

Extended distribution of *Oreorchis patens* (Orchidaceae) and its Red List status in India^a

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Mots-clés/Keywords : biogéographie/biogeography, conservation, Inde/India, Orchidaceae, *Oreorchis patens*, taxinomie/taxonomy.

Abstract

Oreorchis patens (Orchidaceae) is recorded for the first time from India. Its detailed description supplemented by photo-plates and information on habitat, phenology and distribution is provided. An artificial key to all taxa occurring under the genus *Oreorchis* in India is also provided. Its threat status in Indian context is assessed by applying IUCN Red Listing Criteria.

Résumé

Première observation et statut de conservation de *Oreorchis patens* (Orchidaceae) en Inde – *Oreorchis patens* (Orchidaceae) est enregistré pour la première fois en Inde. L'article fournit une description détaillée, des planches de photographies et des informations sur son habitat, sa phénologie et sa distribution géographique. Une clé artificielle d'identification de tous les taxons du genre existant en Inde est également proposée. Son statut de menace dans le contexte indien est évalué sur la base des critères de la Liste rouge de l'UICN.

Introduction

Oreorchis Lindley is an orchid genus comprising 16 or 17 terrestrial species (Freudenstein, 2005; Pearce and Cribb, 1997) distributed in the montane regions of the Western Himalayas, Tibet, South-West China, Siberia, Manchuria, Japan and Taiwan. Misra (2007) listed three taxa of *Oreorchis*

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from India namely *Oreorchis foliosa* (Lindley) Lindley, *Oreorchis foliosa* var. *indica* (Lindley) N.Pearce & P.J.Cribb and *Oreorchis micrantha* Lindley distributed in the Himalayan region. During a botanical excursion to Triyuginarayan in Garhwal region of Western Himalaya, the first author (DKA) came across some interesting specimens of terrestrial orchids growing among other orchids such as *Calanthe tricarinata* Lindley, *Cypripedium cordigerum* D.Don, *Oreorchis micrantha* Lindley, *Platanthera arcuata* Lindley, etc, on the temperate forest floor. On critical observation and perusal of relevant literature [Duthie, 1906; Deva & Naithani, 1986; Pearce & Cribb 1996; 1997; 2002; Chowdhery, 1998; Lucksom, 2007; Xinqi *et al.*, 2009] and in consultation with the images of type materials at GH, AMES, TAIF, the specimens were identified as *Oreorchis patens* (Lindley) Lindley, a taxon hitherto not recorded from India. Details of synonymy, description with photographs, phenology, habitat and distribution are provided for easy recognition of the species in the field. Taxonomy of this species is discussed and an artificial key to all taxa occurring under the genus *Oreorchis* in India is provided. Its threat status in Indian context is accessed by applying IUCN Red Listing criteria and guidelines (IUCN, 2012a; 2012b; 2013).

Results

Oreorchis patens (Lindley) Lindley

in *Journal of the Proceedings of the Linnean Society*. Botany 3: 27. 1858; Pearce & Cribb in *Edinburgh Journal of Botany* 54(3): 319. 1997; Xinqi *et al.*, in Z.Y.Wu, P.H.Raven & D.Y.Hong (eds.), *Flora of China* 25 (Orchidaceae): 246. 2009. Type: Siberia, 1826, *J.Prescott s.n.* (holo. K-LINDL *n.v.*).

Corallorhiza patens Lindley, *Genera and Species of Orchidaceous Plants*: 535. 1840.

Oreorchis lancifolia A.Gray in *Memoirs of the American Academy of Arts and Sciences*, n.s. 6: 410. 1858-1859. Type: Japan, Hakodate, 12 vi 1853, *Wright s.n.* (holo. GH, image viewed online).

Oreorchis setschuanica Ames & Schlechter in *Repertorium Specierum Novarum Regni Vegetabilis, Beihefte* 4: 65. 1919. Type: China, Western Szechuan [Sichuan], Pan-lan-schan, Kuan Hsien, vi 1908, *Wilson 1771* (holo. AMES, photo viewed online).

Oreorchis yunnanensis Schlechter in *Repertorium Specierum Novarum Regni Vegetabilis, Beihefte* 17: 68. 1921. Type: China, Yunnan, Maire s.n. (could not be traced – probably destroyed during WW II).

Oreorchis patens var. *confluens* Handel-Mazzetti, *Symbolae Sinicae* 7: 1353, t.42. 1936. Type: China, E Yunnan, 11 vi 1917, Handel-Mazzetti 10217 (holo. WU; iso W, n.v.).

Oreorchis gracilis Franchet & Savatier, *Enumeratio Plantarum in Japonia Sponte Crescentium* 2: 27, 512. 1879. Type: Japan, Sikock, v 1875, Rein 3518 (holo. P, n.v.).

Oreorchis patens var. *gracilis* (Franchet & Savatier) Makino ex Schlechter in *Repertorium Specierum Novarum Regni Vegetabilis, Beihefte* 4: 223. 1919; Pearce & Cribb in *Edinburgh Journal of Botany* 54(3): 322. 1997.

Oreorchis gracilis var. *gracillima* Hayata, *Icones Plantarum Formosanarum* 2: 141. 1912. Type: Taiwan, Rontabunzan, 29 iv 1914, U.Mori s.n. (holo. TAIF, image viewed online).

Oreorchis gracillima (Hayata) Schlechter in *Repertorium Specierum Novarum Regni Vegetabilis, Beihefte* 4: 223. 1919.

Oreorchis patens var. *gracillima* (Hayata) S.S. Ying in *Quarterly Journal of Chinese Forestry* 21(2): 116. 1988.

Description. Terrestrial herbs, generally 20-40 (rarely up to 70) cm tall. Roots thick, generated from the base of pseudobulbs. Pseudobulbs underground, corm-like, close together forming a row, 1-3.5 × 0.8-2 cm, 2-3 noded, ellipsoid-oblong to ovoid-conical, white, covered with brown, scarios sheaths at lower nodes, with sheathing leaf-bases at apical portion. Leaves 2 (sometimes 1), lateral on the pseudobulb (apical? See note below), petiole 5-8 cm long, enclosed in a brown, tubular sheath, lamina 18-20 (38) × 1.8-2.5 cm, narrowly elliptic-lanceolate to linear, entire, acuminate, plicate, horizontal on ground when flowering. Scape erect, terminal (lateral? See note below) on the pseudobulb, 20-28 (67) cm long, glabrous, green with purplish spots, with 2-3 distant, tubular, brown sheaths up to middle; rachis (4) 9-15.5 cm long, striated, lax to sub-densely (15) 20-25 flowered. Floral bracts 4-5 × c. 1.5 mm, membranous, lanceolate, acuminate, clasping. Flowers 1-1.2 cm across, widely opening, 8-12 mm long, yellowish-brown, flushed with purple inside, petals with large, longitudinal, purple spots inside, lip white with purple spots at side-lobes, apical part of mid-lobe and near the callus ridge, column white. Pedicel plus ovary filliform, 5-8 (12) mm long, resupinate. Dorsal sepals 5-6 (8.5) ×

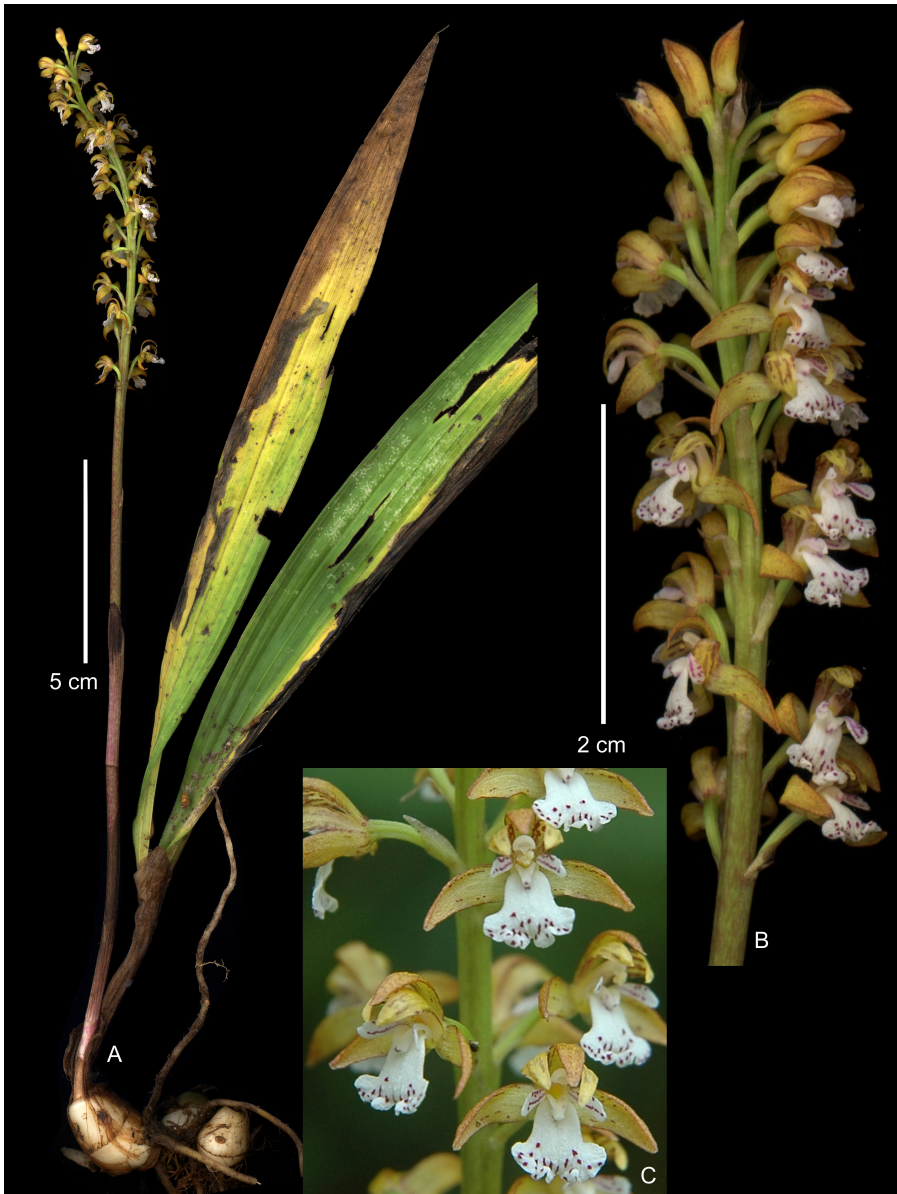


Plate 1. *Oreorchis patens* (Lindley) Lindley

A. Habit; B. Rachis with flowers; C. Close up view of a portion of rachis (not to scale) [Source: DK Agrawala 40119A (BSD)]

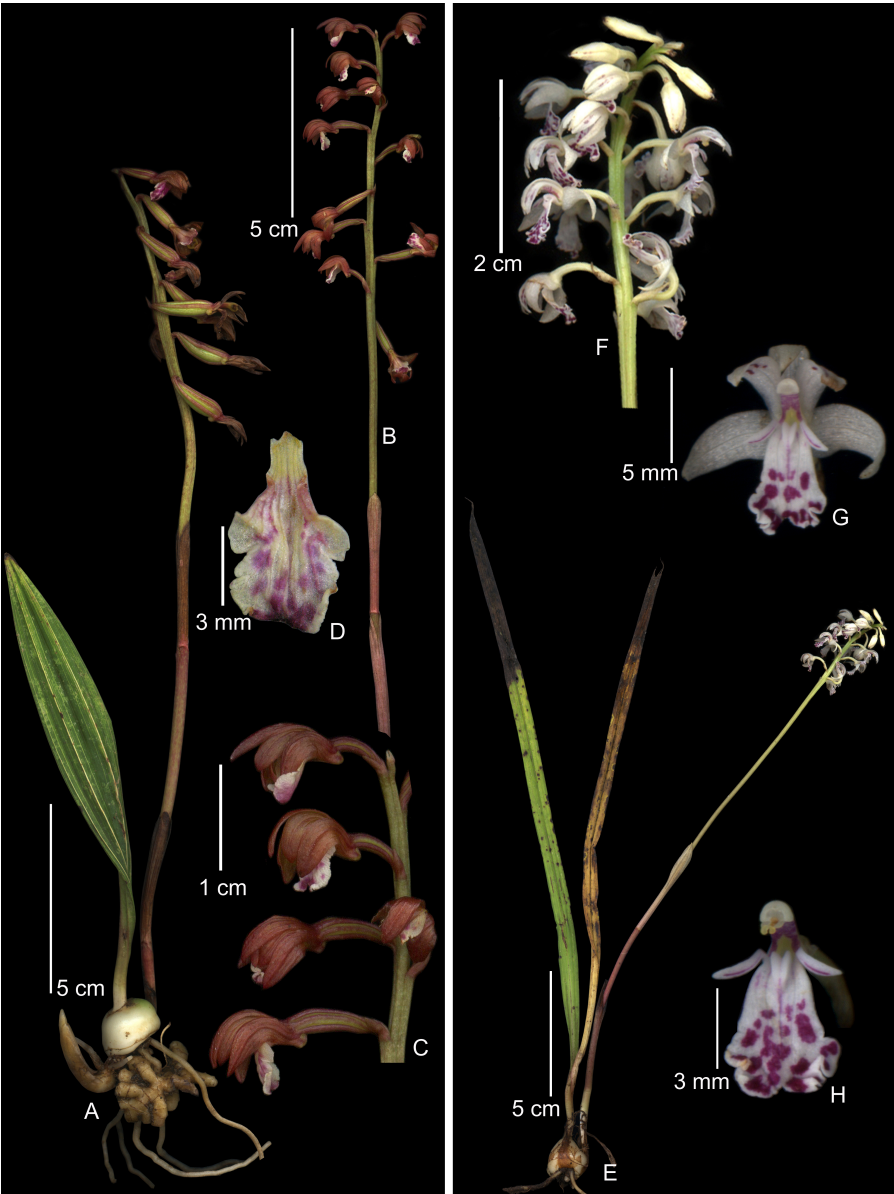


Plate 2. *Oreorchis foliosa* var. *indica* (A-D) & *O. micrantha* (E-H)

A. Habit; B. Inflorescence; C. A portion of inflorescence enlarged; D. Lip (flattened); E. Habit; F. Inflorescence; G. Flower; H. Lip and column. [Source: A-D: DK Agrawala 112100 (BSD); E-H: DK Agrawala 40119B (BSD)]

c. 1.5 mm, oblong-lanceolate, acute-acuminate, 3-veined, hooded with petals. Lateral sepals 5-6.5 (8.5) × 2-3 mm, falcate, lanceolate, acute, 5-veined. Petals 4.5-6 (7.8) × 1.2-1.5 (2.5) mm, oblong-lanceolate, falcate, acute, 3-veined. Lip 4.5-5.5 (8) mm long, 3.5-5 mm broad at the widest point, base cuneate, clawed, adnate to column-foot, 3-lobed; side-lobes arise below the middle, 2-3 × 0.7-1 mm, linear-oblong-lanceolate, falcate, arcuate; mid-lobe flabellate, cuneate at base, 3-5.5 (7) mm long, widening towards apex, strongly veined, margin strongly undulate towards apex, emarginate forming two converging lobules; disc with a pair of elevated callus ridge started above the base and run midway of the mid-lobe. Column 2.5-4 (5) mm long, arcuate, widening towards apex, extended at base into a short foot. Anther apical, stipe hamular, J-shaped. Capsules oblong. (PLATE -1).

Flowering. June-July. **Fruiting.** September-October (*vide* Xinqi *et al.* 2009).

Habitat. In shaded places in temperate grasslands in association with *Calanthe tricarinata*, *Cypripedium cordigerum*, *Oreorchis micrantha* etc. at an altitude of 2200-2250 m.

Distribution. INDIA: Uttarakhand; RUSSIA (SIBERIA); SOUTH KOREA; JAPAN; CHINA; TAIWAN.

Specimen examined. **India:** Uttarakhand, Rudraprayag district, Triyuginarayan, 2200-2250 m. [30°40'29.29"N; 78°57'48.88"E], 16.06.2007, *D.K.Agrawala* 40119 (BSD); **Japan:** Hakodate, 12 vi 1853, *Wright s.n.* [holotype of *Oreorchis lancifolia* A.Gray viewed online from GH]; **China:** Western Szechuan [Sichuan], Pan-lan-schan, Kuan Hsien, vi 1908, *Wilson* 1771 [holotype of *Oreorchis setschuanica* Ames & Schlechter viewed online from AMES]; **Taiwan:** Rontabunzan, 29 iv 1914, *U.Mori s.n.* [holotype of *Oreorchis gracilis* var. *gracillima* Hayata viewed online from TAIF].

Threat status in India. *Oreorchis patens*, although widely distributed from North-Western Himalaya to China, Taiwan, Russia (Siberia), South Korea and Japan, is known from India only from a single locality (as presently reported) in Triyuginarayan, Rudraprayag district of Uttarakhand. A total of 30 matured individuals were found spread over an area of about 1 square km of shaded forest floor. The habitat is subjected to direct threats like grazing and high degree of human encroachment for agricultural land. Khrapko (1990) recorded pollination of *Oreorchis patens* by the flies

Episyrphus balteatus and *Sphaerophata menthastri* (Diptera). However, this species also propagates vegetatively by annual sympodial growth from the base of the pseudobulb. Climate change is one of the plausible threats for this species. Being an annual herb, its generation length is estimated as 1 year. As there is no data available regarding the rate of population reduction, Criteria A and C (IUCN, 2012a) cannot be applied to evaluate its threat status. As it is (as we have stated above) known from a single habitat of 1 km², its Extent of Occurrence (EOO) and Area of Occupancy (AOO) are equal and estimated as 4 km² (Criteria B1, B2) by considering the grid of minimum size i.e. 2 km × 2 km. Number of location is one (B2a) and a continuous decline in area, extent, and quality of habitat is projected [B2b(iii)] considering the threats mentioned above. The population size is very small and restricted (Criteria D) with 30 matured individuals spread over the area of 1 km². Therefore, the threat perception on this species is assessed as Critically Endangered [CR B1B2ab(iii); D] in Indian perspective. As the other populations of this species in different countries are far away and separated by geographical barriers/ unsuitable habitats, immigration of propagules among the population is less likely. Therefore, no down-listing or up-listing of category (IUCN, 2012b) can be done with the original assessment.

Taxonomic notes.

(1) In the revision of the genus *Oreorchis*, Pearce & Cribb (1997) have treated *Oreorchis patens* and *Oreorchis patens* var. *gracilis* as distinct taxa based on number of leaves, the former being one leaved and the later with two leaves. However, they have described the pseudobulbs of *O. patens* as “uni-to bifoliate at apex” and mentioned under note as “one of the features common to all mainland plants is the presence of a single leaf. The Japanese plants, however, have one or two leaves and have been the subject of considerable confusion over the years”. Xinqi *et al.* (2009) have treated both taxa as synonymous and described the leaves as one or two. Considering the close similarity in floral characters, wide range of distribution and having examined the type materials of some of heterotypic synonyms under both taxa, we also agree with Xinqi *et al.* (2009) in treating these taxa as synonymous.

(2) Pearce & Cribb (1997) have described *Oreorchis patens* and *Oreorchis patens* var. *gracilis* as having apical leaves and a lateral scape. The illustration provided under *O. patens* clearly indicates the same. This character is not represented in the illustration of *O. patens* var. *gracilis*. Xinqi *et al.* (2009) have also described and illustrated the same under *Oreorchis patens*. However, in the present report, leaves are observed as lateral and the scape as terminal on the pseudobulbs. This character is also clearly observed in the types of *Oreorchis lancifolia*, *Oreorchis setschuanica* and *Oreorchis gracilis* var. *gracillima* (all now synonyms under *Oreorchis patens*). The description presented in this paper is compiled from recorded characters of our own collection, as well as on the characters described by Pearce & Cribb (1997) and Xinqi *et al.* (2009).

Key to all taxa of *Oreorchis* known to occur in India

- 1a. Lip without a callus; side-lobes of lip reduced or absent
..... *Oreorchis foliosa* var. *indica* (Lindley) Pearce & Cribb [PLATE-2 (A-D)]
- 1b. Lip with a callus ridge; side-lobes of lip well developed 2
- 2a. Side-lobes of lip broad, oblong to ovate, attached by a broad base to the centre of lip *Oreorchis foliosa* var. *foliosa*
- 2b. Side-lobes of lip narrow, slender, lanceolate-falcate, attached by a narrow base below the middle of lip 3
- 3a. Leaves apical; scape lateral; flowers white to pale yellow, with large purple blotch at mid-lobe of lip; apex of the lip weakly or not undulate
..... *Oreorchis micrantha* Lindley [PLATE-2 (E-H)]
- 3b. Leaves lateral; scape apical; flowers brownish yellow, with small, rounded purple spots at mid-lobe of lip; apex of lip strongly crispate-undulate *Oreorchis patens* (Lindley) Lindley [PLATE-1]

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Le genre *Oreorchis* comprend 16 ou 17 espèces terrestres distribuées dans les régions montagneuses de l'Himalaya occidental, du Tibet, de Chine du sud-ouest, de Sibérie, de Mandchourie, du Japon et de Taiwan. Trois taxons sont cités pour l'Inde : *Oreorchis foliosa*, *Oreorchis foliosa* var. *indica* et *Oreorchis micrantha* présents dans la région himalayenne. Lors d'une excursion botanique en Triyuginarayan dans la région de Garhwal, Himalaya occidental, le premier auteur a découvert une petite population d'un quatrième taxon, non encore enregistré pour l'Inde, *Oreorchis patens*, poussant parmi d'autres orchidées telles que *Calanthe tricarinata*, *Cypripedium cordigerum*, *Oreorchis micrantha*, *Platanthera arcuata* etc, sur le sol d'une forêt tempérée. Cet article fournit tous les détails sur la synonymie, une description accompagnée de photographies, et d'autres détails sur la phénologie, l'habitat, la distribution géographique et le statut de conservation au sens de l'UICN. Une clé artificielle de tous les taxons du genre présents en Inde est proposée.

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