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The first record of *Hemiorchis pantlingii* King (Zingiberaceae) in the flora of Bhutan

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Abstract. A botanical exploration carried out in Samtse District (south-western Bhutan) in 2019 led to a discovery of the rare perennial herb *Hemiorchis pantlingii*. It was found in shaded areas within a subtropical plantation forest of *Shorea robusta* Gaertn. at an elevation of 386 m. This species differs from *H. rhodorrhachis* in lateral staminodes, with apex ± truncate, yellow to orange-yellow, but also labellum mid-region distinctly raised with a single broad keel, and apical projection – a single blunt lobe. The plant is assessed as near threatened (NT) under the IUCN Red List categories and criteria.

Key words: *Hemiorchis pantlingii*, Bhutan, conservation, habitat, Samtse District, taxonomy, threat status

1. Introduction

The Zingiberaceae, commonly known as the ginger family, are a group of herbaceous plants (Polunin & Stainton 1997) primarily distributed in tropical regions around the world. It includes about 1600 species within 52 genera (Christenhusz & Byng 2016; Govaerts *et al*. 2017; Kumar & Singh 2018). In India, the Zingiberaceae comprise around 200 species across 20 genera (Kumar *et al*. 2013; Kumar & Singh 2018), compared to 25 species in 8 genera in Bhutan (Smith 1994).

The genus *Hemiorchis* Kunz. (Zingiberaceae) comprises 3 species: *H. burmanica* Kurz, *H. pantlingii* King, and *H. rhodorrhachis* K.Schum., distributed in the Central Himalayas, Myanmar, and Thailand (Larsen & Triboun 2000; Govaerts *et al*. 2017; Tan *et al*. 2020). Some of these species are also found in the Eastern Himalayas, south of the Brahmaputra in India, and Bangladesh. Among these, *H. pantlingii* is found in Nepal, India, Bangladesh, and Myanmar (Srivastava & Ghoshal 2005; Kumar & Singh 2018). In Bhutan, Smith (1994) included a brief description of the genus *Hemiorchis* in the flora of Bhutan based on the distribution of *H. pantlingii* in the Darjeeling state of India. However, the presence of *H. pantlingii* in Bhutan remained unknown until recent exploration.

During our botanical exploration in Samtse District in 2019, a large population of the genus *Hemiorchis* was found growing in the shaded plantation forest of *Shorea robusta* Gaertn. Initially, the species was tentatively identified as *H. pantlingii*, with the assistance from Dr. Pankaj Kumar. *Hemiorchis pantlingii* was first described by George King (Brühl & King 1896), based on the type material collected by Robert Pantling (British plant collector) from Mungpoo area, Sikkim state of Bharat (India) in 1891. The species is similar to the closely related *H. rhodorrhachis* but differs in having lateral staminodes with apex ± truncate, yellow to orange-yellow, while labellum mid-region distinctly raised with a single broad keel, and an apical projection – a single blunt lobe.

2. Material and methods

Measurements of the morphological parts were taken in situ from 10 randomly chosen flowers of the unidentified species, by using a measuring tape and a 15-cm ruler. Geographical details, like elevation and geo-coordinates, were collected using Garmin GPS (*eTrex* 40) and photographed in the field with a digital camera. Subsequently, it was thoroughly scrutinized and compared with relevant literature sources (King &

Pantling 1895-1896; Smith 1994; Lucksom 2001; Singh *et al*. 2012; Kumar & Singh 2018; Tan *et al*. 2020) and herbarium specimens available at the herbaria BM, E, K, and CAL (herbarium codes follow Thiers *et al*., 2024, continuously updated). The investigation eventually resulted in a definitive identification of the species as *Hemiorchis pantlingii*, the first record for Bhutan.

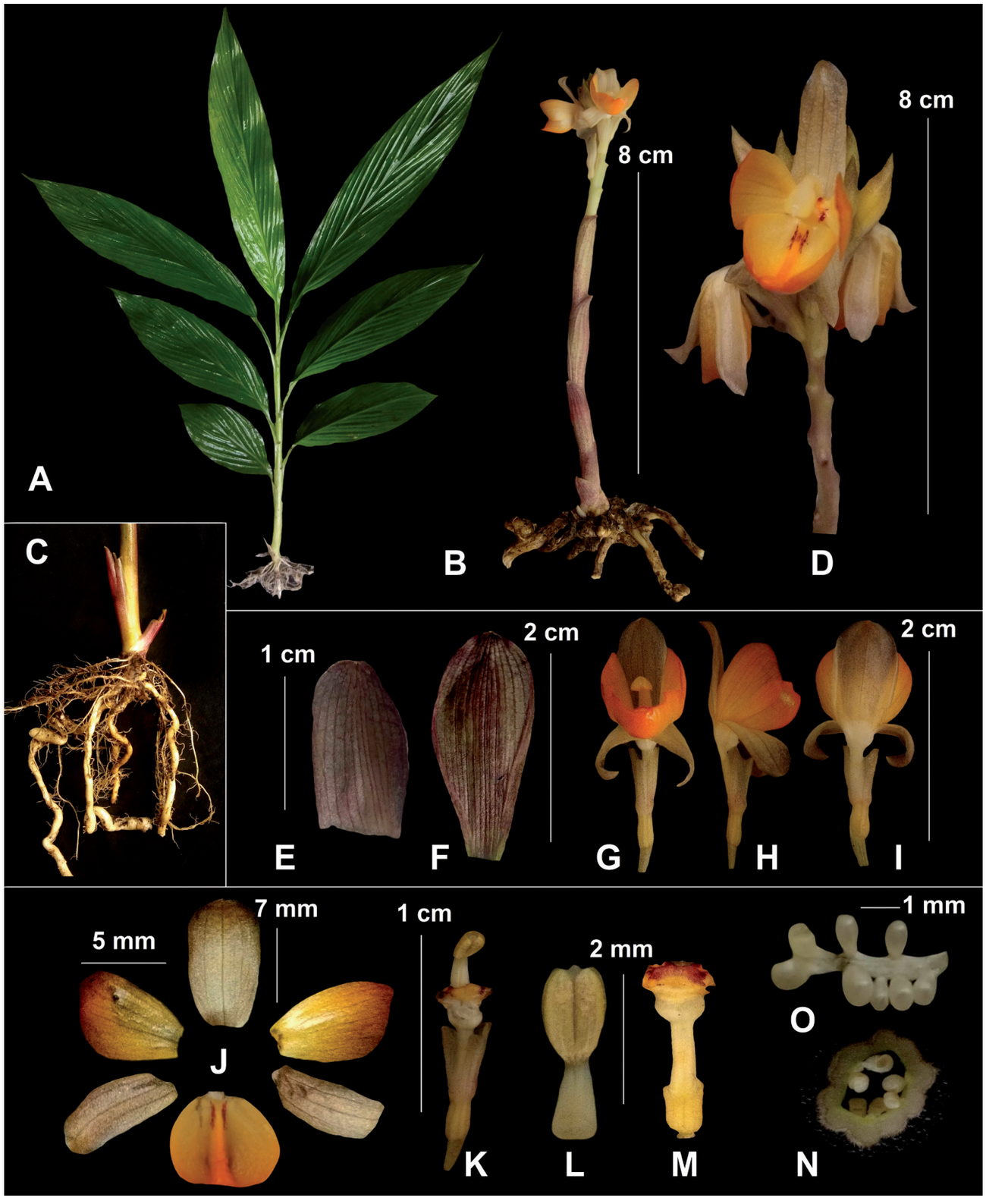

Fig. 1. *Hemiorchis pantlingii* King

Explanations: A – leafy stem habit, B – flowering stem habit, C – roots and rhizomes, D – inflorescence, E-F – adaxial view of sheaths, G-I – flower (front, side, and back views), J – dissected flower, K – pedicel, stamen, and pistil, L – stamen, M – pistil, N – transverse section of ovary, O – seeds

The conservation status of the new species was evaluated according to the IUCN categories and criteria (IUCN 2022) and using the GeoCAT tool (Bachman *et al*. 2011). Distributional data were plotted on a map, using QGIS software version 3.38.1 (QGIS Development Team, 2024). Here, we provide a comprehensive morphological description, information on phenology, ecology, and distribution. Additionally, colour photographs of the species are provided.

3. Results and discussion

Hemiorchis pantlingii King, Ann. Roy. Bot. Gard. (Calcutta) 5(2): 163. 1896.; J.N. Mitra, Fl. Pl. E. India 1: 250 (1958); A.S. Rao & D.M.Verma, Bull. Bot. Surv. India 14(1-4): 119 (1972); H. Hara, Enum. Fl. Pl. Nepal 1: 61. 1978.; R.M. Smith in H.J. Noltie (eds), Fl. Bhutan 3(1): 198. 1994.; S.Z. Lucksom, J. Bombay Nat. Hist. Soc. 98(3): 493. 2001., S. Tan *et al*., Edinb. J. Bot. 77 (3): 481-483. 2020.

Type: India, Sikkim, Mungpoo, 300-1060 m, 1891, *R. Pantling s.n.* (lectotype K000640570!). Figs. 1-2.

Description: Plant herbaceous, hysteranthous, rhizome 25-40 cm long, branching. Leafy stem 10-60 tall, 0.5-1.5 cm in diameter. Leaf ovate-lanceolate, sheathing at base, green; basal leaf 6-26 cm × 3.5-9 cm; upper leaf 20-30 cm × 3-6 cm, glabrous, veins 2-4; sheath in basal ones 1-5 cm × 0.5-2.3 cm, in upper one 7-25 cm × 1-3 cm. Inflorescences spicate; peduncles stout, 12-17 cm long, leafless, but with 4-6 bracts. Bracts oblong to spathulate, 1.6-4 × 1.2-2 cm, pale pinkish-white, with 13-17 veins, pubescent on outer surface. Calyx tubular, with 3 short sub-equal and sub-acute lobes shorter than corolla-tube, membraneous, outer surface pubescent. Corolla oblong, pale pinkish-white, recurved; dorsal lobe 12-15 mm × 6-7 mm; lateral lobes 8-10 mm × 4-5 mm, apex mucronate, adaxially pubescent, abaxially glabrous, prominently 3-veined. Lateral staminodes obovate, 7-9 mm × 6.5-7 mm, concave, apex obliquely-obtuse or truncate, reddish-orange, yellowish-orange towards base, glabrous, obscurely 9-11-veined. Labellum cymbiform, 10-12 mm × 7.5-8 mm, adaxially raised with a single broad keel in middle, reddish-orange at apex, orangey-yellow towards base, basal appendage flap-like, bilobed, dark purple, apex sub-obtuse with a broad mucronate apex. Stamen 1, incurved, shorter than inner whorl of corolla; filament oblong, c. 1.5-2 mm long, thick and fleshy; anther broadly elliptic or oblong, c. 1.5 mm × 1 mm, creamy brown, basifixed, apex emarginate. Ovary cylindrical, c. 2-2.5 mm long, longitudinal grooves present and densely puberulous; style c. 1.5 cm long; stigma cup-shaped, minute, light orange.

Distribution: Bangladesh, Bhutan (Samtse), India, Myanmar, and Nepal (Fig. 3).

Flowering and fruiting: April-May.

Ecology and habitat at the study site: The species was found in shady areas within a subtropical plantation forest of *Shorea robusta* Gaertn. at an elevation of 386 m. It was accompanied by *Curcuma aromatica* Salisb., *Dioscorea bulbifera* L., *Oplismenus hirtellus* (L.) P. Beauv., *Costus soeciosus* (J.Koenig)

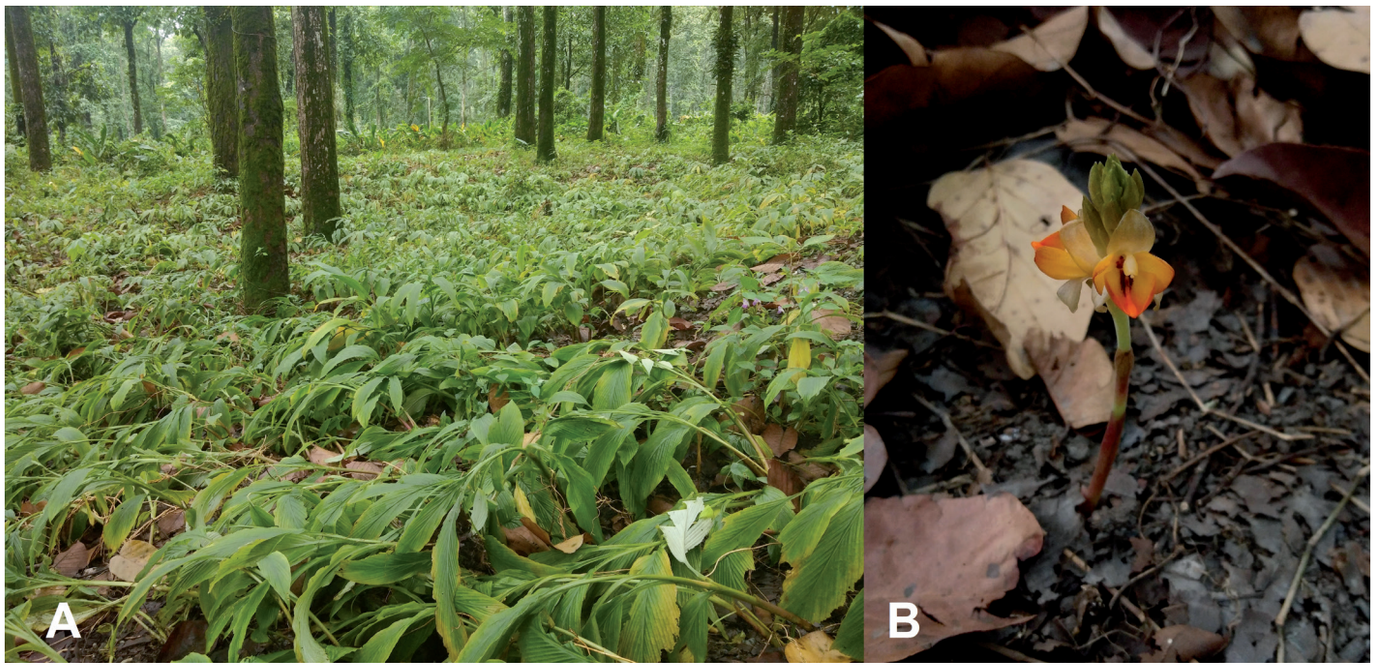

Fig. 2. *Hemiorchis pantlingii* King in a natural habitat
Explanations: A – abundant leafy stems, B – flowering stem

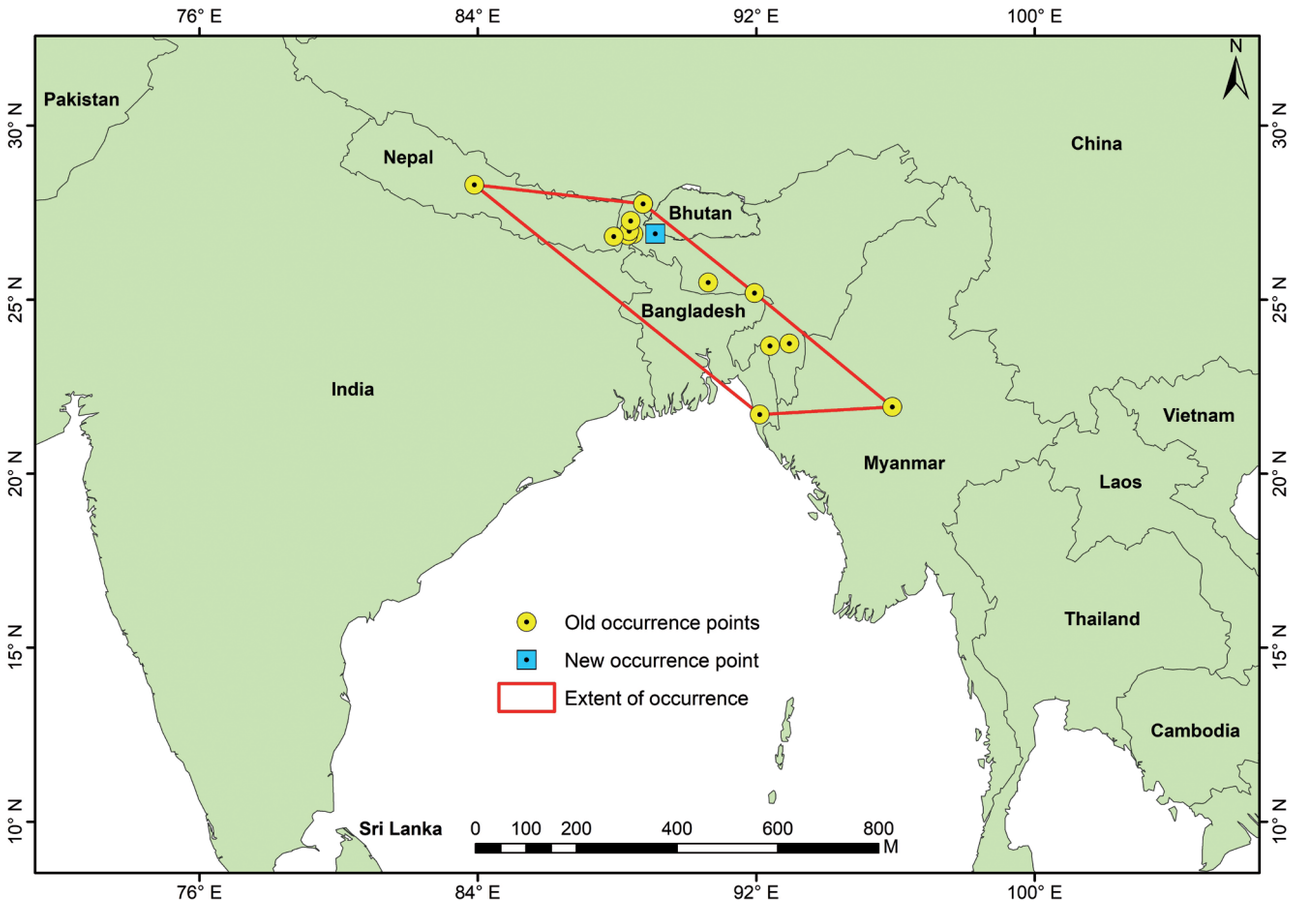

Fig. 3. Global distribution and extent of occurrence map of *Hemiorchis pantlingii* King

Sm., *Remusatia vivipara* (Roxb.) Schott, *Globba multiflora* Wall. ex Baker, *Impatiens tripetala* Roxb. ex DC., and *Ipomoea turbinata* Lag.

Specimens examined: Bhutan, Samtse District, near Samtse town, Forest Range colony, 26.892°N, 89.099°E, 386 m, 6 April 2020, *P. Gyeltshen & C. Tashi* 21 (THIM).

Provisional threat status: According to Kumar and Singh (2018), *Hemiorchis pantlingii* is known to occur at 22 localities in Southeast and South Asia. Persistence of the species in India was predicted to be threatened due to anthropogenic disturbances and habitat degradation, with the number of mature individuals estimated to be 500 (Kumar & Singh 2018). In Bhutan, a stable population of c. 1500 mature individuals was observed in the field. However, the collection of leaf mould by local communities and the consumption of rhizomes by wild boars contribute to habitat degradation and population decline. The extent of occurrence (EOO) for the species is estimated to be 2,82,716 km^2, while the area of occupancy (AOO) as 56 km^2 (Fig. 3) by using GeoCAT software (Bachman *et al.* 2011). The intensity of potential threats is unknown but habitat degradation and population decline due to forest fires or wild boars are likely to push the species rapidly into the endangered category. Therefore, the species is assessed as near threatened (NT) because of its relatively large EOO, which indicates a wide ecological niche, but also its occurrence in 23 localities and the ongoing threats of habitat loss and population decline.

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Research concept and design: P. Gyeltshen
Collection and/or assembly of data: P. Gyeltshen, Ch. Tashi
Data analysis and interpretation: P. Gyeltshen, Ch. Tashi
Writing the article: P. Gyeltshen, Ch. Tashi
Critical revision of the article: P. Gyeltshen
Final approval of article: P. Gyeltshen, Ch. Tashi

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