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## SHORT COMMUNICATION

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## CONSERVATION ASSESSMENT OF TWO RARE GINGERS (ZINGIBERACEAE) FROM DAMPA TIGER RESERVE, MIZORAM, INDIA

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**Abstract:** This work reports the distribution of two rare Zingiberaceae, *Globba spathulata* and *Hemiorchis pantlingii*, in Dampa Tiger Reserve, a protected area, located in Mizoram, northeastern India. Both these species have a distribution restricted to the northeastern part of India and the adjoining countries of Bangladesh, Myanmar and northern Thailand. In this study, we enumerate the species, present their current global distribution and conduct a conservation assessment for them. The study indicates presence of rare floral species in the protected landscape, and a lack of ecological and conservation attention to the region. A conservation assessment conducted for both species, based on their existing global distribution and potential threats, identifies the species as 'Vulnerable'.

**Keywords:** Chittagong Hill Tract Region, *Globba spathulata*, *Hemiorchis pantlingii*, Indo-Burma biodiversity hotspot, Lushai hills.

Zingiberaceae is a group of terrestrial herbaceous plants with a wide global distribution that spans across the tropical regions of the world, with around 1600 species represented by 52 genera (Christenhusz & Byng 2016; Govaerts et al. 2017). This group attains its highest diversity in the Indochinese continental region (Šckorničková & Newman 2015). Throughout their distributional range, Zingiberaceae are important plants

due to their use in medicine, food, perfumes, or as ornamental plants. Within India, around 200 species of Zingiberaceae are found, belonging to 20 genera (Kumar et al. 2013), popular amongst which are turmeric and ginger, used commonly in most Indian homes.

### MATERIALS AND METHODS

This work is based on records of two rare Zingiberaceae, *Globba spathulata* Roxb. and *Hemiorchis pantlingii* King, encountered in Dampa Tiger Reserve (TR), Mizoram, India, in April 2014. Dampa TR is a protected area, located in the Lushai Hills of western Mizoram, along a transitional zone with the Chittagong Hill Tract region of Bangladesh (Fig. 1). The core area of the reserve covers less than 500km<sup>2</sup>, and supports tropical evergreen, tropical semi-evergreen and tropical moist deciduous forests (Champion & Seth 1968). Areas with past shifting cultivation regimes are dominated by bamboo. The altitudinal gradient of the reserve varies from 50–1,095 m.

Populations of the species reported in this study were encountered during a reconnaissance survey being

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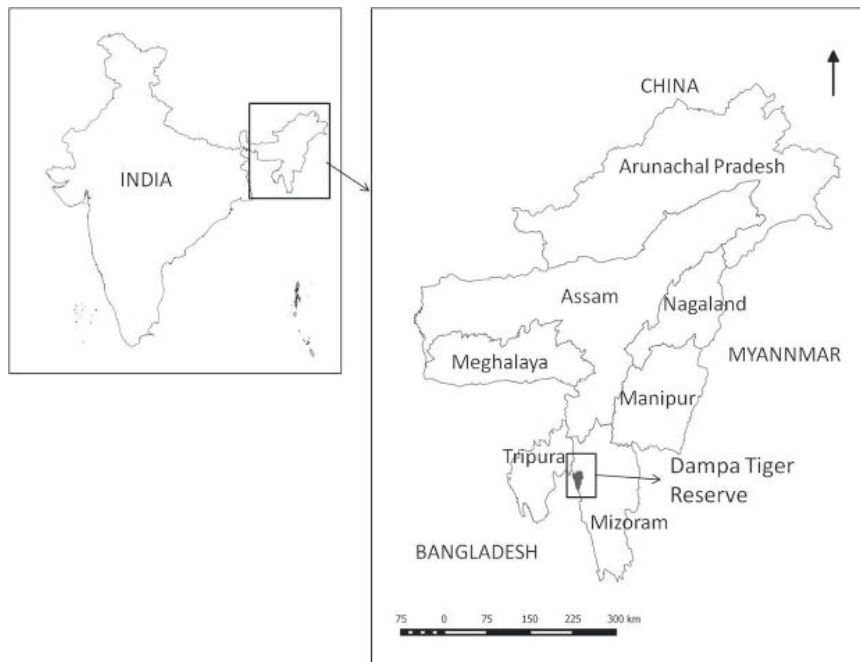


Figure 1. Map of northeastern India, showing the location of Dampa Tiger Reserve. In the inset is a map of India.

conducted for a large ranging study on Clouded Leopards *Neofelis nebulosa* within the protected area. During the survey period, intensive foot-surveys were conducted in the northeastern part of the reserve, covering an area of approximately 100km<sup>2</sup>. Although the focus of the survey was to collect information on the felid community found in the reserve, incidental information on rare species from other taxonomic groups encountered was also documented.

We further conducted extensive literature searches for our target species, focusing on taxonomic descriptions, distribution, habitat preferences, and potential threats. This yielded limited information, indicating paucity of data for the two species. Based on the information obtained, we used GeoCat (Geospatial Conservation Assessment Tool; Bachman et al. 2011) to assess the extent of occurrence (EOO) and the area of occupancy (AOO) for the species, and generate maps for the same. This information, along with secondary inputs on potential conservation threats to the species were used to conduct a conservation assessment. Information on taxonomy and ecology of the species is also presented in this work. Due to rarity of the species, no voucher specimens were collected. However, detailed photographs of the plants were taken to help ascertain their taxonomic identities.

#### ENUMERATION OF GENUS AND SPECIES

##### *Globba* L., Mant. Pl. 2: 143 (1771).

TYPE: *Globba marantina* L. [Lectotype: Oriental India, Herb. Linn. No. 45.1 (LINN!)]

Distribution: *Globba* L. was originally described from India with three species (Linné, 1771: 170). The present distribution of the genus spans across the tropical and subtropical parts of Asia, extending to northeastern Australia, constituted by 102 species, 15 varieties and five subspecies. Of these at least seven species are found in India (Govaerts et al. 2017).

##### *Globba spathulata* Roxb. in Carey, Fl. Ind. 1: 83 (1820)

*Mantisia spathulata* (Roxb.) Schult., Mant. 1: 49 (1822).

Type: Bangladesh, Silhet, M.R. Smith s.n. (Could not be traced).

Diversity and description (from Roxburgh, 1820). Panicles radical, erect, oblong, and range from 20–30 cm high. They are composed of many diverging, simple, lengthening branches with every part including the bract of a pretty light azure colour. Bracts are oval-oblong, concave with a larger one under each branch of the panicle, and one to each flower. Flowers are numerous and produced in a continued succession for several weeks on the same panicle. Perianth is superior, widening towards its three-toothed mouth. Corolla tube is long, slender, curved and villous. Border three-lobed; lobes nearly equal and equally arranged, with oblong

and concave shapes. Lip cuneate, deeply two-parted but less than that found in *G. subulata*, much larger than the divisions of the exterior border, deep orange yellow, forming a pretty contrast with lively purple of every other part of the panicle. Filament long, slender, recurved, and as in the genus; near the base, instead of an inner border to the corolla, there is a spatulate, diverging wing on each side. Its specific name is taken from its shape, which readily allows distinguishing this species from *G. subulata*, which greatly resembles this species when in flower. The anther has semilunar wing on each side. Germ one-celled, containing many ovules, attached to three parietal receptacles.

Flowering period: Early April

Distribution: Eastern Himalayas to Myanmar (Govaerts et al. 2017).

Notes: Popularly *G. spathulata* is also called the “Dancing Girl” flower since its yellow colored corolla resembles a skirt, while the staminoids look like two arms. The species flowers for a short period during the monsoon, following which the rhizomes become dormant and make it difficult to locate the plant.

In April 2014, the species was photographed at an approximate elevation of 1,020m in Dampa TR in Mamit District of Mizoram (Image 1). The species was located in a rocky, open, high elevation area exposed to adequate sunlight. From a perspective of its global distribution, the occurrence of this species in Dampa TR is a first record for the district.

Specimens examined: 1456 (E00228036) (E!), 27.iv.2006, Bangladesh: Chittagong, Rangamati District, coll. M.F. Newman & J. Škorničková; 1204 (E00158133) (E!), 30.v.2001, Chittagong, Rangamati District, Sitapahar Reserved Forest, Karnaphuli River, vertical rocks by water, coll. M.F. Newman; 331 (E00035185) (E!), 23.v.1931, Karnaphuli River, 50m, coll. W.J.L. Wenger; 332 (E00035184) (E!), 22.v.1931, Karnaphuli River, 50m, coll. W.J.L. Wenger; s.n. (K000815690) (K!), Chittagong, 1876, coll. J.L. Lister; 365 (K000815691) (K!), Chittagong, 1876, coll. J.L. Lister; India: s.n. (E00035183) (E!), West Bengal, Darjeeling, coll. J.M. Cowan.

Conservation Assessment: *Globba spathulata* is known from 11 localities (five downloaded from Zingiberaceae Resource Centre (2018) and three from recent literature (Kress et al. 2003; Bhowmik et al. 2010; De & Reang 2016), two from Royal Botanic Gardens (Kew) herbarium and one from the current survey). Of these, one is from West Bengal, three from Mizoram, six from Bangladesh and one from Myanmar. Using GeoCAT software (Bachman et al. 2011), the EOO for the species was estimated to be 118,821km<sup>2</sup>, with an estimated

AOO of 32km<sup>2</sup>. Several recent publications have focused on the rarity of *G. spathulata*, and the need for ex situ conservation interventions for the species (Tandon et al. 2007; Bhowmik et al. 2010; Bhowmik et al. 2011). However, based on literature and repository searches, the species in recent times has been reported from areas beyond Mizoram, and hence its distribution may be more widespread than presently believed.

Four of the reported collections from Bangladesh were made from around river Karnaphuli (Chittagong Hill Tracts), where the Kaptai hydroelectric power dam was set up in 1962. In 2001 and 2006, two subsequent collections of the same species were made, from the rocky banks of River Karnaphuli, although the exact location of the collection is unknown. River Karnaphuli is now known to be heavily polluted (Islam et al. 2016), hence rendering a serious threat to any flora growing along its banks. Plants at the two localities at Lunglei and Kolasib districts face threats due to frequent landslides, forest fires, deforestation, shifting cultivation, and habitat degradation due to presence of road building activities (De & Reang 2016). The newly discovered population of this species in this publication, from Dampa TR, although relatively secure because of its location in a protected area, may still be susceptible to threats imposed by intrusive management practices such as habitat modification through controlled burning to facilitate growth of grasses for wild ungulates.

The existing information on the species accounts for less than 20 mature individuals in the wild. However, recognizing that this may be an outcome of limited survey effort, we speculate the number of mature individuals at all sites collectively to be more than 20 but less than 500. Further, based on our existing knowledge of the species, we also predict a decline in population size due to habitat degradation. Hence, based on IUCN Categories and Criteria (IUCN 2014), we assess this species as Vulnerable under categories [VU C2a(i); D1],

***Hemiorchis* Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 42: 108 (1873)**

TYPE: *Hemiorchis burmanica* Kurz. [Type: Myanmar, Tenasserim, Martaban, Pegu, Shittang Valley, Kurz (K!)]

Diversity and Distribution: *Hemiorchis* was originally described in 1873 from Tenasserim in Myanmar, with enumeration of a single species *Hemiorchis burmanica* (Kurz, 1873). Today this genus comprises three species distributed from the central Himalaya to Myanmar and Thailand (Larsen & Triboun 2000; Govaerts et al. 2017). These species include *H. pantlingii* King with a distribution in eastern Nepal, northeastern India,





Image 1. *Globba spathulata*: A - plant in habitat; B - close-up of plant; C - close-up of flower.

Bangladesh and Myanmar; *H. rhodorrhachis* K. Schum distributed in India, Bangladesh (Srivastava & Ghoshal 2005), Myanmar and northern Thailand (Larsen & Triboun 2000); and *H. burmanica* Kurz restricted to Myanmar (Govaerts et al. 2017).

***Hemiorchis pantlingii* King, Ann. Roy. Bot. Gard. (Calcutta) 5: 163 (1896)**

Type: India, Sikkim, Mungpoo, 1,000–1,500 m, 1891, *R. Pantling s.n.* (K!).

Description (from King & Pantling 1895–1896). Herbaceous, rhizome 30 to 45 cm long, branching, sparsely clothed with short fibres. Leafy stems which are distinct from the flowering ones and produced post

flowering, 38–50 cm long; leaves are ovate-lanceolate, tapering to each end, sheathing at the base, 15–35 cm long and 5–11 cm broad. Flowering stem stout, 1.3–20 cm long, leafless, but with 4 to 6 blunt spathaceous bracts. Flowers spicate. Calyx tubular, pubescent, membraneous, with three short sub-equal sub-acute lobes shorter than the corolla-tube. Corolla in two whorls of three each with the outer whorl pinkish, with a dorsal ovate segment and two lateral shorter and narrower segments, all sub-acute. Inner whorl is yellowish, shorter than the outer, the two lateral segments broad, obovate, emarginated, the middle lobe rhomboidal, concave with a central thick ridge from base to apex; at the base a transverse recurved process, and at the side of the

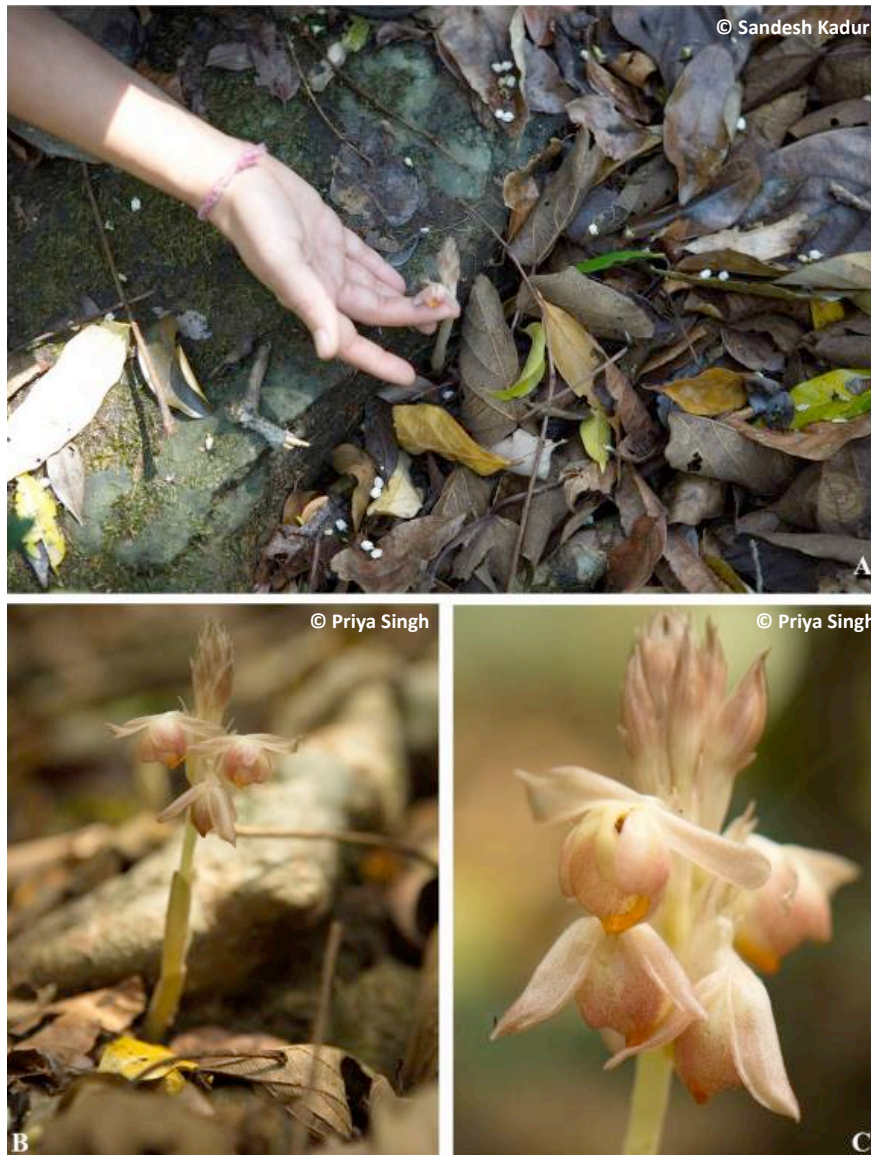


Image 2. *Hemiorchis pantlingii*: A - plant in habitat; B - close-up of plant; C - close-up of flower.

base two purple divergent fleshy process (staminodes). Fertile stamen incurved, shorter than the inner whorl of the corolla; the filament thick and fleshy; anther broadly elliptic, emarginated at the base and apex, 2-celled with longitudinal lateral dehiscence. Ovary inferior, obliquely and narrowly ellipsoid, striate, one celled; three placentas; stigma projecting slightly above the apex of the anther, minute, cup-shaped. Capsule fusiform, 3cm long, 8- to 10-ribbed, pubescent, crowned by the withered segments of the perianth. Seeds broadly ovoid, 0.6cm long, with a short white fleshy aril. All plants were in a stage of flowering, with fleshy looking stems measuring 15–20 cm tall. The plants bore no leaves at the time of photographing them. The outer whorls of

the corolla had a shade of pink while the inner ones had a shade between cream and yellow.

Flowering period: Early April

Distribution: Bangladesh, Nepal, India and Myanmar.

Notes: *Hemiorchis pantlingii* was described originally by King (1895), based on a specimen collected by Robert Pantling from Sikkim. Thereafter, the plant was rediscovered in Sikkim (Luckson 2001), followed by more recent reports from Garo Hills in Meghalaya (Singh et al. 2012) and Borail Wildlife Sanctuary in Cachar Hills, Assam (Barbhuiya et al. 2012).

Information on the species suggests that *H. pantlingii* is amongst the earliest flowering Zingiberaceae, with highly ephemeral flowers that shed after 4-5 days. The



peduncle, however, supports several buds that continue to flower for 2–3 weeks (Singh et al. 2012). Post flowering season, ovate to lanceolate leaves which are 15–35 cm long and 5–11 cm wide, appear on the plant, but are shed in late autumn, post which only the rhizome survives underground (Hooker 1895), which was supported by us not sighting the plant between December 2014 to March 2015. The plant may be insect pollinated, due to its brightly colored ephemeral flowering habit.

Specimens examined: Bhutan: 300 m, 1893, R. Pantling s.n. (K!-Syntype); 300m, 1893, R. Pantling s.n. (P00686502) (P!-Syntype); 300m, 1893, R. Pantling s.n. (U0115372) (U!-Syntype); Sikkim, 300m, 1893, R. Pantling s.n. (US00336050) (US!-Syntype); 300m, 1893, R. Pantling s.n. (K000640571) (K!-Syntype); 300m, 1893, R. Pantling s.n. (BM000958128) (BM!-Syntype); 300 m, 1893, R. Pantling s.n. (E00149942) (E!-Syntype). India: Sukhne, Darj-drik, 22 April 1958, S. K. Mukerjee 4615 (BKF); West Bengal, Sivok, March 1873, J. S. Gamble 4015B (K!); West Bengal, Chunabati, 760 m, April 1876, J. S. Gamble 617A (K!); West Bengal, Darjeeling, Mongpoo, 300 m, 1891, R. Pantling s.n. (BM000958129) (BM!-Isolectotype); West Bengal, Darjeeling, Mongpoo, 300 m, 1891, R. Pantling s.n. (K000640570) (K!-Lectotype); West Bengal, Darjeeling, Mongpoo, 300 m, 1891, R. Pantling s.n. (K000640571) (K!-Isolectotype); West Bengal, Darjeeling, Mungpoo, 300 m, 1891, R. Pantling s.n. (P00686501) (P!-Isolectotype). NEPAL, Saktim Tea Estate, Mai Khola, 450 m, 19 April 1971, J. D. A. Stainton 6795 (BM000958130) (BM!).

Conservation Assessment: Based on historical accounts downloaded from Zingiberaceae Resource Centre (2018), available reference (Kress et al. 2003), collections at Royal Botanic Gardens (Kew) herbarium and recent surveys, *H. pantlingii* is known to occur at 22 localities, which include two in Mizoram, two in Meghalaya, seven in Sikkim, seven in West Bengal, one in Bangladesh, one in Myanmar and two in Nepal. The Extent of Occurrence for the species is estimated to be 282,714 km<sup>2</sup> and the Area of Occupancy as 52 km<sup>2</sup> using GeoCAT software (Bachman et al. 2011). Reports of the species from Nokrek Biosphere Reserve in Meghalaya and Dampa TR in Mizoram (Image 2), although indicate its presence in protected area landscapes; we believe the species may still be threatened by anthropogenic induced disturbances such as habitat management and naturally occurring fires. Habitat degradation is also a major threat in the Himalayan regions of Sikkim and West Bengal due to rapid influx of people into the region (CEPF 2005). We estimate less than 500 mature individuals for the species, based on the fact that all

locations from existing surveys do not support more than 20 mature individuals. However, we believe the species has been poorly surveyed for in the wild with possibilities of discovering new localities harboring it. There is an inferred decline in the population size of the species due to habitat degradation. Based on IUCN Categories and Criteria (IUCN 2014) this species can hence be assessed as Vulnerable [VU C2a(i); D1].

#### CONSERVATION IMPLICATION

With 86% of its geographical area under forest cover, Mizoram supports the largest forested area for any state in India (State of Forest Report 2017). This region is also a part of the Indo-Burma Biodiversity Hotspot (Myers et al. 2000) and is located within the Eastern Himalayan Endemic Bird Area (Stattersfield et al. 1998). Despite its ecological significance and vast forest cover, it has been poorly surveyed for biodiversity, as evinced by the range extensions for *G. spathulata* and *H. pantlingii* reported in this study.

The state supports a small network of protected areas which in times of increasing anthropogenic pressures and changing land-use patterns, urgently requires inventorying biodiversity in order to make appropriate conservation decisions. Also, with large areas being converted to oil-palm monocultures (Mandal & Raman 2016), it is important to extend the coverage of protection within the state while ensuring that habitat management practices in protected areas do not compromise survival of rare native floral species.

#### REFERENCES

- Bachman, S., J. Moat, A.W. Hill, J. de la Torre & B. Scott (2011). Supporting Red List threat assessments with GeoCAT: geospatial conservation assessment tool. *ZooKeys* 150: 117–126; <http://doi.org/10.3897/zookeys.150.2109>
- Barbhuiya, H. A., B.K. Dutta, A.K. Das & A.K. Baishya (2012). *Hemiorchis pantlingii* King (Zingiberaceae): a rare species new to Assam. *Journal of Economic and Taxonomic Botany* 4: 826–828.
- Bhowmik, S.S.D., S. Kumaria & P. Tandon (2010). Conservation of *Mantisia spathulata* Schult. and *Mantisia wengeri* Fischer, two Critically Endangered and endemic Zingibers of Northeast India. *Seed Technology* 32 (1): 57–62.
- Bhowmik, S.S.D., S. Kumaria & P. Tandon (2011). Long-term conservation through cryopreservation of immature seed of *Mantisia spathulata* and *Mantisia wengeri*; two Endangered plants of north-east India. *CryoLetters* 32(6): 498–505.
- CEPF (2005). Ecosystem Profile: Eastern Himalayan Region. Downloadable from [http://www.cepf.net/Documents/final\\_ehimalayas.ep.pdf](http://www.cepf.net/Documents/final_ehimalayas.ep.pdf), Assessed on 7 July 2017.
- Champion, H.G. & S.K. Seth (1968). *A Revised Survey of Forest Types of India*. Government of India Press, New Delhi, 404pp.
- China Plant Specialist Group (2004). *Aristolochia westlandii*. In: IUCN 2008. 2008 IUCN Red List of Threatened Species. Downloaded on 26 January 2009.
- Christenhusz, M.J.M. & J.W. Byng (2016). The number of known plants



- species in the world and its annual increase. *Phytotaxa* 261: 201–217; <http://doi.org/10.11646/phytotaxa.261>
- De, A. & D. Reang (2016).** New locality records of the 'Dancing Girl' of Mizoram, a rare zinger species. *Journal of Threatened Taxa* 8(5): 8841–8843; <http://doi.org/10.11609/jott.2051.8.5.8841-8843>
- Govaerts, R., N. Newman & J.M. Lock (2017).** World Checklist of Zingiberaceae. Facilitated by the Royal Botanic Gardens, Kew. Published on the Internet; <http://apps.kew.org/wcsp/>, Retrieved on 12 June 2017.
- Hooker, J.D. (1895).** *Hemiorchis pantlingii*. *Annals of the Royal Botanic Garden, Calcutta* 5: 163–164.
- Islam, T., J. Amin, R.B. Ahmed, R. Hasan & S.K. Palit (2016).** Assessment of industrial effluent pollution in Karnaphuli River, pp. 128–133. In: Islam, I. & H.A. Rahm (eds.) Proceedings of 3<sup>rd</sup> International Conference on Advances in Civil Engineering, 21–23 December 2016, CUET, Chittagong, Bangladesh.
- IUCN (2014).** *Guidelines for using the IUCN Red List Categories and Criteria, Version 11*. Prepared by the Standards and Petitions Subcommittee. Available from: <http://www.iucnredlist.org/documents/RedListGuidelines.pdf> (accessed 1 July 2017).
- King, G. 1895.** A century of new and rare Indian plants. *Ann. Roy. Bot. Gard. Calcutta* 5:2-166.
- King, G. & R. Pantling (1895–1896).** *Hemiorchis pantlingii*. In: Description of new and rare Indian plants. *Annals of Royal Botanic Garden, Calcutta* 5 (2): 163–164.
- Kress, W.J., R.A. DeFilipps, E. Farr & D.Y.Y.Kyi (2003).** A checklist of the trees, shrubs, herbs, and climbers of Myanmar. Department of Systematic Botany, National Museum of Natural History, Washington DC, USA, 599pp.
- Kumar, K.M.P., G.R. Asish, M. Sabu & I. Balachandran (2013).** Significance of gingers (Zingiberaceae) in Indian system of medicine - Ayurveda: an overview. *Ancient Science of Life* 32(4): 253–261; <http://doi.org/10.4103/0257-7941.131989>
- Kurz, S. (1873).** New Burmese Plants, Part 2. *Journal of Asiatic Society of Bengal* 42: 59–110.
- Larsen, K. & P. Triboun (2000).** *Hemiorchis rhodorrhachis* K. Schum. (Zingiberaceae), a new record for Thailand. *Thai Forest Bulletin (Botany)* 28: 39–43.
- Linné, C. (1871).** *Mantissa Plantarum Altera*. Stockholm, 142pp.
- Lucksom, S.Z. (2001).** Rediscovery of *Hemiorchis pantlingii* (Zingiberaceae) from Sikkim Himalaya. *Journal of the Bombay Natural History Society* 98: 493–495.
- Mandal, J. & T.R.S. Raman (2016).** Shifting agriculture supports more tropical forest birds than oil palm or teak plantations in Mizoram, northeast India. *The Condor: Ornithological Applications* 118: 345–359; <http://doi.org/10.1650/CONDOR-15-163.1>
- Myers, N., R.A. Mittermeier, C.G. Mittermeier, G.A.B. da Fonseca & J. Kents (2000).** Biodiversity hotspots for conservation priorities. *Nature* 403: 853–858.
- Roxburgh, W. (1820).** *Globba spathulata*. In: Carey, W. & N. Wallich (ed.) *Flora Indica* 1. The Mission Press, Serampore, 493pp.
- Šckorničkova, J. & M. Newman (2015).** *Gingers of Cambodia, Laos & Vietnam*. Singapore Botanic Gardens, National Parks Board, Singapore, 229pp.
- Singh, B., S.J. Phukan, V.N. Singh, B.K. Sinha & S.K. Borthakur (2012).** Recollection of *Hemiorchis pantlingii* King after a century from Meghalaya. *Indian Journal of Forestry* 35: 97–98.
- Srivastava, S.C. & P.P. Ghoshal (2005).** *Hemiorchis rhodorrhachis* Schum. (Zingiberaceae)- a new record for Bangladesh. *Bangladesh Journal of Plant Taxonomy* 12: 59–61.
- State of the Forest Report (2017).** *India-State of the Forest Report*. Forest Survey of India, Dehradun.
- Stattersfield, A.J., M.J. Crosby, A.J. Long & D.C. Wege (1998).** *Endemic Bird Areas of the World: Priorities for Biodiversity Conservation*. Cambridge (UK): Birdlife International. Birdlife Conservation Series no. 7, 846pp.
- Tandon, P., S.S.D. Bhowmik, A.A.Mao & S. Kumaria (2007).** Rapid in-vitro clonal propagation of *Mantisia spathulata* Schult., a rare and endemic plant of Northeastern India for recovery. *Biotechnology* 6 (1): 68–71.
- Zingiberaceae Resource Centre (2018).** *Globba spathulata* and *Hemiorchis pantlingii*. In: The gingers of the world. Downloaded from <http://zingiberaceae.e-monocot.org> on 13 March 2018.





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