

Rediscovery of *Polygonatum tessellatum* F. T. Wang & Tang in Manipur, north-eastern India

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Abstract. *Polygonatum tessellatum* F. T. Wang & Tang (Asparagaceae) was rediscovered in Manipur after a gap of 97 years. Description, image, and current population size are provided on the basis of recent botanical explorations.

Key words: Asparagaceae, India, Manipur, *Polygonatum*, rediscovery

1. Introduction

The genus *Polygonatum* Mill. (1754, Asparagaceae, Nolinoideae) comprises about 73 species distributed from south-western China and Japan to the eastern Himalayas (Jeffrey 1980; Chen & Tamura 2000; Floden 2018; POWO 2022). Diagnostic characteristics of the genus include the presence of rhizomes, often arching stems, alternate, opposite or whorled phyllotaxy, axillary inflorescences with one or several flowers, perianth tubes longer than segments, and berries (Wang *et al.* 1978; Chien-Ti & Yen-Hsueh 2019; Chen *et al.* 2000; Chen & Tamura 2000; Ying 2000). This genus was divided into 3 sections based on the chloroplast molecular markers, leaf arrangement, and the number of chromosomes: section *Polygonatum*, with alternate leaves and chromosome number x between 9 and 11; section *Sibirica*, which includes *P. sibiricum* Redouté, with whorled leaves and $x = 12$; and section *Verticillata*, with variable phyllotaxy and x from 13 to 15 (Meng *et al.* 2014; Chien-Ti & Yen-Hsueh 2019).

2. Material and methods

In February 2017 an inventory was conducted in different districts of the Manipur state to collect medicinal plants and thus to enrich the medicinal plants

repository at the Foundation for Revitalization of Local Health Traditions (FRLHT), Bangalore, India (Fig. 1). The collected voucher specimens were identified by referring to various Floras (Hooker 1894; Haridasan & Rao 1987; Chowdhery *et al.* 1996, 2008; Kanjilal & Bor 1997; Chen & Tamura 2000; Singh *et al.* 2000; Mao & Dash 2020) and online herbaria (K, GBIF, CAS, PE, SZ). The identification of one *Polygonatum* species, however, proved to be difficult. Further critical examination of the descriptions and illustrations of the Flora of China (Chen & Tamura 2000; Wu & Raven 2000) and comparison with the type specimen (K000820729) confirmed that it was *P. tessellatum* (Fig. 2). This species is always characterized by 4-5 sub-sessile leaves at the top nodes, 2-4 flowers in an axil, and bright red berries.

Wang and Tang (1936) first described this species from SW China. However, G. Forrester collected a similar *Polygonatum* sp. in July 1925 from upper Burma (NE), coll. no. 27082, deposited at herbarium E. Later it was identified as *P. tessellatum* sp. nov. and treated as a syntype. According to Floden (2018), two collections had been vouchered from India: one from Nagaland, collected by Frank Kingdon-Ward (*FKW 19019*) and deposited at the Muirhead Memorial Herbarium, and another from Shirui (Siroi), Manipur, deposited at E and HUH. Based on the photograph and P. Barney's

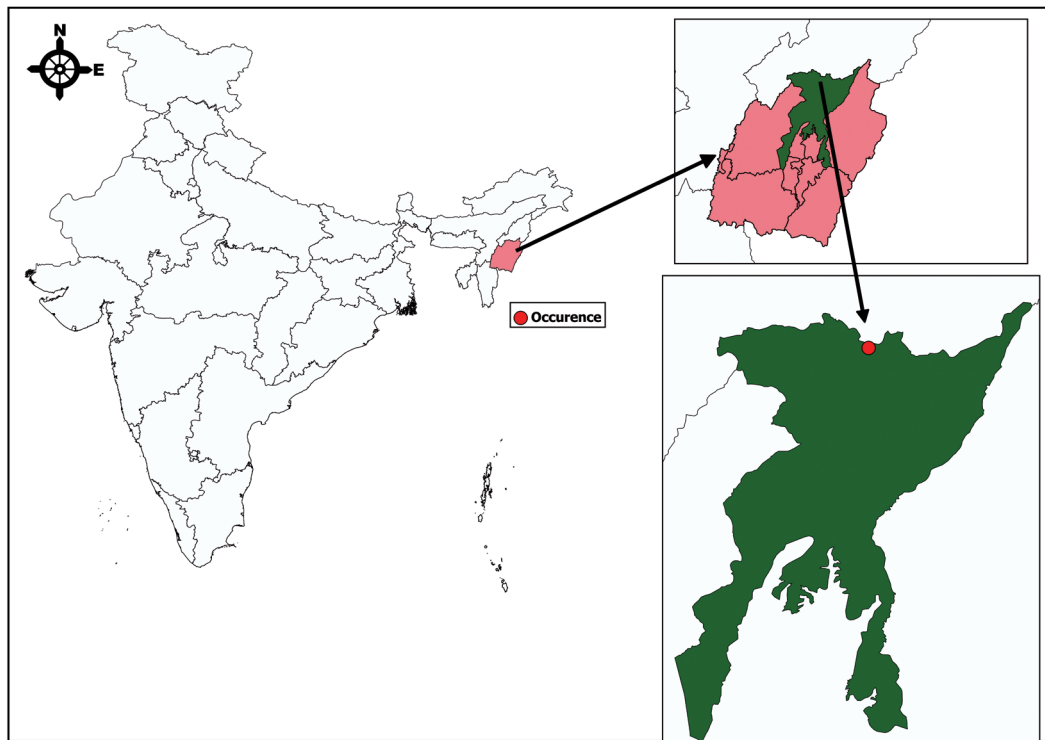


Fig. 1. Location of *Polygonatum tessellatum* F. T. Wang & Tang in Punanamai forest, 1831 m.a.s.l., Senapati district, Manipur, India

personal communication, Floden (2018) reported this species as a new record to India that Gogoi (2010) did not include. This taxon has not been annotated in the checklist of monocotyledons of India (Mao & Dash 2020) and not found in any Indian herbaria. Hence a comparison of the travel time of G. Forrester and Frank Kingdon-Ward in north-eastern India with the present collection, warrants that this species was rediscovered after 97 years from the same state, Manipur (Fig. 1). The recently collected herbarium specimen was deposited at the National Herbarium of Medicinal Plants (FRLHT) at Bengaluru, India.

3. Systematic accounts

Polygonatum tessellatum F. T. Wang & Tang, in Bull. Fan Mem. Inst. Biol. 7: 85. 1936. (Fig. 1).

Description: Tufted epiphytic herb with basal rhizome, globose, 1.5-2 cm thick. Stem up to 70 cm long, glabrous. Leaves in whorls of 4, rarely 5, occasionally opposite, sessile, oblong-lanceolate, 6.5-7 × 2.5 cm, leathery, cuneate at base, with 3 distinct longitudinal veins, cross veins prominent, acuminate at apex. Inflorescence 2-4-flowered; peduncle very short, glabrous; bracts caduceus. Pedicel inconspicuous, striate, up to 3.5 cm long, glabrous. Berries ovoid-subglobose, reddish, when ripe *c.* 8 mm across, *c.* 11-seeded; pedicel ascending at maturity

Phenology: Fruiting: December-February.

Habitat & ecology: Found in moist deciduous forests, in association with *Bambusa* sp., *Brassaiopsis aculeata* (Buch.-Ham. ex D. Don) Seem., *Calamus* sp., *Elaeocarpus serratus* L., *Maesa indica* (Roxb.) A. DC., *Michelia doltsopa* Buch.-Ham. ex DC., *Mycetia* sp., *Quercus lamellosa* Sm., and *Senecio scandens* Buch.-Ham. ex D. Don.

Distribution: China, Myanmar, Thailand, and India.

Specimens examined: India, Manipur, Senapati district, Khungho hills, 2380 m.a.s.l., (Fig. 1) 17th February 2017, *N. Dhatchanamoorthy* 120377, (FRLH).

Conservation: Only 3 matured clumps of *Polygonatum tessellatum* were found within the radius of 5 km² from the study area. During the field work we observed frequent visits of local inhabitants for the extraction of natural resources, and landslides are the additional threat to this habitat, which are common in these hills, in addition to the hydroelectric power project. Other local populations of *P. tessellatum* may still be found in this poorly studied region, but currently this species should be classified provisionally as Data Deficient as per the IUCN category.

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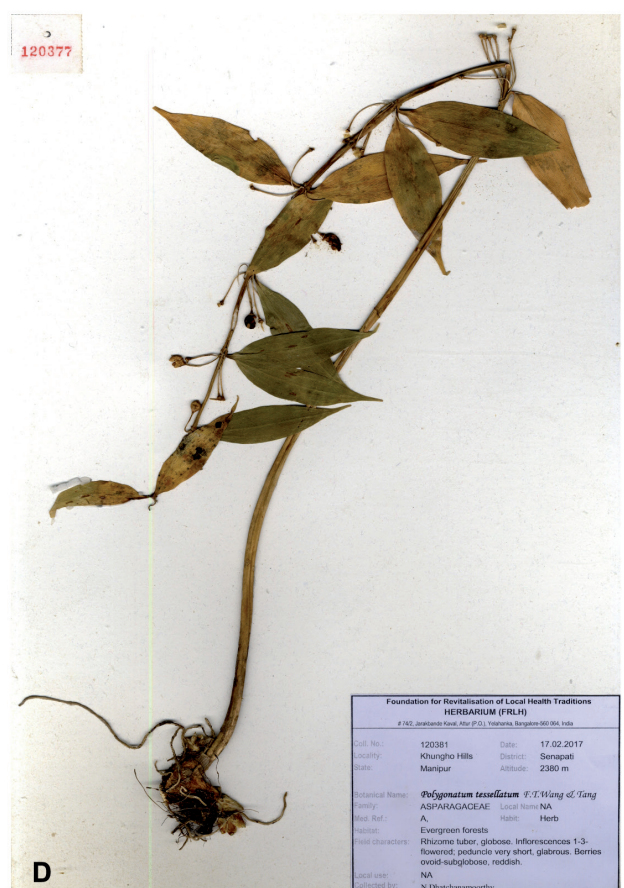


Fig. 2. *Polygonatum tessellatum* F. T. Wang & Tang
Explanations: A – type specimens, B – habit, with fruiting twig, C & D – voucher specimens

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References

- CHEN X. Q., LIANG S. Y., XUI J. M. & TAMURA M. N. 2000. Liliaceae. In: Z. Y. WU & P. H. RAVEN (eds.). Flora of China, Vol. 24, pp. 73-263. Missouri Botanical Garden Press and Science Press, St. Louis and Beijing.
- CHEN X. Q. & TAMURA M. N. 2000. *Polygonatum* Mill. In: Z. Y. WU & P. H. RAVEN (eds.). Flora of China 24, pp. 223-235. Science Press/Missouri Botanical Garden Press, Beijing/St Louis, MO.
- CHIEN-TI C. & YEN-HSUEH T. 2019. Revision of *Polygonatum* (Asparagaceae, Nolinoideae, Polygonateae) of Taiwan. *PhytoKeys* 117: 99-118. DOI 10.3897/phytokeys.117.31902
- CHOWDHERY H. J., GIRI G. S., PAL G. D., PRAMANIK A., DAS S. K. 1996. Material for the Flora of Arunachal Pradesh. Vol. 1. (Asteraceae-Ceratophyllaceae) In: P. K. HAJRA, A. VERMA & G. S. GIRI (eds.). Flora of India Series 2, pp. 219-228. Botanical Survey of India, Calcutta.
- CHOWDHERY H. J., GIRI G. S., PAL G. D., PRAMANIK A. & DAS S. K. 2008. Material for the Flora of Arunachal Pradesh. Vol. 2. (Asteraceae-Ceratophyllaceae) In: G. S. GIRI, A. PRAMANIK & H. J. CHOWDHERY (eds.). Flora of India Series 2, pp. 193-207. Botanical Survey of India, Calcutta.
- FLODEN A. 2018. Nomenclatural novelties in *Polygonatum* (Asparagaceae) and notes on some recent species distributions. *Annales Botanici Fennici* 56: 5-11.
- GOGOI R. 2010. The family Liliaceae in Manipur, India. *Bulletin of Arunachal Forest Research* 26: 73-81.
- HARIDASAN K. & RAO R. R. 1987. Forest Flora of Meghalaya. Vol. 1, pp. 139-152. Bishen Singh Mahendra Pal Singh, Dehra Dun.
- HOOKE J. D. 1894. *Polygonatum* Tourn. In: J. D. HOOKE (ed.). The Flora of British India. Vol. 6, pp. 319-322. London, Reeve.
- JEFFREY C. 1980. The genus *Polygonatum* (Liliaceae) in Eastern Asia. *Kew Bulletin* 34: 435-471. <https://doi.org/10.2307/4109822>
- KANJILAL U. N. & BOR N. L. (eds.). 1997. Flora of Assam, Vol. 1-5, pp.149-161. Omsons Publications, New Delhi.
- MAO A. A. & DASH S. S. 2020. Flowering Plants of India: An annotated Checklist (Monocotyledons), pp. 199-200. Botanical Survey of India.
- MENG Y., NIE Z. L., DENG T., WEN J. & YANG Y. P. 2014. Phylogenetics and evolution of phyllotaxy in the Solomon's seal genus *Polygonatum* (Asparagaceae: Polygonateae). *Botanical Journal of the Linnean Society* 176(4): 435-451. <https://doi.org/10.1111/boj.12218>
- POWO 2022. Plants of the World Online. Facilitated by the Royal Botanic Gardens, Kew. Published on the Internet; <http://www.plantsoftheworldonline.org/> Retrieved 26 August 2022.
- SINGH N. P., CHAUHAN A. S. & MONDAL M. S. 2000. Flora of Manipur. Vol. 1, pp. 175-180. Botanical Survey of India, Calcutta.
- WANG F. T., TANG T., CHEN S. C., CHANG C. Y., DAI L. K., LIANG S. Y., TANG Y. C., LIU L. & LANG K. Y. 1978. Angiospermae Monocotyledoneae Liliaceae (2). In: F. T. WANG & T. TANG (eds.). *Flora Reipublicae Popularis Sinicae*, tomus 15, pp. 1-280. Science Press, Beijing.
- WU Z. Y. & RAVEN P. H. (eds.). 2000. Flora of China (Flagellariaceae through Marantaceae). 24: 1-431. Science Press, Beijing and Missouri Botanical Garden Press, St. Louis.
- YING S. S. 2000. Liliaceae. In: T. C. HUANG *et al.* (eds.). *Flora of Taiwan*, Vol. 5 (2nd edn), pp. 845-854. Editorial Committee of Flora of Taiwan. Department of Botany, National Taiwan University, Taipei.