



Notes on the identity, distribution and Red list assessment of *Phreatia albofarinosa* (Orchidaceae), a poorly known species from India

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Abstract

Phreatia albofarinosa Ormerod is reported for the first time from Arunachal Pradesh, Manipur, Mizoram and Sikkim (India). Its specimens preserved in different Indian herbaria were found as erroneously identified either as *Phreatia elegans* Lindley or as *Phreatia laxiflora* (Blume) Lindley and have now been properly determined. A detailed description along with photographic illustration and information on phenology, habitat and distribution is provided for easy identification. Its threat status in Indian perspective has been accessed by applying the IUCN Red listing guidelines to facilitate conservation measures for this little-known orchid species.

Résumé

Phreatia albofarinosa Ormerod est ici signalé pour la première fois dans les états indiens de Arunachal Pradesh, Manipur, Mizoram et Sikkim. Les spécimens de ce taxon conservés dans différents herbiers indiens étaient

enregistrés à tort sous les noms de *Phreatia elegans* Lindley ou *Phreatia laxiflora* (Blume) Lindley. L'article propose une description détaillée de l'espèce accompagnée d'une planche photographique, et des notes sur sa phénologie, son habitat et sa distribution. Le niveau de menace en Inde a été évalué selon les directives de la liste rouge de l'IUCN, afin d'aider à prendre des mesures de conservation pour cette orchidée mal connue.

Keywords: conservation, distribution, taxonomy.

Mots clés : conservation, distribution, taxinomie.

Introduction

Phreatia Lindley (1830: 63) [Orchidaceae, Epidendroideae, Podocheileae, Thelasiinae] as circumscribed in Pridgeon *et al.* (2005) represents a group of sympodial epiphytes, pseudobulbous, caulescent or stemless, with axillary, unbranched inflorescence bearing many small, usually white flowers. The genus is closely allied to *Thelasis* Blume (1825: 385) in its vegetative and floral morphology, but differs in having a distinct column-foot. Because of the inconspicuous small flowers, poorly represented herbarium specimens and similar morphology of several species both within the genus and from different genera, the genus is not thoroughly understood as for its taxonomy. The specimens of *Phreatia* are often erroneously identified in different herbaria (Ormerod, 2005). The genus is represented by 211 taxa globally (Chase *et al.*, 2015) and distributed from India, Sri-Lanka, through Malaysia to Australia, New Zealand, and up to the Society Islands (Pridgeon *et al.*, 2005), with the maximum diversity recorded in New Guinea (Ormerod, 2005). Three species [*P. albofarinosa* Ormerod (2005: 183), *P. elegans* Lindley (1830: 63) and *P. plantaginifolia* (J. Koenig, 1791: 60) Ormerod (1995: 22)] have been recorded in India by Singh *et al.* (2019) and Misra (2019). These species have no recorded use for any purpose; they are not frequently spotted in the field surveys; they are poorly represented in the herbaria and belong to a group of poorly known Indian orchids.

Phreatia albofarinosa was described by Ormerod based on old herbarium specimens collected in Thailand (Doi Sutep) and India (West Bengal, Meghalaya). These specimens had been earlier identified as either *Phreatia elegans* or *Phreatia formosana* Rolfe (1895: 156) or *Phreatia laxiflora* (Blume, 1825: 350) Lindley (1830: 64). Ormerod (2005) differentiated *Phreatia albofarinosa* from the allied species by the presence of distinctly tapered

apical portion of leaves, longer floral bracts, obliquely ovate petals and a labellum with two indistinct patches of farinose hairs. The specimens from Meghalaya earlier identified as *Phreatia elegans* by Hooker (1890) and as *Phreatia laxiflora* by Deori (1992) were referred to *Phreatia albofarinosa* by Ormerod (2005). The specimens *Pantling* 295 from 'Labha', West Bengal at AMES, which was originally identified as *Phreatia elegans*, was also referred to this species by Ormerod. Actually, Ormerod had mentioned this specimen as collected from 'Lakha' in Sikkim Himalaya by Pantling, but it was a misinterpretation of 'Labha' written on the herbarium label. It was a part of erstwhile Sikkim Himalaya, now referred to 'Darjeeling Himalaya' in the Indian state of West Bengal. A duplicate of this specimen at CAL confirms this observation (Fig. 2B).

Despite having been described by Ormerod in 2005, *Phreatia albofarinosa* did not appear in Indian checklists (Misra, 2007; Rao, 2007; Chowdhery, 2010) and regional floras (Luckson, 2007; Ghosh & Mallick, 2014; Rao & Singh, 2015; Mao & Deori, 2018; Rao & Kumar, 2018) until it was included in Singh *et al.* (2019) and Misra (2019). This may be due to the unawareness about Ormerod's work among the Indian workers. Hitherto, the species was known only by the information available in the protologue. The specimens and distribution data for this species was scanty and poorly known. However, while working for the revisionary studies on the genus *Phreatia* in India under the 'Flora of India' project, fresh specimens of *Phreatia albofarinosa* could be located and studied in Sikkim, Arunachal Pradesh and Mizoram. Further, the specimens erroneously reported as *Phreatia elegans* from Mizoram (Kumar *et al.*, 2013) and Meghalaya (Rao & Singh, 2015) could be identified as *P. albofarinosa*. The specimen from Manipur *Phukan* 102896 (ASSAM), which was originally identified as *P. laxiflora* could also be referred to this species (Fig. 2D). Consequently, the present study not only increases the knowledge on the morphology of *Phreatia albofarinosa* (as live specimens could be studied and presented with photographic evidence), but also records its distribution in Arunachal Pradesh, Sikkim, Manipur and Mizoram for the first time. The unidentified or misidentified herbarium specimens from ASSAM, ARUN, CAL, Orchid Herbarium Tipi (OHT) have also been correctly determined. A detailed description, along with photographic illustration (Fig. 1) and information on phenology, habitat and distribution is provided for easy identification. *Phreatia laxiflora* has been excluded from Indian flora and an artificial key to

all three species of *Phreatia* present in India is proposed. Finally, the threat status in Indian perspective has been accessed to facilitate conservation measures for this poorly known orchid species.

Taxonomic treatment

Phreatia albofarinosa Ormerod, *Taiwania* 50(3): 183, f.1. 2005.

S.K. Singh *et al.*, *Orchids of India-A Pictorial Guide*: 436. 2019; S. Misra, *Orchids of India*: 524. 2019.

Type: Thailand, Doi Sutep, 1005 m, 12 August 1910, *Kerr* 259 (holotype: K000891211-Photo!) (Fig. 2A). India, Sikkim (presently West Bengal), Labha ('Lakha'), 1830 m., August 1889, *Pantling* 295 (Paratype: AMES); India, Meghalaya, Khasia Hills, Pomrang, 19 September 1850, *J.D. Hooker & T. Thomson* 2329 (Paratype: K).

Phreatia laxiflora auct. non (Blume) Lindley, 1830: N.C. Deori, *Journal of the Orchid Society of India* 6(1-2): 27, f.2. 1992; C.S. Kumar & Manilal, *A Catalogue of Indian Orchids*: 83. 1994; A.N. Rao, *Bulletin of Arunachal Forest Research* 23 (1-2): 28. 2007; S. Misra, *Orchids of India*: 313. 2007; C.S. Rao & S.K. Singh, *Wild Orchids of Meghalaya*: 44. 2015.

Phreatia elegans auct. non Lindley 1830: J.D. Hooker, *Flora of British India* 5: 810. 1890 *pro parte*; R. Kumar *et al.*, *Keanean Journal of Science* 2: 23, f.2A & 2B. 2013.

Phreatia formosana auct. non Rolfe: Seidenfaden, *Opera Botanica* 89: 149, f.97(A-E). 1986.

Description. Epiphytic herbs, 10-17 cm tall, acaulescent. Leaves 4-6, distichous, arranged in a fan, 6-17 × 0.8-1.5 cm, narrowly elliptic-oblong to ligulate-oblong, unequally notched at apex, mid-vein prominent below; base sheathing, articulate, equitant, overlapping, strongly veined, 1.5-3 cm long, dilated at base. Raceme axillary, 11-22 cm long, erect to arching above; peduncle 7-10.5 cm long, erect, glabrous, with 2-3 distant, tubular-lanceolate, 9-13 mm long, clasping sheaths; rachis 4-11 cm long, usually arching, irregularly winged, sub-densely many-flowered. Floral bracts 1.5-4.5 × 0.6-1.5 mm, gradually decreasing above, lanceolate, cymbiform, acuminate, brownish, persistent. Flowers small, widely opening, 2.2-2.8 mm across, white, glabrous. Pedicel plus ovary 2-3 mm long, clavate, ridged, glabrous, green. Dorsal sepal 1.4-2 × 1-1.2 mm, broadly ovate, acute. Lateral sepals 1.5-2.6 × 1.2-1.6 mm at base, oblique, broadly ovate, acute, forming a broad obtuse saccate mentum. Petals 1-1.2 ×

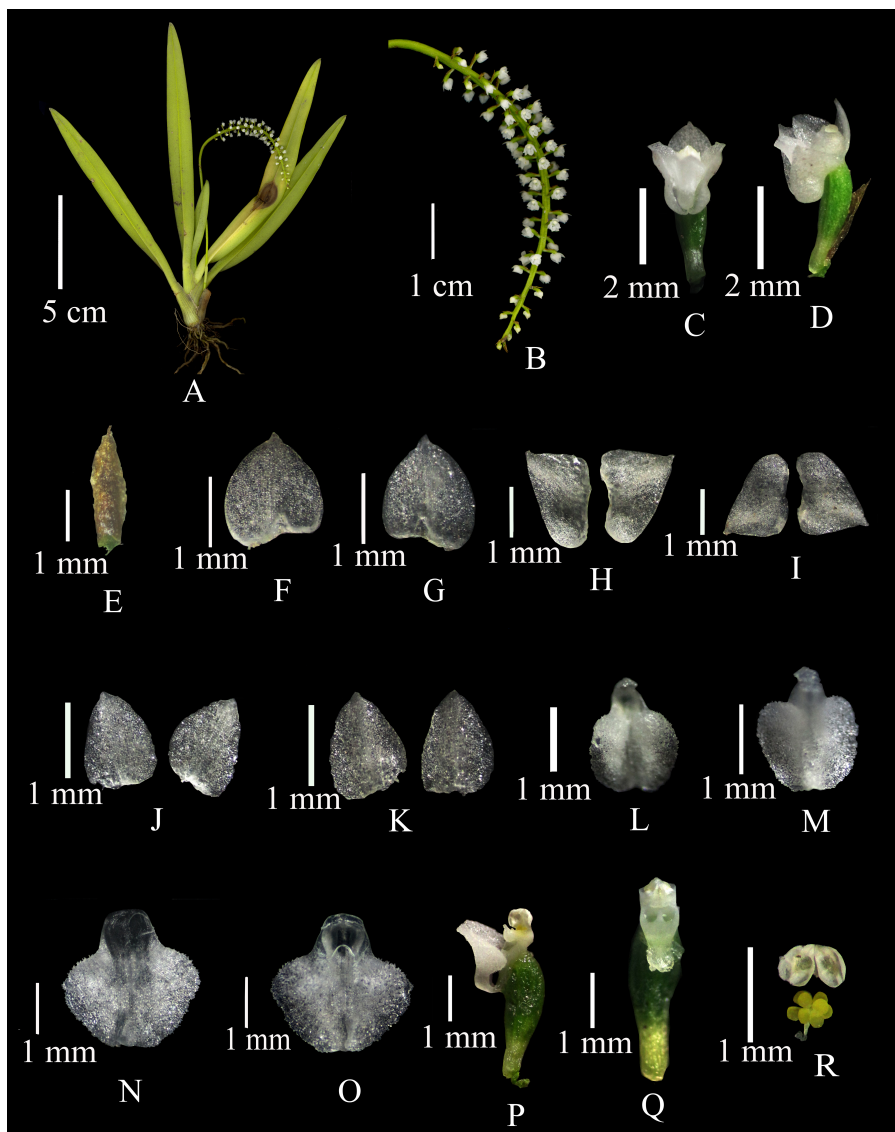


Fig. 1. *Phreatia albofarinosa*

A. Habit; B. Inflorescence; C. Flower (front view); D. Flower (side view); E. Floral bract; F. Dorsal sepal (ventral surface); G. Dorsal sepal (dorsal surface); H. Lateral sepals (ventral surface); I. Lateral sepals (dorsal surface); J. Petals (ventral surface); K. Petals (dorsal surface); L - O. Labellum (in different posture); P. Labellum with column, pedicel and ovary; Q. Column with pedicel and ovary; R. Anther cap and pollinia
[after D.K. Agrawala 37872 (BSHC) dissected and photographed by D.K. Agrawala].

0.8-1 mm, obliquely ovate, subacute. Labellum 1.5-2 × 1.2-1.5 mm, distinctly clawed at base, saccate, simple, abruptly widened into a broadly ovate-deltoid lamina, margin finely pubescent, upper surface with two patches of farinose hairs, apex obtuse-emarginate. Column 0.8-1.2 mm long, truncate; foot distinct, incurved; anther orbicular; pollinia yellow, obovoid, attached by a long slender stipe to a common viscidium; rostellum erect, uncinat. Capsules 3.5-5 × 1-1.5 mm, ellipsoid, shortly stalked (Fig. 1).

Flowering. July-August. Fruiting: September.

Habitat. Epiphytic on mossy tree trunks and moist rocks in evergreen forests at 1000-1800 m elevation.

Distribution. India (Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Sikkim, West Bengal), Thailand.

Specimens examined. INDIA: Arunachal Pradesh: Lower Subansiri district, Palin, 16.05.1966, fld. at Shillong on 27.07.1966, *A.R.K Sastry 45600* (ARUN); Dibang Valley district, Jambopani, 700 m., 24.08.2001, *M. Bhaumik 3203* (CAL); West Kameng district, Sessa, 1650 m, 11.01.2015, *D.K. Agrawala 37881A* (BSHC); Sessa, *S.N. Hegde 4513* (Orchid Herbarium Tipi); Tipi, 16.07.1997, *A.N. Rao 29856* (Orchid Herbarium Tipi); Sissini, 19.09.2000, *A.N. Rao 30605* (Orchid Herbarium Tipi); Lohit district, Hawaii, 18.09.1985, *A.N. Rao 21420, 21421* (Fig. 2F), *21422* (Orchid Herbarium Tipi); Papum Pare district, Itanagar, Ganga, 414 m, 25.05.1984, *S.N. Hegde 14546* (Orchid Herbarium Tipi). Manipur: Senapati Hills, 13.07.2006, *S. Phukan 102896* (ASSAM). Meghalaya: Jaintea Hills, Jarain, 25.08.1972, *N.C. Deori 51731* (ASSAM, Fig. 2C). Mizoram: Murlen National Park, Champhai, 14.08.2013, *Ramesh Kumar & party 128711* (ASSAM); Aizawl district, Tlawng river side, 11.03.2021, *S. Chakraborty & S. Sarkar 41530* (BSHC). Sikkim: South Sikkim, Lower Makarjung near Ranjit bridge, 1470 m, 22.08.2014, *D.K. Agrawala 37872* (BSHC, Fig. 2E). West Bengal: Lava (Labha), 1830 m. (6000 ft.), August 1899, *Pantling 295* (CAL-452793, Fig. 2B, duplicate of Paratype at AMES).

Key to the *Phreatia* species in India

- 1a. Tiny plants, not more than 5 cm tall, with a short stem; flowers pale yellowish-green; labellum with 2 minute, yellowish glands at base
3. *Phreatia plantaginifolia*
- 1b. Larger plants, more than 10 cm tall, stem pseudobulbous or absent; flowers white; labellum without any gland at base.....2

- 2a. Plants acaulescent; labellum with 2 patches of farinose hairs.....
1. *Phreatia albofarinosa*
 2b. Plants pseudobulbous; labellum pilose on upper surface.....
2. *Phreatia elegans*

Red list Assessment as per IUCN guidelines

(IUCN, 2012a; 2012b; 2019)

The global distribution of *Phreatia albofarinosa* is in India and Thailand. In India, the species is known so far from 14 sub-populations distributed in Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Sikkim and West Bengal. The Extent of Occurrence (EOO) in India has been calculated in GeoCAT as 224,830.895 km² and the Area of Occupancy (AOO) as 56 km² by considering the minimum grid size of 2 × 2 km (Fig. 3). Fresh specimens of the species have been observed in Arunachal Pradesh, Mizoram and Sikkim with 10-15 matured individuals in each sub-population. All the recorded habitats are on decline due to developmental activities, widening of roads, expansion of agricultural field and tourism. As an epiphyte, its survival depends on that of the host species. The pollination and seed germination are vector dependent and vegetative reproduction is not so effective. The AOO meets the threshold for Endangered category under Criteria B of IUCN, but the number of locations (14) exceeds the threshold for Vulnerable. However, the species can be considered as 'Severely fragmented' because of the disjunct nature of the distribution. In view of the above, the threat perception on this species is assessed as Endangered [EN B2ab(iii)] in Indian perspective. As the other populations of this species outside India are far away and intersected by geographical barriers/unsuitable habitats, immigration of propagules or gene flow among 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.

Opposite page

Fig. 2. Specimens of *Phreatia albofarinosa* from different herbaria

A. Holotype specimen at K [K000891211]; B. Duplicate of Paratype [Pantling 295 (CAL)]; C. N.C. Deori 51731 (ASSAM) originally identified as *Phreatia laxiflora*; D. S. Phukan 102896 (ASSAM)] from Manipur, originally identified as *Phreatia laxiflora*. E. Specimen from Sikkim [D.K. Agrawala 37872 (BSHC)]. F. Specimen from Arunachal Pradesh [A.N. Rao 21421 (Orchid Herbarium Tipi)].



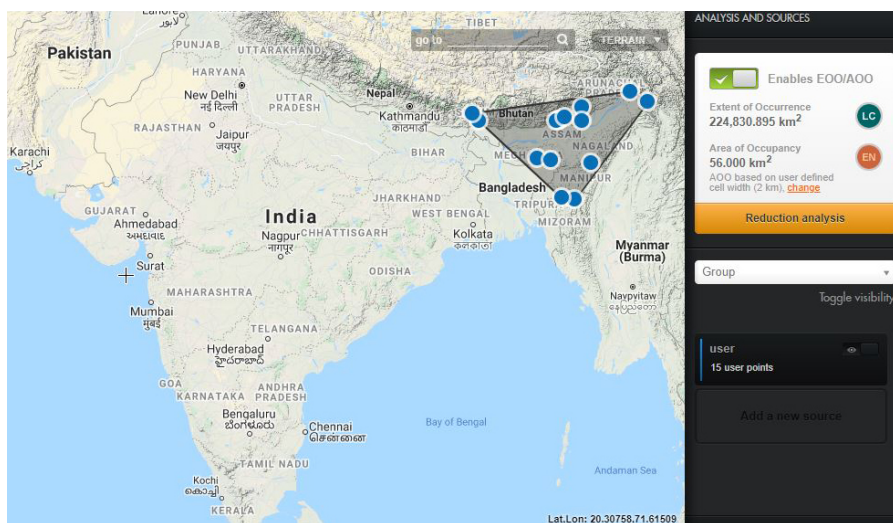


Fig. 3. Distribution map of *Phreatia albofarinosa* in India

with Area of Occupancy and Extent of Occurrence

[Map created in GeoCAT platform <http://geocat.kew.org>.]

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