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Cover: *Saproamanita praeclara*: Sporocarp in habitat © Kantharaja. R.



Endemic *Primula xanthopa* Balf.f. & R.E. Cooper: rediscovery after 88 years from Bumdeling Wildlife Sanctuary, Bhutan

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The genus *Primula* L. is one of the largest genera with approximately 430 species distributed in temperate and alpine regions of the northern hemisphere (Richards 2003; Ghalley et al. 2021). About 71 species of *Primula* L. are recorded in Bhutan (Grierson & Long 1999; Ghalley et al. 2021). *P. xanthopa* Balf.f. & R.E. Cooper is endemic to Bhutan, recorded only from a single locality where it was discovered by R.E. Cooper on 10 August 1915 during an expedition in Bhutan (Smith & Fletcher 1943). The species was collected again by Ludlow & Sherriff from the same locality in 1933 (Smith & Fletcher 1943). The present record of *P. xanthopa* Balf.f. & R.E. Cooper was rediscovered from south-west of Bumdeling Wildlife Sanctuary, Bhutan (91.313°E, 27.577°N) on 5 August 2021 at an elevation of 3,785 m. This rediscovery of the species comes after a lapse of 88 years from the time it was last recorded by Ludlow and Sherriff in 1933. *P. xanthopa* was found growing in a Fir-forest with existential threats from grazing and anthropogenic activities. The current findings used Flora of Bhutan manual for identification and morphological description of *P. xanthopa*, along with description on its distribution. Herbarium specimen was prepared, and the specimen is

deposited in the herbarium center of Bumdeling Wildlife Sanctuary.

P. xanthopa was collected during a field exploration on 5 August 2021 from Dongla pass, Lhuntse district, Bhutan. Herbarium specimen was prepared following Smith (1971) and submitted to Bumdeling Wildlife Sanctuary herbarium collection center with the herbarium collection number 330. The morphological characteristics were examined for confirmation of the identity of the specimen using the manual “*Flora of Bhutan*” (Grierson & Long 1999). The Geo-coordinates were recorded with Garmin GPS.

Taxonomy: *P. xanthopa* Balf.f. & R.E. Cooper in Notes Royal Botanical Garden Edinburgh (1916); Ward (1930); Smith & Fletcher (1943); Grierson & Long (1999).

Type: Bhutan, Dong La, Kurted (Cooper, 4393-type, 4977); Ludlow & Sherriff, 329, (Syntype-BM, Photo!)

Description: Perennial herb with slender rhizome bearing withered leaves remains. Leaves obovate or elliptic or oblong including petiole 2–9 cm long, 0.8–2 cm broad; apex rounded, margin coarsely sharply toothed, base narrowed to a slender petiole, glabrous and efarinose above, thickly golden farinose beneath.

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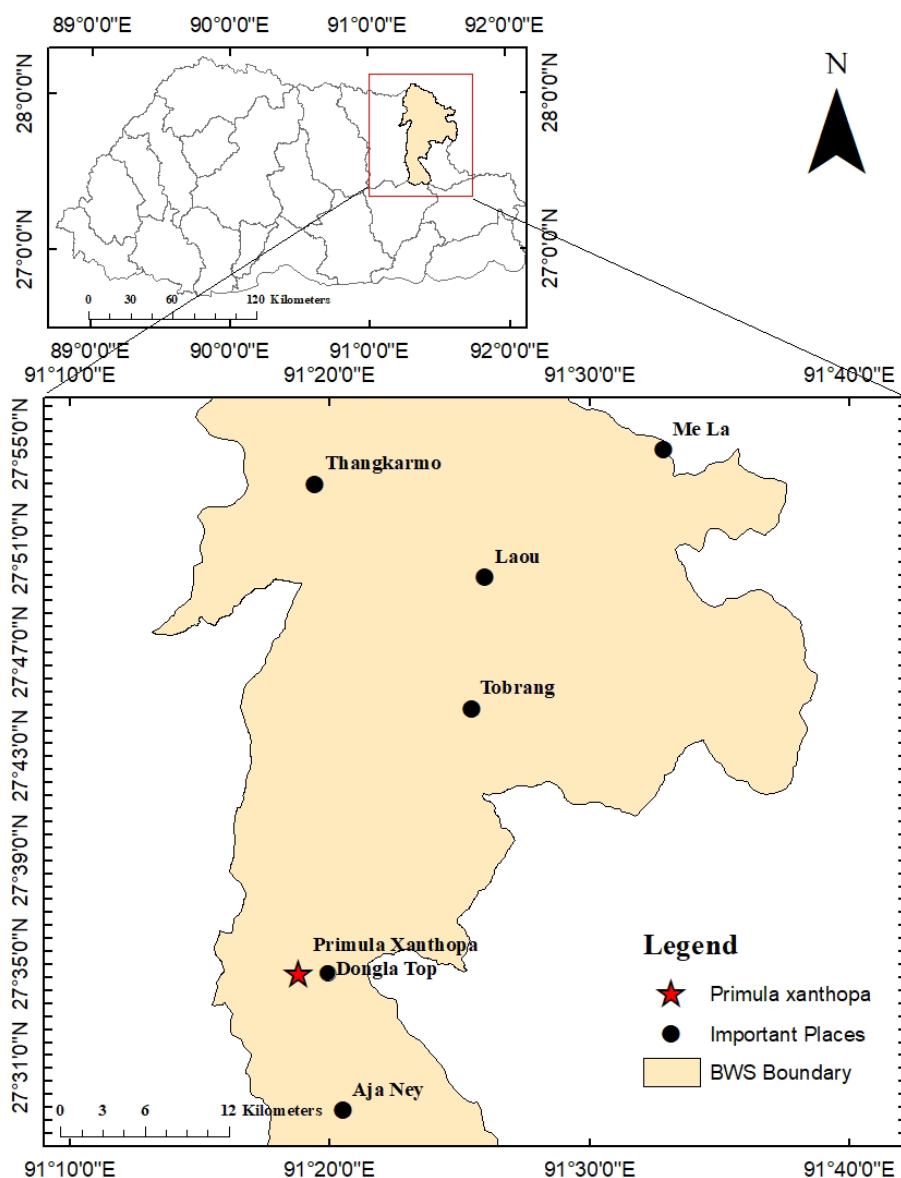


Figure 1. Distribution record of *Primula xanthopa* in Bumdeling Wildlife Sanctuary, Bhutan.

Midrib conspicuous below with very slender lateral nerves; petiole winged, as long as the blade or up to twice as long, broad and sheathing at the base, yellow-farinos. Scape 5–12.7 cm tall, slender, farinose towards the apex, carrying 1–4 flowers. Bracts unequal, oblong to slightly oblanceolate, 7 mm long and nearly 2 mm broad, or linear-lanceolate and about 3.5–4 mm long, in all cases more or less farinose. Pedicels up to 1 cm long, sub-erect, yellow-farinos. Calyx 4–6 mm long, campanulate, farinose within and without, cut to about two-third into oblong-ovate obtuse or acute teeth. Corolla purplish pink with a yellow eye, exannulate, heteromorphic; tube cylindrical, ampliate above the insertion of the stamens, about 1 cm long; limb 1–16

cm across with obovate emarginate lobes. Stamens, Kith anthers barely 1 mm long, inserted near middle of tube in pin-eyed flowers, towards apex in thrum-eyed. Long style almost equaling tube; short style as long as calyx. Capsule oblong, almost 5–6 mm long, included in calyx (Smith & Fletcher 1943; Grierson & Long 1999).

Distribution: Dongla, Bumdeling Wildlife Sanctuary, Bhutan (Figure 1)

Specimens examined: Bhutan, Bumdeling Wildlife Sanctuary, (Dongla, Lhuntse) (91.313°E, 27.577°N; 3,785m) 5 August 2021, R.E Cooper, Dongla, 1915, (Syntype BM, Photo!). The specimen was deposited at Bumdeling Wildlife Sanctuary herbarium collection center, Trashiyangtse with collection number 330, which



Image 1. *Primula xanthopa*: A—Habit and habitat | B & E—Corolla with yellow eye | C—Inflorescence | D—Entire plant | F—Calyx | G—Leaves.
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was collected on 5 August 2021 by Mr. Karma Sangay from Dongla, Lhuntse (Image 2).

Habitat: This species is found only from Dongla in Bumdeling Wildlife Sanctuary, eastern Bhutan, where it was found by Cooper in 1915, growing on mossy rocks/cliffs under fir forest at 4,000 m (Smith & Fletcher 1943). The actual coordinates of *P. xanthopa* was not reflected by R.E. Copper as well as other plant explorers except the locality name and habitat (Smith & Fletcher 1943). Similarly, in this current observation, the plant was found growing on mossy rock and cliff-ledges in a fir forest in the vicinity of the same locality as found by R.E. Copper and Ludlowi & Sherrif, dominated by *Abies densa* Griff, *Rhododendron lepidotum* Wall, associated with *Rosa sericea* Lindl and herbs like *P. gracilipes* Craib and *P. denticulata* Sm. The plants of *P. xanthopa* were found growing in Dongla, Lhuntse at a single locality at an altitude of 3,785 m in the current observation. The plants were inhabiting shady cliffs facing north-west direction.

Flowering: *P. xanthopa* flowers in July–August, Corolla purplish-pink with a yellow eye with long style almost equaling tube; short style as long as calyx and deeply incised leaves and long petiole which distinguish it from similar plants like *P. yunannensis* Franch (Smith & Fletcher 1943).

Conservation status: *P. xanthopa* is endemic to Bumdeling Wildlife Sanctuary, Bhutan. The species is not listed in International Union for Conservation of Nature Red List (IUCN) as the species remained unexplored since 1933 with limited information (Ward 1930). Despite being endemic and rare, it is not included in protected plant species list of Forest and Nature Conservation Rule and Regulation (2017), Bhutan. The habitat of *P. xanthopa* was observed to have existential threats from grazing animals and anthropogenic activities

such as timber extraction, which pose major concerns over its distribution. Proper conservation methods are needed before the habitat of this endemic species will deteriorate and vanish leading to extinction of the species. Therefore, concerned authorities and agencies should initiate appropriate strategies to conserve this species from threats and developmental activities.

Conclusion: *P. xanthopa* is recorded from Dongla pass, Bumdeling Wildlife Sanctuary, Bhutan during floristic exploration on 5 August 2021. A single plant was found growing on a mossy rock in a fir forest in the vicinity of the same locality where it was found by R.E. Copper, Ludlowi & Sherrif. The habitat of rare *P. xanthopa* was observed to have existential threats from grazing animals and anthropogenic activities such as timber extraction, posing major concerns over its distribution. The plant should be protected at the earliest by all feasible methods before its disappearance.

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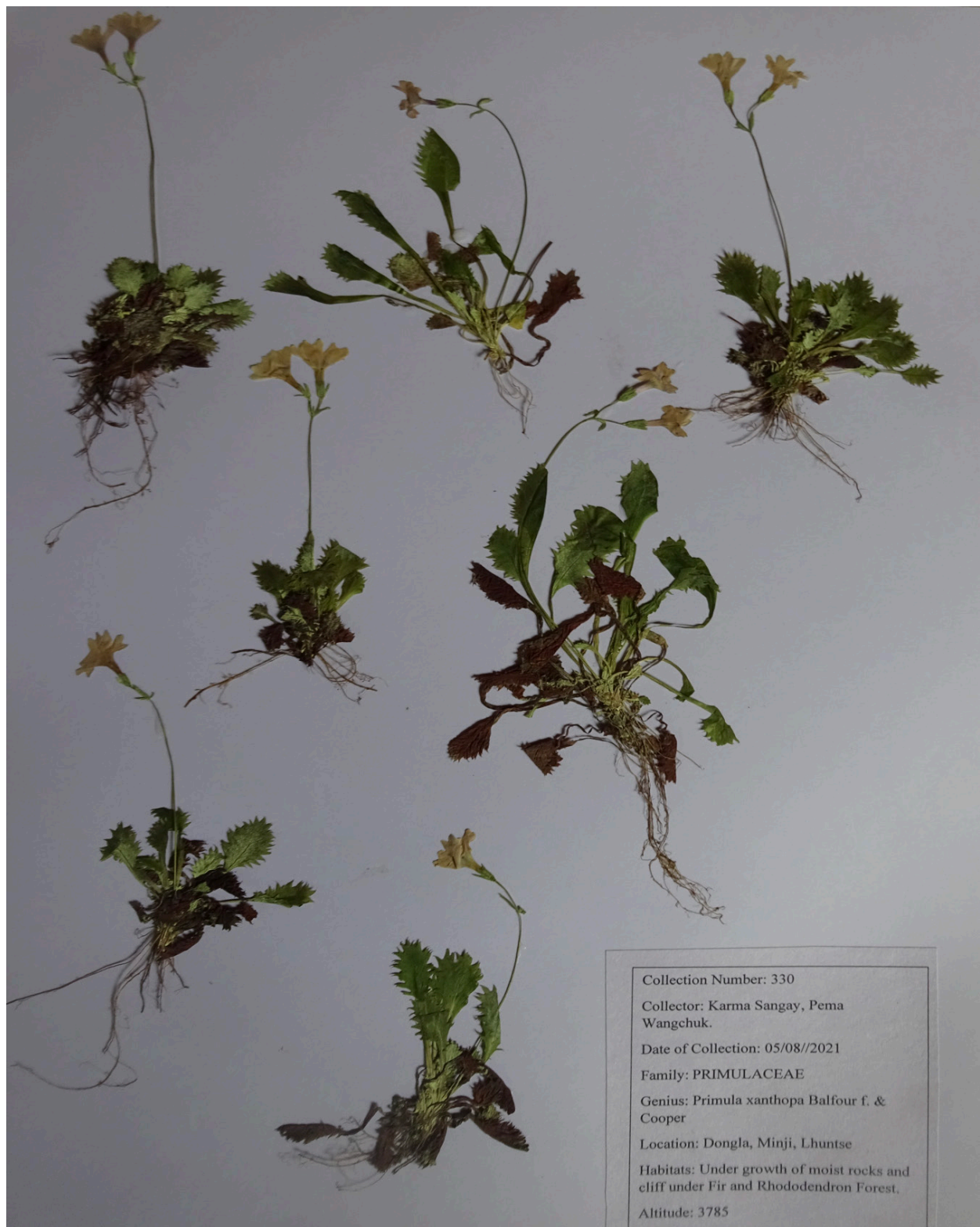


Image 2. Herbarium sheet of *Primula xanthopa*.

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