

Meconopsis merakensis var. *merakensis* (Papaveraceae), a new record for India

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Abstract: *Meconopsis merakensis* Tosh.Yoshida, R.Yangzom & D.G.Long var. *merakensis* is reported for the first time in India, from the Tawang district of Arunachal Pradesh. It has deeply nodding, bowl-shaped, bluish or purplish flowers and the tip of the elongate rachis is often curved. Morphological characteristics of the species were examined and photographic plates are provided in the present communication for easy recognition of this taxon in the field.

Keywords: Arunachal Pradesh, Himalaya.

Introduction

Meconopsis Vig. is one of the most distinctive and beautiful genera of the family Papaveraceae (Taylor & Cox, 1934; Grey-Wilson, 2014). The genus was first described by Viguier in 1814 who named it poppy-like (from Greek *mekon* = poppy, *opsis* = likeness). Mostly herbaceous, the genus is native to the high-altitude areas of the Himalayas distributed from Pakistan, India, Nepal, Bhutan, Myanmar, to China. *Meconopsis* comprises c. 50–80 species (Grey-Wilson, 2014; Xiao & Simpson, 2017) with 16 species in India (Debnath & Nayar, 1993). The genus is characterized by large saucer-shaped blue, yellow, white, purple and red flowers. The majority of *Meconopsis* species are used in traditional herbal medicine systems (Kala, 2003) and some species are also cultivated as ornamentals for their attractive

flowers. The genus exhibits wide morphological variation in terms of height, ranging from a few centimetres to 2 meters. The plants occur along a wide altitudinal gradient from 3000 to 5800 m. *Meconopsis* has been defined by several authors based on morphological (Prain, 1906; Kingdon-Ward, 1926; Taylor & Cox, 1934; Wu & Chuang, 1980; Grey-Wilson, 2014), cytological (Kumar *et al.*, 2013) and molecular phylogenetic traits (Xiao & Simpson, 2015, 2017). Morphological and recent molecular studies have raised concern regarding the taxonomy of *Meconopsis* and *Papaver* L. Comprehensive molecular studies need to be carried out to resolve the taxonomical ambiguity of the genera. In the present study, the most recent and authentic literature is followed for taxonomical treatment of *Meconopsis merakensis* var. *merakensis*.

The high altitude areas of eastern Himalaya remain largely botanically unexplored and the regions hold great potential for the discovery of many new species. During the floristic study of the high-altitude wetland flora of the Tawang district of Arunachal Pradesh, specimens of *Meconopsis* were collected from different locations in the study area during the summer and rainy seasons of the years 2016 to 2018. One interesting *Meconopsis* taxon was collected from the alpine rocky slope near Nagula Tso wetland area (Latitude N 27°39'04.07" and Longitude E 91°51'48.95" at an altitude of around 4200 m) in the rainy season in 2018. The Nagula Tso Wetland Complex (NWC) is situated North of the Tawang township of western Arunachal

Pradesh, bordering China (Tibet). The NWC contains more than 100 permanent alpine freshwater lakes distributed between 3000 to 4420 m altitudes. Nagula Tso lake is located between Latitude N 27°39'16.27" and Longitude E 91°51'48.09" at around 4120 m altitudes, and is locally known as *Gribtsang Tsho* (Fig. 1). The entire Nagula Tso area is a pilgrimage site of the Buddhist community (*Monpa*) of Tawang.

The collected specimen possessed a blue flower, spiny hairs covering the stem and leaves, and a narrow, curved tip of the elongate rachis. A perusal of the literature revealed that this specimen belongs to *Meconopsis merakensis* Tosh.Yoshida, Yangzom & D.G.Long var. *merakensis*, which has recently been described from Merak and Sakten localities of Trashigang district in Bhutan (Yoshida *et al.*, 2017). Therefore, the present communication reports it as a new distributional record for the flora of India. A detailed description and photographs of the taxon are provided for its identification.

Materials and Methods

The standard taxonomic procedure was adopted to process the collected specimens (Rao & Sharma, 1990). The voucher specimens were deposited at the herbariums of the G.B. Pant National Institute of Himalayan Environment (GBPI) and Botanical Survey of India Arunachal Pradesh Regional Centre (ARUN) for future reference. After a critical study of herbarium specimens housed at various institutions such as the Botanical Survey of India, Itanagar (ARUN), State Forest Research Institute (SFRI), Itanagar, Rajiv Gandhi University (RGU) and International online herbaria of Royal Botanic Gardens, Kew, United Kingdom and review of relevant literature (Wu & Chuang, 1980; Grey-Wilson, 2014; Yoshida *et al.*, 2016; Xiao & Simpson, 2017) and further personal communication with the experts (Dr. Grey-Wilson & Mr. T. Yoshida), the specimen was identified as *Meconopsis merakensis* var. *merakensis*. The distribution maps were prepared using the software QGIS 3.12.1-Bucuresti (QGIS Development Team, 2020)

Taxonomic treatment

Meconopsis merakensis Tosh.Yoshida, Yangzom & D.G. Long var. ***merakensis***, *Sibbaldia* 14: 89. 2017["2016"]. *Type*: BHUTAN, **Trashigang district**, Merak region, 03.07.2014, 4290 m, R. Yangzom & C. Wangmo 730 (THIM!). **Figs. 1 & 2**

Herbaceous, monocarpic, 30–60 cm tall, whole plant covered with brown or white patent spiny hairs throughout; stems 12–30 cm long, spreading, with 2–5 mm long bristles. Basal leaves many; petioles broadly linear, membranous, 2–8 cm long; lamina mostly strap-shaped or linear-oblong, margins entire or wavy, occasionally coarsely toothed, acute or rounded at apex, densely covered with patent spiny hairs on both surfaces. Inflorescence racemose, tip of elongate rachis often gradually narrowed and curved. Flowers 4–12, on 2–4 cm long pedicels, usually nodding, bowl-shaped, 2–6 cm across. Sepals 2 or 3, oblong, 1–1.6 cm long. Petals 4–6, broadly obovate-suborbicular, 2–4 cm long, margins entire, bluish or purplish. Stamens numerous; filaments filiform, 6–8 mm long, yellow. Ovary ovoid, densely bristly; style 1–4 mm long; stigma 4–7-lobed, greenish yellow. Capsules sub-cylindrical, bristly, 3–3.5 cm long, with prominently thick conical base.

Flowering & fruiting: Flowering from July to August and fruiting from August to September.

Habitat: The plants occur on Northwest facing alpine meadows and rocky slopes in high altitude Himalaya, between 3800–4500 m. The species is very rare and occurs in the field with scattered populations confined to some isolated pockets in the Northwest regions of the Nagula lake area. The *Monpa* community of Tawang has strictly prohibited the collection of fuel wood, fodder and other forest resources from the Nagula Tso sacred landscape under their community customary laws.

Distribution: Eastern Bhutan and now in India.

Specimen examined: INDIA, **Arunachal Pradesh**, District Tawang, Nagula Tso N 27°39'04.07" E 91°51'48.95", 4200 m, 30.07.2018, K.S. Kanwal & M. Ori SERB/KSK/1203 (ARUN, GBPI).

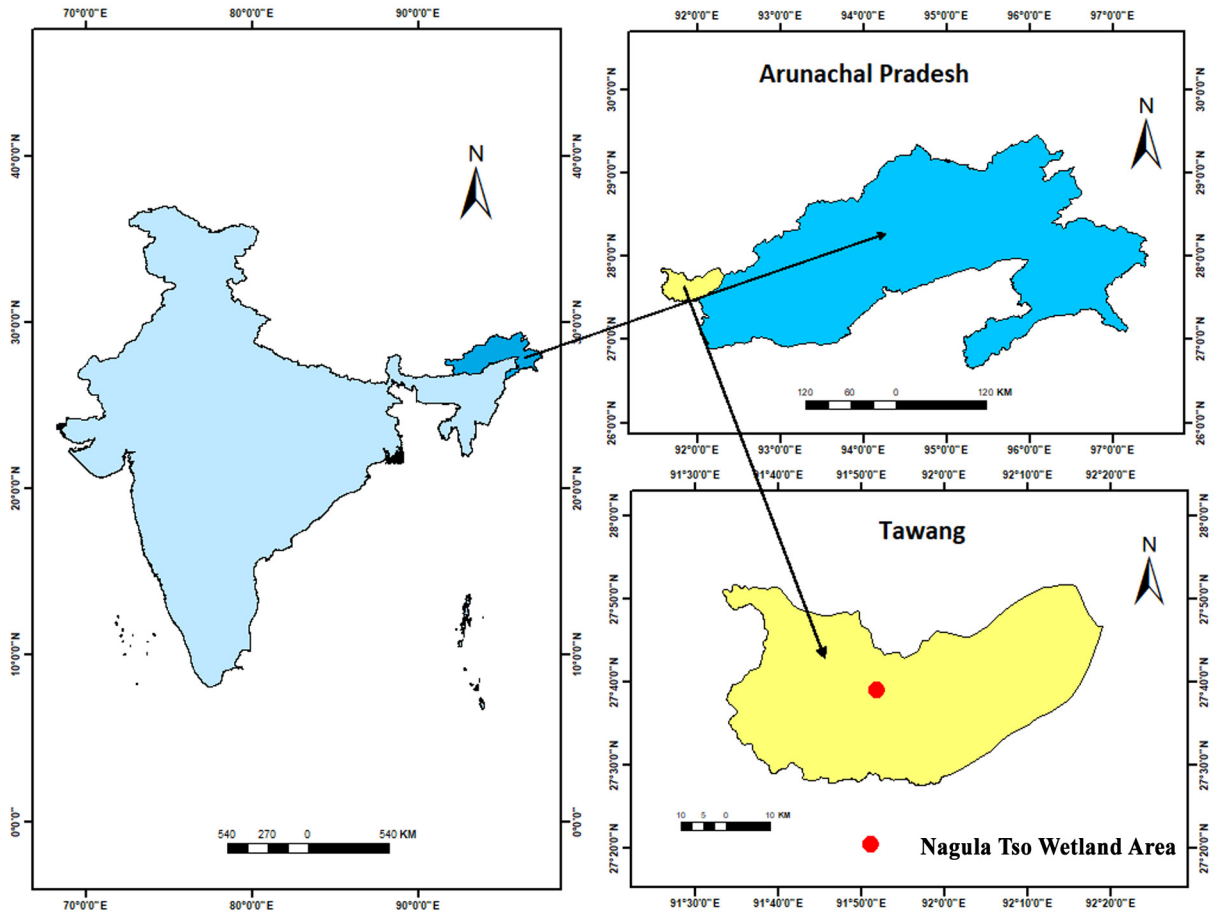


Fig. 1. Map area and the collection point of *Meconopsis merakensis* Tosh.Yoshida, Yangzom & D.G.Long var. *merakensis* in the Tawang district[drawn using the software QGIS 3.12.1 -Bucuresti (QGIS Development Team, 2020)].

Conservation notes: *Meconopsis merakensis* var. *merakensis* faces threats from livestock, mainly from trampling by yaks and horses, unregulated tourism, development works that result in the destruction and fragmentation of the species' habitat. In the future, the species may face further threats due to climate change. Seven species of *Meconopsis* have shown an upward shift in mean elevation of 302.3 m between the pre 1970s (1922–1969) and the post 1970s (1970–2016) in the Himalaya–Hengduan Mountains region (He *et al.*, 2019). Endemic and rare plant taxa, such as *M. merakensis* var. *merakensis*, with very small populations and special habitats, require specific conservation measures such as the development of an on-site *Meconopsis* garden for the germplasm conservation in the Tawang district.

Notes: The detailed analysis carried out here revealed that *M. merakensis* var. *merakensis* is close to *M. prainiana* Kingdon–Ward var. *prainiana* in having four-petalled flowers, hairy stems and in leaf structure but differs by its longer and sub-cylindrical capsules and stems less densely covered with spiny hairs (Yoshida *et al.*, 2017[“2016”]). *Meconopsis merakensis* has two varieties, var. *merakensis* characterised by its bluish or purplish flowers, and *M. merakensis* var. *albolutea* Tosh.Yoshida, Yangzom & D.G.Long distinguished by its white or yellow flowers (Yoshida *et al.*, 2017). The latter variety is distributed in Bhutan and western Arunachal Pradesh, India.

Key to *Meconopsis prainiana* and *M. merakensis* and their varieties (adopted from Yoshida *et al.*, 2017)

1. Capsules ellipsoid, 1.5–2.5 cm long; stems quite densely covered with patent spiny hairs 2

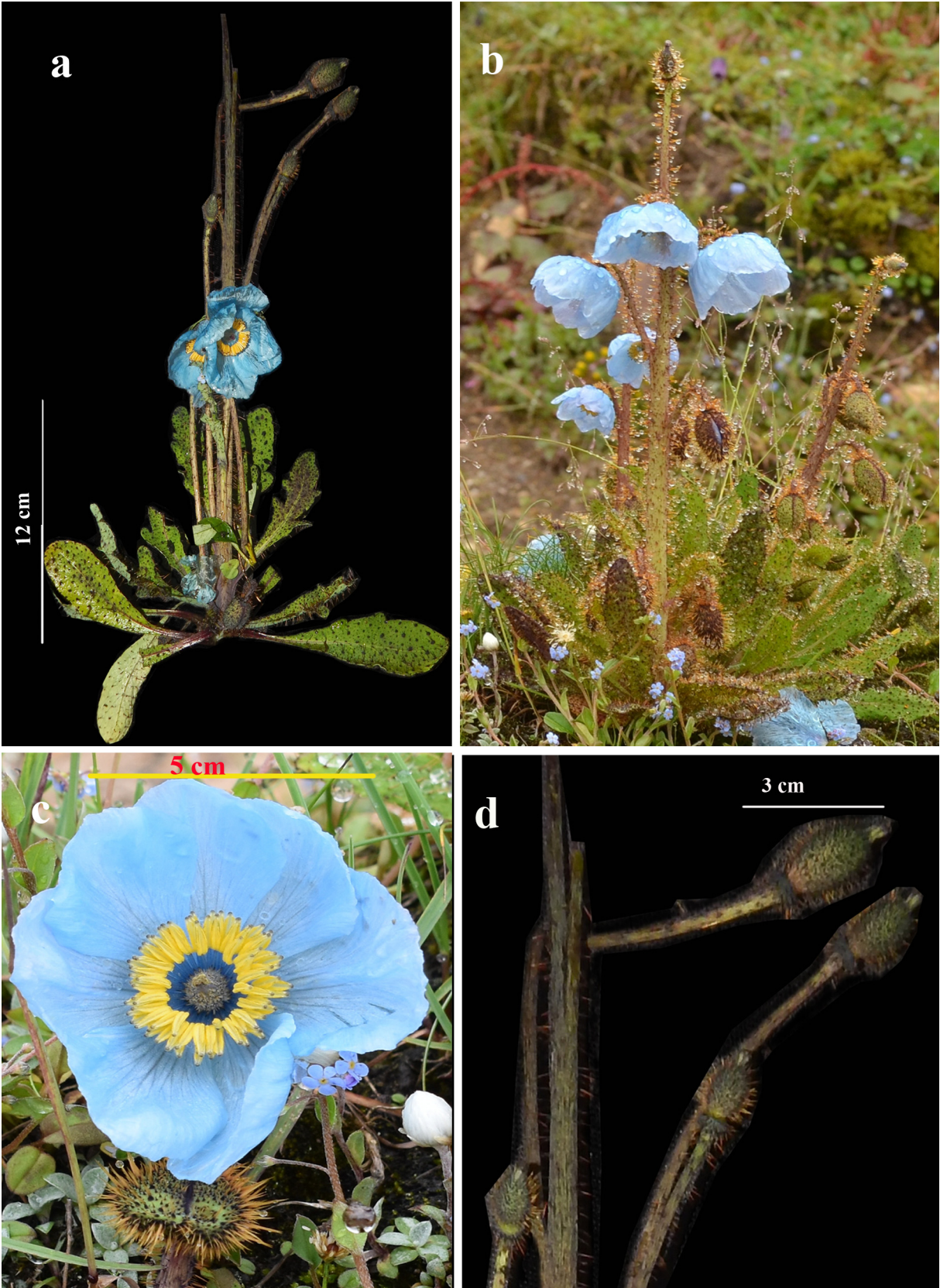


Fig. 2. *Meconopsis merakensis* Tosh.Yoshida, Yangzom & D.G.Long var. *merakensis*: **a.** Habit; **b.** A plant in natural habitat; **c.** Flower – enlarged view; **d.** Capsules (from K.S. Kanwal & M. Ori SERB/KSK/120g; photos by Dr. K.S. Kanwal).

1. Capsules sub-cylindrical, 3.0–3.7 cm long; stems less densely covered with spiny hairs ...
..... 3
2. Petals pale blue to purple
..... *M. prainiana* var. *prainiana*
2. Petals pale yellow *M. prainiana* var. *lutea*
3. Petals bluish or purplish
..... *M. merakensis* var. *merakensis*
3. Petals white or yellow
..... *M. merakensis* var. *albolutea*

Acknowledgements

The authors are highly thankful for financial support from the Research project (F.No. EMR/2014/000408) funded by the Science & Engineering Research Board (SERB), Department of Science and Technology (DST), Government of India. The second author is thankful to the Director, Botanical Survey of India and Head of Office, BSI APRC, Itanagar, Arunachal Pradesh for necessary facilities and encouragement. The authors are also thankful to the local community for valuable information about the Nagula Tso wetland area. The authors gratefully acknowledge the help of Mr. Toshio Yoshida, Chiba, Japan and Dr. Magnus L. Liden, Uppsala University, Sweden for species identification and valuable suggestions. We are also highly grateful to the Department of Environment and Forest, Govt. of Arunachal Pradesh and the Indian Army for giving necessary permission and support during the field study.

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