



## Addition of two rare ground orchids in flora of West Bengal (India)

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### Abstract

*Goodyera recurva* Lindley and *Zeuxine gracilis* (Breda) Blume have been reported from Neora Valley National Park, Darjeeling, West Bengal. The presence of both species enriches the orchid flora of this province. Detailed descriptions, information on phenology, distribution and photo plates are provided for their easy identification in the field and to facilitate conservation measures.

### Résumé

*Goodyera recurva* Lindley et *Zeuxine gracilis* (Breda) Blume ont été signalés dans le Parc National de Neora Valley, Darjeeling, dans le Bengale occidental. La présence des deux espèces enrichit la flore d'orchidées de cette province. Une description détaillée, des informations sur la phénologie, la distribution et une illustration sont fournies pour faciliter l'identification sur le terrain et les mesures de conservation de ces deux taxons.

**Key words:** *Goodyera recurva*, Neora Valley National Park, *Zeuxine gracilis*

**Mots clés :** *Goodyera recurva*, Parc national de la vallée de Neora, *Zeuxine gracilis*

## Introduction

During a recent botanical expedition to the Neora Valley National Park in the Eastern Himalaya, two rare ground orchids belonging to the subtribe *Goodyerinae* were collected by the authors. Both taxa were found growing in humus-rich soil in the shade in a broadleaf forest between Alubari to Jorepokhri (2600-3100 m) and in a dry mixed forest at Mithundhara (800 m) within the National Park area. In the field, *Goodyera recurva* Lindley (1857:183) can easily be recognized by its recurved, pendulous inflorescence with secund flowers and hypochile without any hairs/calli inside but with thickenings on veins, whereas *Zeuxine gracilis* (Breda 1827 (1829): [17], t. 9) Blume (1858: 69) can be recognised by its white labellum-epichile with yellow-orange hypochile and mesochile and almost uniformly oblong to rectangular (not narrowed towards base) epichile-lobules with rounded apex. In addition to field observations and distinguishing characters of both species, the relevant literature pertaining to Indian Orchidaceae (Hooker, 1888-1890 and 1895; King & Pantling, 1898; Duthie, 1906; Santapau & Kapadia, 1966; Pradhan, 1976 and 1979; Bose & Bhattacharjee, 1980; Deva & Naithani, 1986; Katakai, 1986; Kumar & Manilal, 1994; Chowdhery, 1998; Hynniewta *et al.*, 2000; Pearce & Cribb, 2002; Misra, 2004 and 2007; Yonzone *et al.*, 2011 and 2012; Kumar *et al.*, 2013; Bhattacharjee & Chowdhery, 2018) was also consulted. These literatures and the consultation of available herbarium specimens allowed us to confirm new distributional record of these two taxa for West Bengal.

## Taxonomic treatments

### 1. *Goodyera recurva* Lindley

*Journal of the Proceedings of the Linnean Society, Botany* 1: 183. 1857; J. D. Hooker, *Flora of British India* 6: 112. 1890; Pradhan, *Indian Orchids* 1: 106. 1976; T.K. Bose & S.K. Bhattacharjee, *Orchids of India* 296. 1980; Pradhan & S.C. Pradhan, *Himalayan Jewel Orchids* 27. 2005; S. Misra, *Orchids of India-A glimpse* 301. 2007; Av. Bhattacharjee & H.J. Chowdhery in P. Singh (ed.), *Fascicles of Flora of India* 28: 72. 2018.

Synonyms: *Goodyera prainii* J.D.Hooker, *Flora of British India* 6: 112. 1890; T.K. Bose & S.K. Bhattacharjee, *Orchids of India* 296. 1980. *Orchiodes recurvum* (Lindley) Kuntze, *Revisio Generum Plantarum* 2: 675. 1891. *Goodyera recurva* Lindley var. *prainii* (J. D. Hooker) Pradhan, *Indian Orchids* 1: 106. 1976.

Indian Material studied: Meghalaya, Khasia, 1524–1829 m, without date, *Hooker & Thomson 345* (K, image!, holotype of *G. recurva*); Meghalaya, East Khasi Hills district, Muflong, without date, *Hooker & Thomson 345* (K, image!, isotype of *G. recurva*); Arunachal Pradesh, West Kameng District, Bomdila, 19.08.1982, *A.N. Rao 4467* (OHT); Nagaland, Naga Hills, Pulinabadya, ca. 2194 m, 12.1886, *Prain 59* (K, image!, holotype of *G. prainii*); West Bengal, Darjeeling, Neora Valley National Park, on the way to Alubari to Jorepokhri, 01.02.2016, 2735 m, 27.13213 N and 88.723073 E, *Vinay Ranjan, Gopal Krishna & Anant Kumar 77347* (CAL0000035962!).

Description (plate 1): terrestrial herbs, ca. 9 cm tall. Rhizome creeping, ca. 3 cm long. Stem ca. 6 cm long, ca. 3 mm in diam., terete, erect, suddenly decurved at apex ending with a pendulous inflorescence, glabrous. Leaves 5–6, spaced along stem or clustered at base, narrowly ovate to lanceolate, 2.5–3.5 × 1.2–1.5 cm, cuneate at base, entire at margins, acute at apex, adaxially green, abaxially pale green, glabrous, nerves 5 from base, sometimes obscurely reticulate; petioles 1–1.5 cm long, sheathing at base. Inflorescence a densely many flowered terminal raceme, abruptly recurved, secund, pubescent, with 3–5 sheathing bracts; sheathing bracts linear-lanceolate, 1.5–2 cm long, acute at apex, clasping, pubescent. Floral bracts linear-lanceolate, 1.2–1.5 cm long, sparsely ciliate at margins, acuminate at apex, usually longer than ovary, pubescent, 3-veined. Flowers 0.5–1 cm long, resupinate, barely open. Sepals free, sub similar, greenish white, acute at apex, sparsely pubescent, 1-veined; dorsal sepal ovate to ovate-lanceolate, 4–6 × 1.2–2.5 mm, forming hood with petals; lateral sepals obliquely ovate to ovate-lanceolate, 4–6 × 1.4–2.7 mm, not spreading. Petals white, obliquely linear-oblong to linear-lanceolate, 4–6 × 1.2–1.5 mm, subacute to acute at apex, glabrous, 1-veined. Labellum white, broadly ovate, 3–5.3 mm long, cymbiform; hypochile saccate, 1.5–2 × 2.9–3.2 mm, glabrous inside, slightly thickened along 5 veins; epichile linear-ligulate, 1.5–3.5 × 1.3–1.6 mm, subacute or obtuse at apex, recurved. Column 1.5–2.2 mm long; rostellum 1.5–2 mm long, bifid, subacute at apex. Anther ovate, ca. 2 × 1.8 mm, acuminate at apex. Pollinarium ca. 3 mm long; pollinia oblong-obclavate, ca. 1 mm long, bifid; caudicles ca. 1 mm long; viscidium narrowly ovate-oblong, pedicelled ovary terete or oblong-fusiform, 4–8 mm long, twisted, pubescent.

Flowering: February (in West Bengal; present report); August–December, April–June (in Arunachal Pradesh, Meghalaya, Nagaland [Bhattacharjee & Chowdhery, 2018])

Habitat: the species is found growing on decayed leaf-litters between 2500–3000 m elevation.

Distribution: India: Arunachal Pradesh, Meghalaya, Nagaland and West Bengal (present report); Bhutan; China.

Note: it is rare in distribution and confined to Himalayan region and North-east India.



### Plate 1. *Goodyera recurva*

A. Herbarium specimen: V. Ranjan, G. Krishna & A. Kumar 77347 (CAL) - B. Close view of flowers - C. Habit

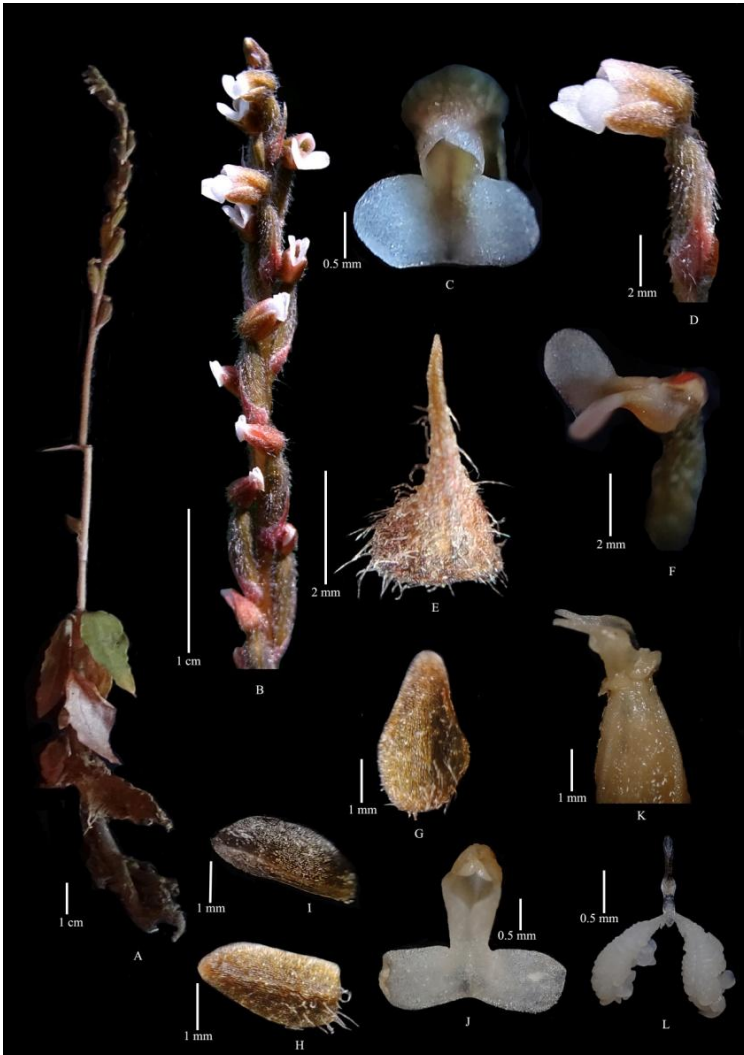
## 2. *Zeuxine gracilis* (Breda) Blume

*Collection des Orchidées les plus remarquables de l'Archipel Indien et du Japon* 69, t. 18, fig. 2 & t. 23 D. 1858; Pradhan, *Indian Orchids* 1: 116. 1976; S. Misra, *Orchids India* 320. 2007; Av. Bhattacharjee & H.J. Chowdhery in P. Singh (ed.), *Fascicles of Flora of India* 28: 170. 2018. Synonyms: *Psychechilos gracile* Breda, *Genera et Species Orchidearum et Asclepiadearum* 2: [17], t. 9. 1827 (1829). *Zeuxine blatteri* C.E.C. Fischer, *Bulletin of Miscellaneous Information (Royal Botanic Gardens, Kew)* 1928: 76. 1928; C.E.C. Fischer in Gamble, *Flora of the Presidency of Madras* 1456. 1928; T.K. Bose & S.K. Bhattacharjee, *Orchids of India* 525. 1980.

Indian Material studied: Kerala, Wayanad District, Sultan Battery, 950 m, 08.02.1963, *Ellis 18603* (MH); Karnataka, Mysore District, Minbole, Agumbe, 12.02.1963, *Raghavan 86363* (BSI); Karnataka, Hassan District, stream between Davalkere and Davarunde, 06.04.1972, *Ramamoorthy & Gandhi HFP 2771* (MH); Tamil Nadu, Madurai District, Tandigudi-Pannaikadu, 1250 m, 20.02.1978, *Chandrabose 54214* (MH); Tamil Nadu, Coimbatore District, Kiran Shola, Topslip, Coimbatore South Forest Division, 05.03.1978, *Subramanian 7126* (FRC); Kerala, Palakkad District, without locality, 1100 m, 11.01.1979, *Vajravelu 59101* (MH); Kerala, Palakkad District, Dam site way to Kunthipuzha, 1200 m, 10.03.1982, *Sathish Kumar SV 10198* (CALI); Kerala, Idukki District, Calvary, Mount, ca. 1050 m, 26.01.1983, *Pandurangan 76638* (CAL; MH); Kerala, Malapuram District, Nilambur, Kunda Hills, 26.02.1983, without collector *CU 34068* (CALI); Kerala, Palakkad District, Walaghat, near Kunthipuzha, 27.02.1983, *Sathish Kumar SV 10796* (CALI); Karnataka, Coorg District, Kumarahalle-Pushpa Giri way, 12.02.1984, *Vajravelu 77781* (MH); Kerala, Idukki District, Pulianmala, ca. 1100 m, 26.02.1984, *Pandurangan 78098* (MH); Kerala, Thiruvananthapuram District, Agasthyamalai, ca. 1700 m, 01.04.1989, *Mohanan 5196* (TBGT); Kerala, Thiruvananthapuram District, Agasthyamalai, Chemungi, ca. 1000 m, 05.02.1991, *Mohanan 10318* (TBGT); Kerala, Thiruvananthapuram District, Agasthyamalai, Chemungi, ca. 1000 m, 18.03.1991, *Mohanan 11339* (TBGT); Arunachal Pradesh, West Kameng District, Kimi, 12.03.1996, *A.N. Rao 30942* (OHT); Karnataka, North Kanara District, Anshi National Park, Kamshethadi on Anshi Ulvi road, 23.03.2007, *Punekar 4833* (CAL); West Bengal, Darjeeling, Neora Valley National Park, Mithundhara, 23.02.2020, 770 m, 27.020039 N and 88.7652 E, *Vinay Ranjan, Gopal Krishna & Anant Kumar 86872* (CAL).

Description (plate 2): terrestrial herbs, 15–26.5 cm tall. Rhizome pale greenish-brown, terete, 3.5–6 cm long, creeping, rooting at nodes. Stem greenish brown or pinkish-brown, erect, 11.5–20.5 cm long, sometimes decumbent at base, unbranched, glabrous, sometimes with few membranous sheaths formed by withered leaf-bases. Leaves green, 1–8, scattered along stem, withered during flowering, ovate to ovate-lanceolate, 2.5–3.5 × 1.2–1.7 cm, cuneate to subrounded at base, entire at margins, acute at apex, glabrous; petioles 0.5–1 cm long, sheathing at base; nerves 3–5-veined, obscure except mid vein. Inflorescence a laxly 6 to many flowered, terminal raceme, olive green when young, pale pinkish-brown at maturity, pubescent; sheathing bracts lanceolate, 1–1.5 cm long, clasping at base, long-acuminate at apex, pubescent, 1-veined. Floral bracts pinkish red, subtriangular, 5.5–8 × 2.5–3.5 mm, margins shortly ciliate, long-acuminate at apex, usually shorter or sometimes as long as pedicelled ovary, pubescent, 1-veined. Flowers 4–5 mm long, resupinate. Sepals free, olivaceous brown or greenish-pink, white near apex, pubescent; dorsal sepal ovate, 3–3.5 × 1.8–2 mm, subacute to obtuse at apex, adnate to petals forming a hood over the column, 1-veined; lateral sepals oblong-ovate, 2.8–3 × 1.2–1.5 mm, subacute or obtuse at apex, 1-veined. Petals pale white, obliquely oblong-elliptic, 2.8–3 × 1–1.2 mm, obtuse at apex, glabrous, unilaterally 1-veined. Labellum white with bright yellow or orange-yellow base, 2.8–4 mm long; hypochile bright yellow or orange-yellow, saccate, ca. 1 mm long, with 2 filiform horn-shaped appendages (1 on either side); mesochile bright yellow or orange-yellow, subquadrate, ca. 0.8 mm long, margins incurved; epichile 2-lobed; lobules white, oblong to subrectangular, 0.8–1 × 1–1.2 mm, mostly round at apex, divergent, forming obtuse an angle (when spread) with axis of labellum. Column pale yellow, 1.2–1.6 mm long, with 2 short, conical, fat wing-like projections below rostellum; rostellum 0.8–1 mm long, bifid, projecting, subacute or obtuse at apex. Stigma 2-lobed, elliptic, lateral, well separated. Anther white with reddish tinge, 1.2–1.5 mm long. Pollinarium pale golden-yellow, 1.2–1.5 mm long; pollinia oblong-terete, 0.7–1 mm long, bifid; caudicles 0.3–0.5 mm long; tegula oblong-elliptic, ca. 0.6 mm long; viscidium nearly

indistinct from tegula. pedicelled ovary elliptic-oblong to terete, green, 4.5–5.5 mm long, sometimes slightly curved, twisted, pubescent.



### Plate 2. *Zeuxine gracilis*

A. Habit, B. Inflorescence, C. Close view of flower, D. Lateral view of flower, E. Floral bract, F. Lateral view of flower without sepals and petal, G. Dorsal sepal, H. Lateral sepal, I. Petal, J. Labellum, K. Column with some portion of ovary, L. Pollinarium.

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Flowering: February (in West Bengal; present report); January–April, September–October (Arunachal Pradesh, Karnataka, Kerala, Maharashtra, Meghalaya, Odisha, Tamil Nadu [Bhattacharjee & Chowdhery, 2018]).

Habitat: the species is found growing in dry mixed forest between at 700–1000 m elevation.

Distribution: India: Arunachal Pradesh, Karnataka, Kerala, Maharashtra, Meghalaya, Odisha, Tamil Nadu and West Bengal (present report); Borneo; China; Indonesia; Malaysia; Thailand; Vietnam.

Note: it is fairly common in the Western Ghats, but uncommon in other parts of India. *Zeuxine gracilis* is closely related to *Z. affinis* (Lindley 1840: 487) Bentham ex J. D. Hooker (1890: 108) and can be differentiated from the latter on the basis of bracts, labellum and column. The bracts in *Z. gracilis* are more or less triangular with short ciliate margins, whereas in *Z. affinis* these are ovate-lanceolate, pubescent. The labellum is orange-yellow at base with whitish epichile in *Z. gracilis* but in *Z. affinis* it is white. The shape of epichile lobules in *Z. gracilis* are oblong to sub-rectangular, forming an obtuse angle with the axis of labellum, whereas in *Z. affinis* these are broadly ovate-oblong to subspathulate, forming an acute angle with the axis of labellum. In *Z. gracilis*, the column is 1.2–1.6 mm long, with 2 short, conical, fat wing-like projections below rostellum, while in *Z. affinis* the column is 2–3 mm long, without any distinct wing but with a seam with 2 upwards tongues below rostellum.

## Acknowledgements

The authors are thankful to Dr. A. A. Mao, Director, Botanical Survey of India, Kolkata for sanctioning the project and support. The authors are thankful to the PCCF (Wildlife) & Chief Wildlife Warden, West Bengal Forest Department for kind permission for collection of plant materials and to CCF (North) and DFO (Gorumara Wildlife Division II) for logistic support and help.



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