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A third species of *Epipogium* (Orchidaceae) added to the Indian flora

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Abstract
Epipogium japonicum Makino was recently observed in Neora Valley National Park, Darjeeling, West Bengal, India. Its presence as a new addition to Indian flora brings to 3 the number of known species on the Indian territory. A brief description with an illustration, a determination key and a geographical distribution map of the three species known in India are proposed.

Résumé
Epipogium japonicum Makino a récemment été observé dans le Parc National Neora Valley (Darjeeling, West Bengal) en Inde. Ceci constitue une addition nouvelle à la flore indienne et porte à 3 le nombre d'espèces connues sur le territoire indien. Nous en donnons ici une brève description, accompagnée d'une illustration et d'une carte de distribution géographique en Inde des trois espèces en question. Une clé de détermination de ces trois espèces est également proposée.

Keywords: Flora of India, Neora Valley National Park, new record, taxonomy.
Mots clés : flore d'Inde, nouvel enregistrement, Parc national Neora Valley, taxinomie.

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Introduction

According to the world checklist of Orchidaceae (Govaerts *et al*., 2018), the mycotrophic genus *Epipogium* Gmelin ex Borkhausen (1792: 139) is comprised of three species. Later, this number increases up to 5 after the recent discovery of new species from Taiwan (Lin *et al*., 2016; Hsieh *et al*., 2018): *Epipogium aphyllum* Swartz (1814:32), *Epipogium japonicum* Makino (1904: 131), *Epipogium kentingensis* T.P.Lin & S.H.Wu (2012: 378), *Epipogium meridianus* T.P.Lin in Hsieh *et al*. (2018: 241) and *Epipogium roseum* (D.Don 1825: 30) Lindley (1857: 177).

The species of this genus are characterized by mycotrophic terrestrial plants, which appear only by a visible inflorescence in shaded and mushroom-rich areas, without chlorophyll throughout the life cycle and therefore heterotrophic, with a coralloid root system producing stolons that turn into new plants (Leake, 1994; Peterson *et al*., 1998; Mercky, 2013).

During a recent exploration in the field of Neora Valley National Park (in the upper Neora Range) located in the eastern Indian Himalayas, an inflorescence of *Epipogium japonicum* in bloom was collected. Terrestrial habit with coralloid root system and aphyllous condition of the specimen confirms as an *Epipogium*. The characters like upside down position of flowers with peculiar pattern of colourful spots on different parts of flower allow us to determine it as *Epipogium japonicum*. Moreover, studies of Indian references to Orchidaceae (Hooker,1888-1890 & 1895; King & Pantling, 1898; Duthie, 1906; Santapau & Kapadia, 1966; Pradhan, 1976 & 1979; Bose & Bhattacharjee, 1980; Deva & Naithani, 1986; Kataki, 1986; Kumar & Manilal, 1994; Hynniewta *et al*., 2000; Misra, 2004 & 2007; Yonzone *et al*., 2011 &2012; Kumar *et al*., 2013) showed that this observation is the first record of this taxon on Indian territory.

In this paper, a brief description accompanied by an illustration, a determination key and a geographical map of all known species in India are proposed.

Key to the *Epipogium* species in India

1a. Flowers not resupinate..***E. aphyllum***
1b. Flowers resupinate...2

2a. Spur close and almost parallel to ovary.......................................***E. roseum***
2b.Spur far from the ovary and almost at right angle with it, or curving away from it...***E. japonicum***

Taxonomic treatment

Epipogium japonicum Makino

in Botanical Magazine (Tokyo) 18: 131 (1904); Xinqi *et al*., *Flora of China* 25: 207 (2009); Raskoti, *Phytotaxa* 233: 182 (2015); Lin *et al*., *Taiwania* 61: 95 (2016). **Type**: Japan: Shimotsuke province, Sept. 09, 1904, *V.N. Aoki s.n.* (Herb.?).

Galera japonica (Makino) Makino, *Botanical Magazine* (Tokyo) 25: 228 (1911).

Indian material studied: West Bengal, Darjeeling, Neora Valley National Park, near PHE source camp, 27.10012ºN & 088.72330ºE, 2197m, October 05, 2018, *Vinay Ranjan* & *Anant Kumar 79344* (CAL).

Description (Fig. 1). Aphyllous, mycotrophic herbs, 15-20 cm high. Tubers obovoid or ellipsoid. Stem erect, terete, fleshy, yellowish with purple spots. Flowers pedicellate in distantly 6-8-flowered raceme; pedicels 2.5-3.5 mm long; floral bracts yellowish with purple spots, ovate-lanceolate, 8-12 × 3-4 mm, acuminate. Sepals and petals yellowish, sub similar, faintly 3-veined, mid vein prominent; dorsal sepal lanceolate, 10-12 × 3-3.5 mm, concave, acute at apex; lateral sepals oblong-lanceolate, 10-12 × 2.5-3 mm, acute at apex. Petals ovate-lanceolate, 10-12 × 3.5-4 mm, acute at apex. Labellum 12-14 × 2-9 mm, spurred, papillate, white with purple spots; hypochile circular with deep pit; epichile deltoid with a channel, 3-lobed at apex. Spur stout, inflated, 7-8 mm long, terete, blunt at end, almost perpendicular to the ovary, yellowish with purple spots. Column arcuate, ca. 2 mm long; rostellum short; anther pale yellowish, sub-orbicular, 2-3 mm across with anther cap; pollinia 2, yellow. Ovary ovoid, 5-6 × ca. 3 mm, yellowish with purple spots. Capsules not seen.

Distribution. This rarely recorded species grows in Japan, central Taiwan, southwestern China, central Nepal (Govaerts *et al*., 2018) and the Neora Valley National Park of Darjeeling Himalayas in West Bengal, India (Fig. 2).

Ecology. This species is reported from the dense and moist sub–temperate forest of Alubari area at an elevation of 2197 m in the Neora Valley National Park of the Eastern Himalayan range in India. This species was seen growing along the Neora river in rock crevices covered with the leaf litter of *Quercus* sp. and *Rhododendron* sp. The collection area Alubari is a steep hilly area endowed with annuals (*Begonia* sp., *Impatiens* sp., *Utricularia* sp., mosses) and orchids. The species is in flowering stage during the rainy season of September to early October.


a
b
c
d
e
5 mm
f
g
h
i
5 mm
j
5 mm
k
2 mm

opposite page

Fig. 1. ***Epipogium japonicum*** **Makino**

a: Habit. b: Close view of Flower. c: Dorsal sepal. d & e: Petals. f & g: Lateral sepals. h: Labellum. i: Side view of labellum with spur. j: Ovary with column & anther. k: Pollinia.

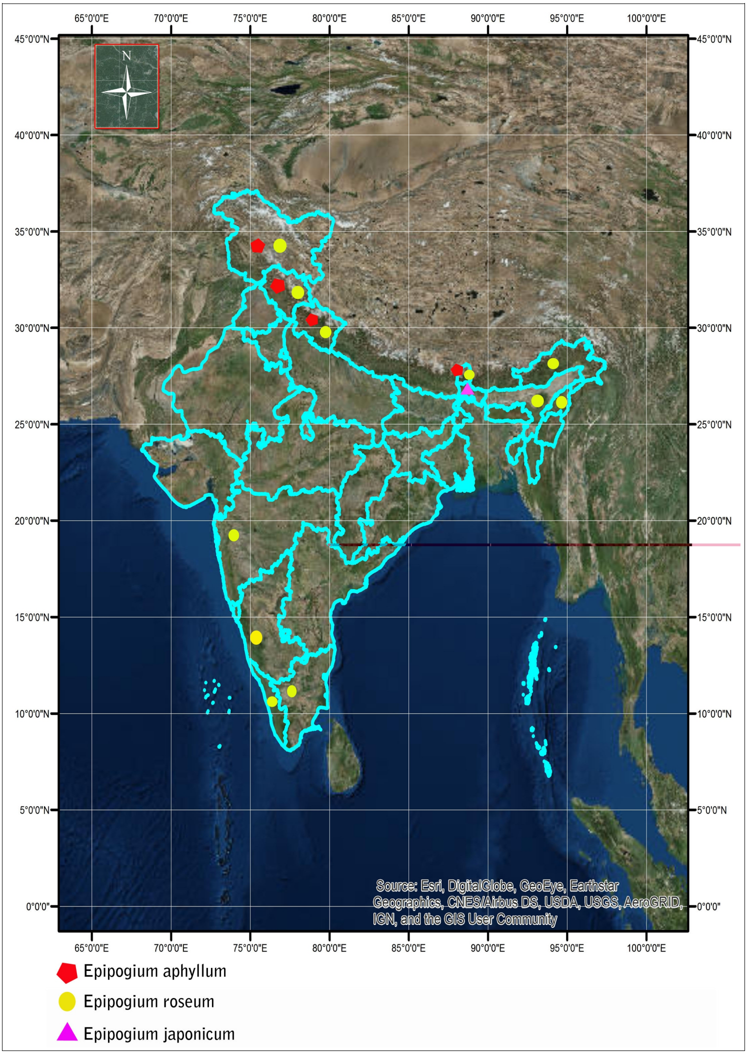

Fig. 2. Map showing the distribution of *Epipogium* in India.

Threats. The destruction as well as fragmentation of natural habitats of orchids in India is due to clear felling of forests for agricultural practices and infrastructural developments and climate change etc. Since the mycotrophic orchids grow in a unique habitat which is rich in organic matter, therefore the most ideal method of conservation is the protection of these habitats. Two (or three) individuals of *Epipogium japonicum* have been observed in Neora Valley National Park. For the accurate assessment of IUCN categories, more exploration in similar habitat is required.

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