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STEREOCHILUS ERINACEUS (RCHB.F.) GARAY (ORCHIDACEAE)- A NEW DISTRIBUTIONAL RECORD FOR INDIA WITH NOTES ON ITS RELATIONSHIPS AND THREAT STATUS ASSESSMENT

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Abstract

Stereochilus erinaceus (Rchb.f.) Garay (Orchidaceae) has been collected from Arunachal Pradesh and is being reported here as new distributional record for India. It was earlier known to occur at Myanmar, Thailand, and Vietnam. A detailed description, illustrative photo-plate along with information on phenology, habitat, and distribution has been provided for easy identification of the species. The species is closely allied to *S. arunachalensis* K. Chowlu & A.N. Rao. Its relationship with other species of *Stereochilus* known from India has been discussed and keyed out. Its threat status in Indian perspective has also been assessed as per IUCN guidelines and conservation measures have been proposed.

Introduction

STEREOCHILUS LINDL. [Orchidaceae-Epidendroideae-Vandeae-Aeridinae], was described in 1858 based on *Stereochilus hirtus* Lindl. as the type species. The genus represents a small group of monopodial, epiphytic orchids with inconspicuous flowers. It comprises seven species globally (Chase *et al*., 2015) and is predominantly distributed in Indo-Himalaya, Sino-Himalaya, and SouthEast Asia. The recent discovery of *S. arunachalensis* (Chowlu and Rao, 2020) from Arunachal Pradesh increased the total number to eight. In India, the genus is represented by four species including the present report. All Indian species are of restricted nature in distribution and confined to the Himalayan region. *Stereochilus* has been reported as biphyletic and can be distinguished from others by the unique labellum morphology, slender column, and elongate rostellum (Pridgeon *et al*., 2014).

During a plant exploration trip to Arunachal Pradesh in July-August 2019, in connection with study of Himalayan Orchids under National Mission on Himalayan Studies, two of us (OC) and (SS) have collected a small monopodial orchid sample in vegetative state. The same was transplanted in the campus of Botanical Survey of India, Sikkim Himalayan Regional Centre at Gangtok for further observations. The specimen flowered in the first week of July 2020. The first glance of it provided an impression of *S. hirtus* Lindl. because of the pubescent pedicel and ovary. But on critical observation and complete morphological characterization, coupled with consultation of literature (Hooker, 1890; Seidenfaden, 1988; Chowlu and Rao, 2020), it was determined as *S. erinaceus* (Rchb.f.) Garay. Perusal of literature (Chowdhery, 1998; Govaerts, 2021; Misra, 2019; Pearce and Cribb, 2002; Rao, 2010; Seidenfaden, 1988; Singh *et al*., 2019) and herbaria (CAL, ASSAM, ARUN, OHT, BSHC) revealed that this species is not known from India and known to occur in Myanmar, Thailand, and Vietnam. Further comparative study with Indian materials of the genus indicated its strong relationship with *S. arunachalensis* and *S. hirtus*.

In the present communication, *S. erinaceus* has been reported as a new record for India. A detailed description, illustrative photo-plate along with information on phenology, habitat, and distribution has been provided for easy identification of the species. Its relationship with other species of *Stereochilus* known from India has been discussed and keyed out. The threat status in Indian perspective has been assessed as per IUCN guidelines and conservation measures have been proposed.

Taxonomic Treatment

Stereochilus erinaceus (Rchb.f.) Garay, Bot. Mus. Leafl. 23(4): 205. 1972; Seidenf., Opera Bot. 95: 133, f.80. 1988; Averyanov, Taiwania 57(2): 136, f.11(e). 2012. *Sarcanthus erinaceus* Rchb.f., Bot. Zeitung (Berlin) 22: 298. 1864; Hook.f., Fl. Brit. India 6: 69. 1890.

Type

Myanmar (Burma): Tenasserim (*Parish* 149, *Herb. Reichenbach* 53488, K, could not be studied).

Description

Epiphytic *herb* with monopodial growth, up to 8 cm long. *Roots* confined to the basal nodes, 1-1.2 mm thick,

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Fig. 1. A-C. *Stereochilus erinaceus* (Rchb.f.) Garay: A, Habit; B-C, Closeup view of flowers (not to scale). [Source: O. Chakraborty and S. Sengupta 40678 (BSHC)].

greyish-green, velamenous. *Stem* reduced, erect or ascending, 1-3 cm long, usually unbranched; internodes 0.5-1.5 cm long, covered by imbricate, distichous, persistent leaf-sheaths. *Leaves* 4-5, confined to apical portion of the stem, alternate, distichous, 4-15 × 0.5-1 cm, dorsiventrally flattened, thickly coriaceous, broadly linear-oblong to lanceolate, channeled along the mid-vein towards base, apex unequally 3-lobed, with obliquely triangular, acute side-lobes and a median, subulate mucro; base sheathing, articulate, sessile. *Racemes* lateral, axillary, usually as long as the leaves or shorter, unbranched, horizontally arched or drooping, 6-8 cm long, slender, weakly flexuous or straight, rigid, dark purplish-brown, densely pubescent; *peduncle* 2-4 cm long, sheathed at base, with 2-3, triangular-acute sterile bracts above; *rachis* slightly thickening, lax to sub-densely 6-many-flowered. *Floral bracts* 2.5-3.5×1-1.5 mm, ovate-triangular, concave, acute-obtuse, papillose. *Flowers* successively opening, 8-12 mm across, widely spreading, pale pinkish with yellow towards the base, basal portion of sepals and petals sometimes with faint purplish-brown stripes along the veins; *labellum* pale pinkish at mid-lobe, yellow at side-lobes and *spur*; *column* yellow at base, pale-purplish above; *anther* dark purplish-brown with two pale-white spots disintegrating in to the beak. *Pedicel* plus ovary 5-8 mm long, reddish-brown, with dense elongated papillae. *Sepals* free, sub-similar, thick textured, 5-6.5× 2.7-3 mm, obovate-oblong, concave, obtuse-rounded, dorsal surface papillate, thickened at middle; lateral sepals slightly oblique. *Petals* 5-6 ×1.8-2 mm, oblong–ligulate, acute-obtuse, with irregular marginal projection near the apex. *Labellum* firmly attached to the base of column, immovable, asymmetrical, fleshy, distinctly spurred, 3-lobed; side-lobes *ca*. 2 × 1 mm, erect, obliquely triangular, pointing forward, minutely toothed at apex; mid-lobe *ca*. 3 × 3 mm, overlapping with side-lobes at base, ovate-triangular, entire, obtuse-rounded, thickened along the median line; *spur ca*. 3 × 2 mm, broadly conical, wider at mouth with a small, conical callus at mouth, front-wall callus large, rounded, crest-like towards mouth, overlaps with the narrow back-wall callus. *Column* 4-5 mm long, erect, dilated at base, laterally winged, obscurely papillate in front towards base; foot absent; anther terminal, ovate, beaked up to 2-3 mm; pollinia 4, almost equal, oblong-ellipsoid, yellow; *stipe* 2-3 mm long, dilated above, clavate; *viscidium* small, glandular; rostellum elongated, narrowly triangular, beaked; stigmatic cavity cordate. *Fruits* not seen. (Figs.1-2).

Flowering

July-August

Fruiting

Not observed.

Habitat

Small epiphytes found growing on main trunk of tall trees in broad-leaved evergreen forest at 500-600 m elevation.

Distribution

India [Arunachal Pradesh (present report)], Myanmar, Thailand, Vietnam.

Specimen Examined

India: Arunachal Pradesh, West Kameng district, on the way to Sessa from Tippi, 560 m, 08.08.2019 (flowered under cultivation on 07.07.2020), *O. Chakraborty and S. Sengupta* 40678 (BSHC).

Taxonomic Notes

Stereochilus erinaceus is unique in having short, thick papillate hair on dorsal surface of sepals and slightly longer papillae at ovary. Seidenfaden (1988) mentioned this species as variable in flower colour. Averyanov

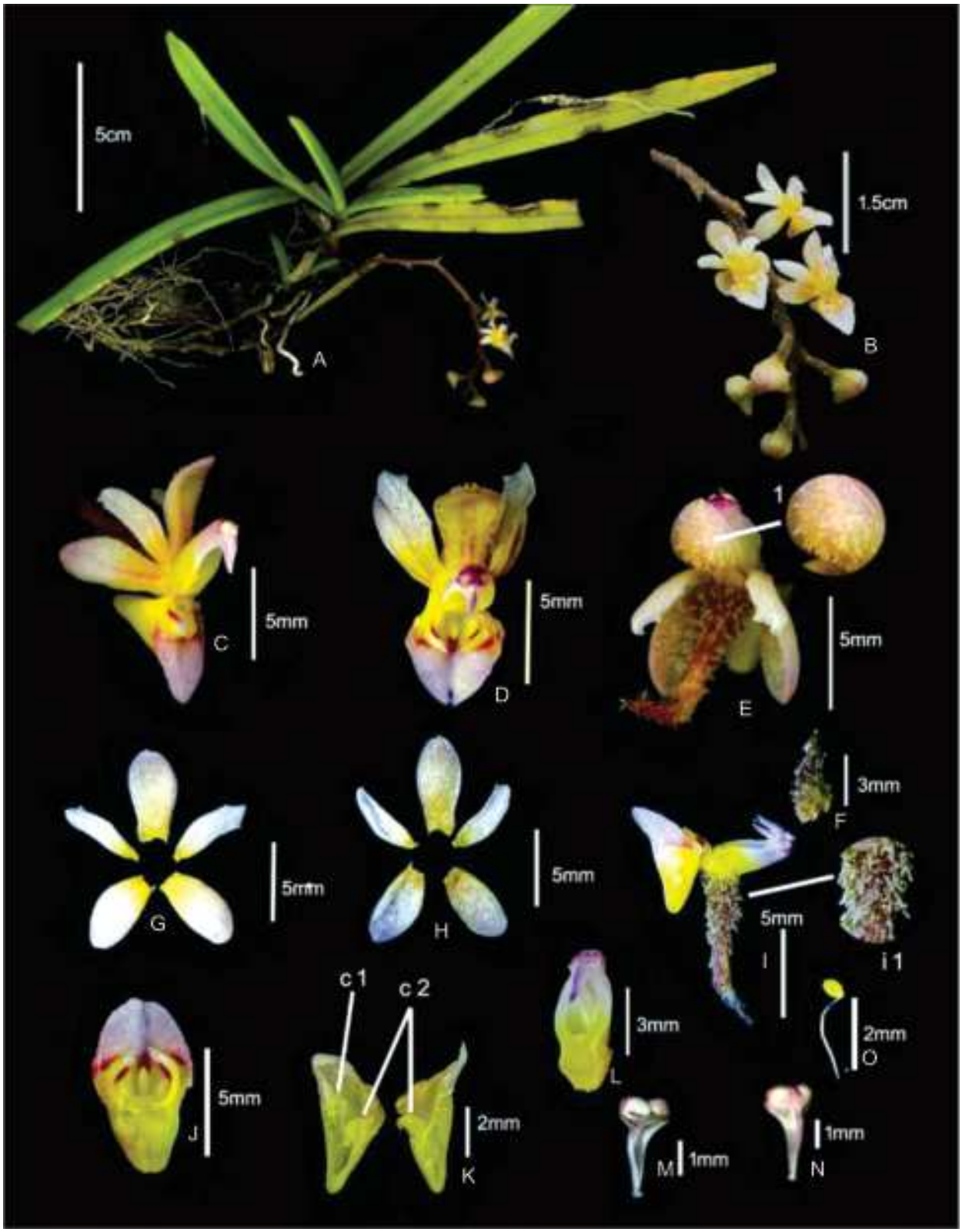

Fig. 2. A-O. *Stereochilus erinaceus* (Rchb.f.) Garay: A, Habit; B, Inflorescence; C, Flower (side view); D, Flower (front view); E, Flower (dorsal view) [e1, magnified portion of papillate sepal]; F, Floral bract; G, Sepals and petals (ventral view); H, Sepals and petals (dorsal view); I, Column with ovary and labellum [i1. Magnified portion of ovary showing long papillae]; J, Labellum (front view); K, L.S. of labellum through spur [c1: backwall callus; c2: front wall callus]; L, Column (front view); M-N, Anther; O, A single pollinium with stipe and viscidium [Source: O. Chakraborty and S. Sengupta 40678 (BSHC), dissected by O. Chakraborty and compiled by S. Sengupta].

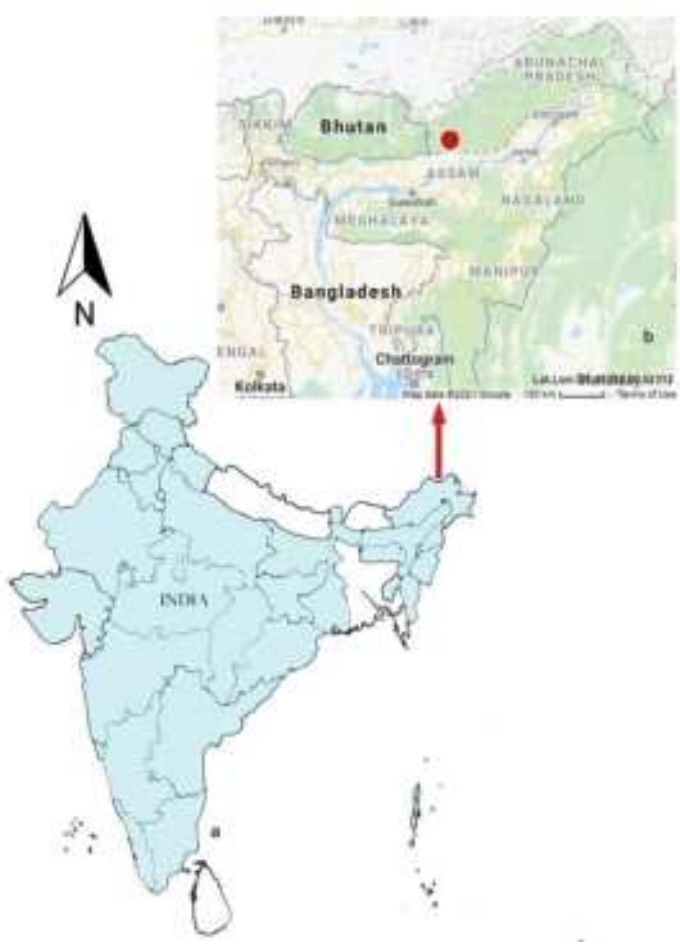

Fig. 3. Map showing the distribution of *Stereochilus erinaceus* (Rchb.f.) Garay in India [map developed in Geo CAT platform].

(2012) recorded it from Vietnam but observed its plants as slightly differing from the typical species. The Vietnamese plants are known to have narrower and longer leaves, very short inflorescence, larger flowers with 5-6 mm long sepals and broader, irregularly erose-denticulate petals [*vs*. wider, flat leaves; elongated inflorescence; relatively smaller flowers and narrower, entire petals in the typical form]. Closer observation of the Fig. 11(e) for *Stereochilus erinaceus* in Averyanov (2012) indicated a pubescent ovary with sparse hair and the sepals with short fat hair at dorsal surface. Chowlu and Rao (2020) described a new species *S. arunachalensis* as closely allied to *S. erinaceus* for the mid-lobe of labellum embracing the side-lobes, but observed it as differing in having the sepals glabrous externally; long, narrow sub-terete leaves and a short, solitary flowered inflorescence. On careful observation of Fig. 1 for *S. arunachalensis* in Chowlu and Rao (2020), the petals were observed as broader with irregularly erose-denticulate margin (although it was not emphasized while describing the species); pedicel plus ovary with dense long papillae and glabrous sepals with thickened mid-vein at dorsal surface. *S. arunachalensis* is more similar to the Vietnamese plant in having the narrower leaves; short inflorescence; larger flowers with 5-6 mm long sepals and the broader, erose-denticulate petals. But this plant has sepals glabrous at dorsal surface. The present collection from Arunachal Pradesh matches perfectly with the typical *S. erinaceus* for the elongated inflorescence with many successive flowers; nature of indumentum at sepals and ovary; and the labellum structure, but these plants have the flat but narrower leaves and larger flowers with 5-6 mm long sepals; thus forming intermediate between the typical *S. erinaceus*, the Vietnamese record and the *S. arunachalensis*. The type specimen of *S. arunachalensis* could not be studied to verify the glabrous nature of sepals and other characters. Fresh collections from the type locality may prove these as conspecific or *S. arunachalensis*, together with the vietnamese plants may represent a variety of *S. erinaceus*.

When *Stereochilus arunachalensis* was compared with *S. hirtus*, there was no significant difference found, apart from the so called narrower, sub-terete leaves and 1-flowered inflorescence in the former. The nature of indumentum in peduncle, rachis and ovary in both the cases was similar and so also the width and erose-denticulate margin of petals and other floral structures. It seems highly likely that the characters in *S. arunachalensis* has been improperly interpreted and the type specimen (single specimen) represents a poorly developed individual in its early flowering stage. Proper examination of the type specimen and fresh specimens from the type locality can only authentically conclude the comparison.

Artificial Key to the Species of *Stereochilus* in India

1a. Mid-lobe of labellum embracing the side-lobes; inflorescence densely pubescent2

1b. Mid-lobe of the labellum continuous with the side-lobes, not embracing it *S. ringens*

2a. Sepals with short, fat, papillate hairs externally *S. erinaceus*

2b. Sepals glabrous externally 3

3a. Leaves narrower, sub-terete; raceme reduced, 1-flowered *S. arunachalensis*

3b. Leaves flattened; raceme elongated, laxly 5-many flowered *S. hirtus*

Red List Assessment As Per IUCN Guidelines (IUCN, 2012A; 2012B; 2019)

Stereochilus erinaceus, although distributed in NorthEast India, Myanmar, Thailand, and Vietnam, it is known from India only from a single locality (as presently reported) in West Kameng district of Arunachal Pradesh (Fig. 3). Few individuals were observed growing as epiphytes on the main trunk of a tall tree. The habitat is under direct threat to developmental activities like construction of Trans-Arunachal Highway, tourism activities, and other anthropogenic pressure. Being an epiphyte, its survival depends on the host species and moreover monopodial orchids do not have effective vegetative mode of propagation. Sexual reproduction is vector dependent and seed germination in nature is subject to availability of suitable mycorrhizal fungus (although fruits were not observed in nature, indicating some pollination barrier). As it is known from a single locality, by considering the minimum grid size of 2 × 2 km, the Area of Occupancy (AOO) can be estimated as 4 sq. km. (criteria B2). The 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 number of matured individuals observed were not more than 10 (criteria D). Therefore, the threat perception on this species is assessed as Critically Endangered [CR B2ab (iii); D] in Indian perspective. As the other populations of this species in different countries are far away and intersected by geographical barriers/ unsuitable habitats, immigration of propagules or gene flow amongst the populations is less likely. Therefore, no down-listing or up-listing of category (IUCN, 2012b) has been done with the original assessment. More intense floristic survey and habitat management is recommended for its conservation.

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