographs of *T. concolor* from Tippi, West Kameng, Arunachal Pradesh, India (27°01'24.6"N, 92°37'31.1"E), through personal communication with fellow researchers (Fig. 2). This confirms the first report of *T. concolor* from the country.



Fig. 1. Herbarium specimen of *Torenia concolor*, collected from Akha hills, India [CAL0000214444] "©The Director, Botanical Survey of India, Kolkata".

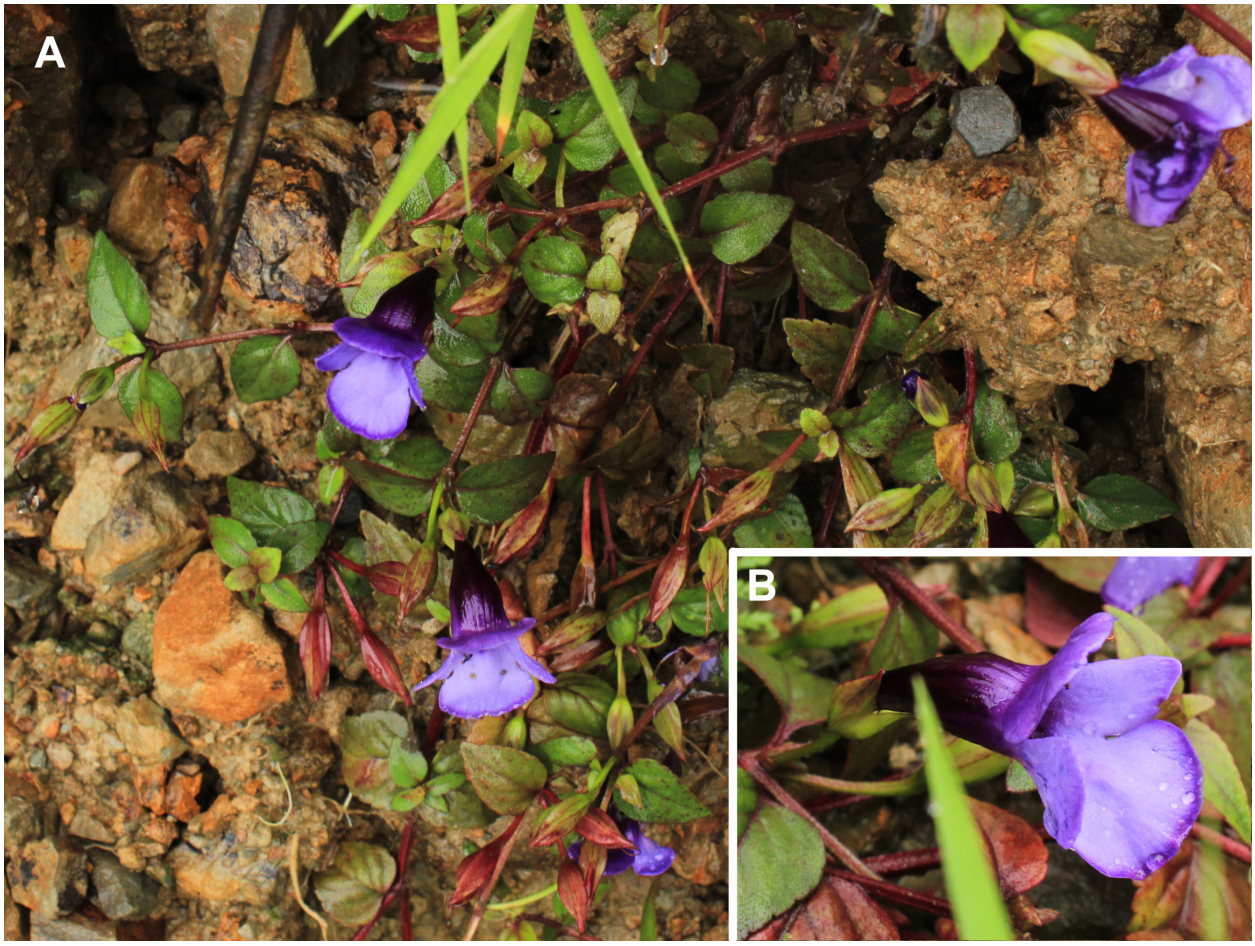


Fig. 2. *Torenia concolor*, photographed in Tippi, West Kameng, Arunachal Pradesh, India: A – habit; B – single pseudo-axillary flower (Photo courtesy: Dipayan Mitra).

Taxonomic treatment

Torenia concolor Lindl. 1846, Edwards's Bot. Reg. 32: t. 62.

≡ *Torenia asiatica* var. *concolor* (Lindl.) Hook. f. 1884, Fl. Brit. India 4: 277.

Lectotype (designated here): "China. Sep 1846. Fortune s. n." (GH! [GH00056881]) (Fig. 3).

= *Torenia rubens* var. *grandiflora* Benth. 1861, Fl. Hongk.: 250. nom. illeg.

= *Torenia albomarginata* Bonati, 1925, Bull. Soc. Bot. France 71: 1094.

Lectotype (first step designated by Yamazaki (1985); second step designated here): Annam: "Nhatrang Recolté sur bord d'un sui dans le sable. Vallée du Sông Mau. 17 V 1922. Poilane 3275" (P! [P00584225!; iso – P00584224; P00584226]).

= *Torenia albo-violacea* Bonati, 1925, Bull. Soc. Bot. France 71: 1094.

Lectotype (first step designated by Yamazaki (1985); second step designated here): "Province Thua Thien, haut cours du Bo Giang. 17 V 1922. Eberhardt 2891" (P! [P00584222; iso – P00584223]).

= *Torenia annamitica* Bonati, 1925, Bull. Soc. Bot. France 71: 1094.

Lectotype (first step designated by Yamazaki (1985); second step designated here): Annam: "Nha-Trang, dans un sentier en forêt près Gian-Chê. 11 V 1922. Poilane 3208" (P! [P00584293; iso – P00584227; P00584292]).

= *Torenia concolor* var. *formosana* T. Yamaz. 1955, J. Jap. Bot. 30: 363.

Holotype: "Formosa, Prov. Taipe, Kielung. 02 XI 1896. Makina s. n." (TOFO).

Distribution: India: Arunachal Pradesh, Assam, Meghalaya; China, Myanmar, Laos, Taiwan, Vietnam.

Additional specimens examined: India, without locality, Unknown Collector s. n. (CAL0000224083); "Assam, Akha hills, 1890, Khan s. n." (CAL0000214444); "Assam, Orang WLS, Darrang district. 29 VI 92. unknown 510" (GUBH, no barcode); "Meghalaya, Khasi hills, Unknown Collector s. n." (CAL, no barcode).



Fig. 3. Lectotype of *Torenia concolor* Lind. (GH000568810) "This image belongs to the Digital Collection of the Harvard University Herbaria (http://huh.harvard.edu/pages/digital-collections-0)".

Torenia diffusa D. Don, 1825, Prodr. Fl. Nepal.: 86.

Lectotype (designated by Kumar and Maurya (2020)): "Nepal. 1821. Wallich 3955" (K! [K001117716]; iso – CAL [CAL0000072022]!; M [M0188414]!) (Fig. 4).

= *Torenia rubens* Benth. 1846, in A. P. de Candolle, Prodr. 10: 410, **syn. nov.**

Lectotype (designated here): "India, Assam, Mack & Mack s. n." (GH! [GH00102246]) (Fig. 5).

Distribution: Bangladesh; Bhutan; India; and Nepal.

Additional specimens examined: "India, West Bengal, Darjeeling, Mongpu, 1200 m, K. Roy & Pal 0096" (NBU).



Fig. 4. *Torenia diffusa*, photographed in Kalimpong, West Bengal, India: A – habit; B – staminal appendages, pointed out by arrows (scale bar: 1 mm) (Photographed by Aaratrik Pal).

Typification notes

Lindley (1846) described *Torenia concolor* based on the plants sent by "Mr. Fortune" from China, which reached the garden of the Horticultural Society in 1844. Yamazaki (1985) inadvertently typified the name citing "Type: Fortune s. n., China, Hongkong, K" and therefore accordingly with Art. 7.11 (Turland et al., 2018). However, only two specimens of a different gathering ("Fortune 125"), collected in 1845, are available at K. As Mr. Fortune sent plants to the Horticultural Society, and not herbarium specimens, the collections less likely to bear any collection number, therefore "Fortune 125" could not be any original material. We could find a single specimen of Fortune, dated as 1 September 1846, "Fortune s. n.", in GH herbarium (GH00056881, Fig. 2). The label on the sheet exhibits handwritten "*Torenia concolor*, China, Fortune, Sept. 1846" and "Hort. Soc. Gard.". Also, the sheet in GH is denoted as verified by "Lind., 1846". Therefore, we re-lectotypify *T. concolor* in this paper.



Fig. 5. Lectotype of *Torenia rubens* Benth. (GH00102246) "This image belongs to the Digital Collection of the Harvard University Herbaria (http://huh.harvard.edu/pages/digital-collections-0)".

Bonati (1924) described three species, viz., *Torenia albomarginata*, *T. albo-violacea*, and *T. annamitica*, mentioning single gathering for each species. He did not mention any herbarium where these gatherings were located. Yamazaki (1985) synonymized these names under *T. concolor* and inadvertently lectotypified these names mentioning P herbarium, where the gatherings were located (see Art. 7.11, Turland et al., 2018). Now, there are more than one sheet for each gathering. According to ICN Art. 9.17 (Turland et al., 2018) we narrow down to a single specimen as the lectotype for each name. We select P00584225 as the lectotype of *Torenia albomarginata*, as P00584225 bears an illustration of dissected corolla, herbarium label with handwritten collection number, "3275", and species name, "*Torenia albomarginata* Botani". Similarly, P00584222 exhibits hand-drawn illustrations of floral parts, Eberhard's herbarium label showing collection no. 2891, and hand-written "*Torenia albo-violacea* Bonati". The sheets of P00584293 exhibit a note with hand-drawn illustrations of floral parts, with handwritten "*T. annamitica* Bonati". Therefore, we select P00584222 and P00584293 as lectotype of *T. albo-violacea* and *T. annamitica*, respectively.

Bentham (1846) described *Torenia rubens* based on the collection of "Da Mack!", from Assam. We looked for the herbarium collection at K online herbarium catalogue, as well as communicated with the curators of K, but could not find any specimen. However, we could locate a single sheet (GH00102246) at GH, collected by "J. Mack and Mrs. J. Mack", from Assam and the sheet bears the name "*Torenia rubens* sp. n." (Fig. 1). Therefore, the sheet is selected here as the lectotype of *T. rubens*.

Kumar and Maurya (2020) cited altogether four isolectotypes for *Torenia diffusa*. We observed that, among the cited specimens, two sheets (E00273716, E00273717) belong to *T. cordifolia*. These two specimens show ovate calyx with rounded base and obtuse apex (vs. ovate-lanceolate calyx with sub-truncate to cuneate base and acute to attenuate apex in *T. diffusa*), erect-straight stem (vs. creeping stem with rooting from nodes). Therefore, we exclude these two specimens from isolectotypes of *T. diffusa*.

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