

***Exacum paucisquamum* (Gentianaceae): a new record for Odisha state from Bonai Forest Division, Odisha, India**

Abstract

Exacum paucisquamum (C. B. Clarke) Klack., so far known only from Western & Eastern Himalayas in India, is reported for the first time from Odisha state. A detailed description of the species, including its phenology, distribution and photographs along with documented associated plants are provided for easy identification in the field. The authors observed it under the leaf litter in moist deciduous forest of Bonai Forest Division, Odisha, India. Therefore, the prevention of forest fire is important to conserve the plants growing associated with leaf litter. The occurrence of *E. paucisquamum* also indicates the healthy forest of the study areas and further need more exploration works on floral diversity.

Keywords: Bonai, Leaf litter, Moist deciduous forest, Mycoheterotrophic

Introduction

Exacum paucisquamum (C. B. Clarke) Klack. was known to occur in India in the state of Sikkim (Singalila range), West Bengal (Darjeeling), in the moist Eastern Himalayas and Uttarakhand (Chamoli) in the Western Himalayas (Clarke 1883; Hara 1975; Tiwari et al. 2015), but the species is not reported from the Odisha state, India. During recent exploration on biodiversity assessment and restoration of threatened plants, on 3 September 2022 in Sole range of Bonai Forest Division (Figure 1), Odisha, the authors collected an interesting species under the leaf litter. After critical morphological **observation and literature review (Yuan et al. 2003, 2005; Klackenberg 2006; Tiwari et al. 2015; Gomes et al., 2022), it** was found that the collected species on decomposed leaf litter was *Exacum paucisquamum* (C. B. Clarke) Klack. This paper is the first report of the species from Odisha state, India. A detailed description, phenology, distribution and photographs along with its associated plants are provided for easy identification.

Taxonomic Treatment

Exacum paucisquamum (C. B. Clarke) Klack., Bot. Jahrb. Syst. 126:478. 2006. *Cotylanthera paucisquama* C.B. Clarke in Hook. f., Fl. Brit. India 4: 94. 1883; H. Hara, J. Jap. Bot. 50:327. 1975; Ho & Pringle, Fl. China 16:3. 1995. *Cotylanthera yunnanensis* W.W. Smith, Notes Roy. Bot. Gard. Edinburgh 13: 158. 1921.

Description

Mycoheterotrophic herb, reached about 3.5-6.5 cm in height. Stem is white, erect, simple and fleshy. Leaves 3-6 pairs, scale-like, opposite, sessile; blade 1.5-3.0 mm long, margin entire, apex acute. Indumentum slightly pubescent. Flowers are solitary, terminal. Calyx 4-lobed, dull white, 3-5 mm long, triangular, apex obtuse; mid-vein distinct. Corolla 4-lobed, dark blue-whitish, 1 cm long, narrowly oblong, entire at margin, obtuse at apex. Stamens 4, anther yellow, 2.5-4.2 mm long, sagittate, slightly curved; filament white, up to 3.1 mm long, linear. Style is linear, 5.8-8.5 mm long. Ovary ovoid-ellipsoid, 2-celled. Capsules are subglobose. Seeds are numerous (Plate 1).

Flowering & fruiting: August – September

Habitat: The species was collected in moist area with rich decomposed leaf litter in evergreen and moist deciduous forest at elevation of 680 msl.

Distribution: China, Hong Kong, NW. Vietnam, India (Sikkim, Uttarakhand, West Bengal, Odisha)

Associate plant species: *Combretum roxburghii* Spreng. (Combretaceae), *Aeginetia indica* L. (Orobanchaceae), *Epipogium roseum* (D. Don) Lidl. (Orchidaceae), *Goodyera hispida* Lind. (Orchidaceae), *Shorea robusta* Roth. (Dipterocarpaceae) and *Nervilia concolor* (Blume) Schltr. (Orchidaceae) (Plate 2)

Notes: The collected plant is growing under leaf litter only. Therefore, the conservation and protection of forest floor from forest fire is important for the conservation of the species. The population was also associated with ground orchids and other terrestrial parasitic plants.

Specimen examined: India, Odisha, Sundargarh, Bonai Forest Division, Sole, 22° 0' 30" N, 84° 36' 57" E, 680.17 m elevation, 3rd September 2022, Sweta Mishra & Sanjeet Kumar, 0073 (APRFH 073).

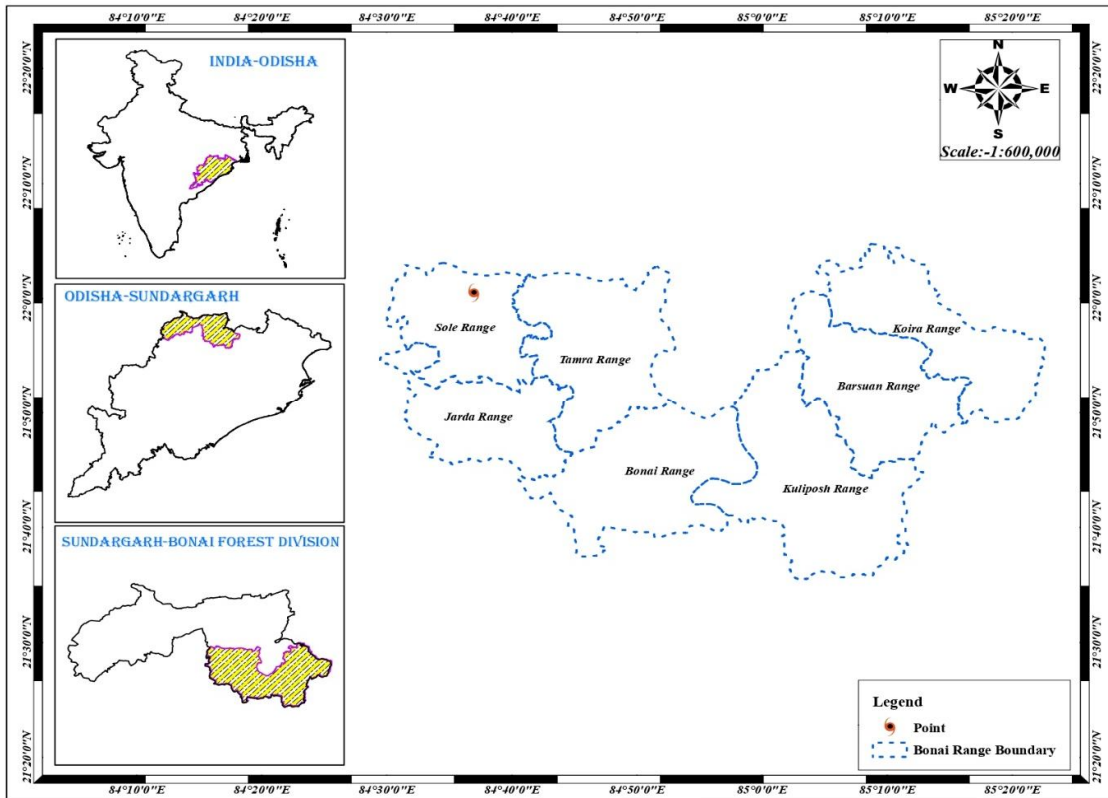


Figure 1: Location map of collected specimen in study area (Point = location of collected species)



Plate 1: *Exacum paucisquamum* (C. B. Clarke) Klack. A) Habit, B) Flower, C) Roots, D) Whole plant and E) Lateral view of the flowers

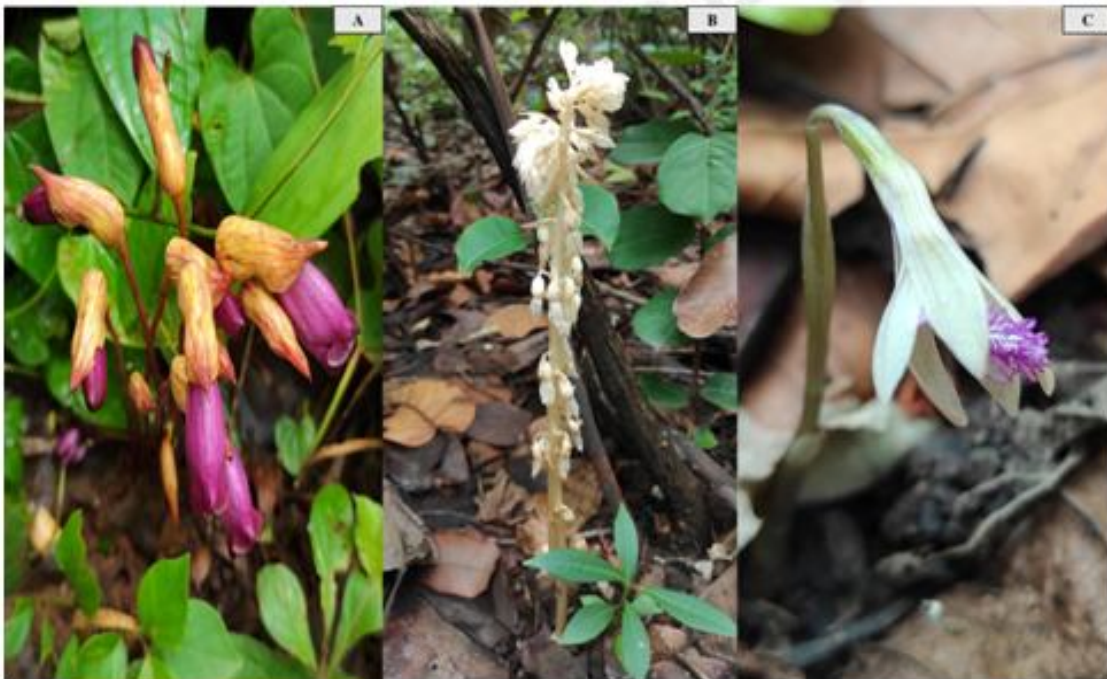


Plate 2: Some documented associated plants species, A) *Aeginetia indica* L., B) *Epipogium roseum* (D.Don) Lidnl., C) *Nervilia concolor* (Blume) Schltr.

Conclusion

The species is described for the first time in this study from the Indian state of Odisha. The presence of *E. paucisquamum* also suggests that the study areas' forests are in good shape and that additional research is needed to understand the richness of their floral species.

References

- Clarke CB. (1883). *Cotylanthera* Blume. In: JD Hooker (Ed.), Flora of British India. Reeve & Co., London. 4: 94-95.
- Hara H. (1975). A new species of *Cotylanthera* (Gentianaceae) from Philippines with a conspectus of the genus. The Journal of Japanese Botany. 50: 321-328.
- Klackenberg J. (2006). *Cotylanthera* transferred to *Exacum* (Gentianaceae). Botanische Jahrbücher für Systematik. 126: 477-481.
- Tiwari JK, Rawat DS and Tiwari P. (2015). *Exacum paucisquamum* (Gentianaceae): A new record for Western Himalaya, India. Rheedea. 25(1): 57-58.
- Yuan YM, Wohlhauser S, Moller M, Chassot P, Mansion G, Grant J, Kupfer P and Klackenberg J. (2003). Monophyly and relationships of the tribe Exaceae (Gentianaceae) inferred from nuclear ribosomal and chloroplast DNA sequences. Molecular Phylogenetics and Evolution. 28: 500-517.
- Yuan YM, Wohlhauser S, Moller M, Klackenberg J, Callmander M and Kupfer P. (2005). Phylogeny and biogeography of *Exacum* (Gentianaceae): a disjunctive distribution in the Indian Ocean Basin resulted from long distance dispersal and extensive radiation. Systematic Biology. 54: 21-34.
- Gomes SI, Kikuchi IA, Lachenaud O, Perdomo J, Léotard G, Maas PJ, Maas-van de Kamer H, Merckx VS. Unravelling the species diversity, phylogeny and biogeography of the mycoheterotrophic Voyriaceae (Gentianaceae) and the description of a new species. TAXON. 2022 Oct;71(5):1013-24.