Rediscovery of *Aponogeton lakhonensis* A. Camus (Aponogetonaceae): a long-lost aquatic plant of India

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Family Aponogetonaceae is a monogeneric freshwater aquatic plant group belonging to the order Alismatales and comprising of around 58 species mostly distributed in the tropical and subtropical regions of Africa, Asia, and Australia (Chen et al. 2015; Yadav et al. 2015; De Silva et al. 2016). In India, the genus *Aponogeton* Linnaeus f. (1781) is known to have only eight species out of which, four are endemic (Yadav & Gaikwad 2003; Yadav et al. 2015). *Aponogeton lakhonensis* A. Camus was first described by Aimée Antoinette Camus in 1909 based on a collection made by F.J. Harmand in 1875 from Mount La-khon, Laos. It is the only species reported from the entire eastern India. Often, this species has been incorrectly labelled as *Aponogeton natans* (L.) Engler & Krause (1906) (Youhao et al. 2010). Hence a comparative analysis between both the species has been studied, enumerated and photographically presented below.

In India, this species was first collected in 1836 by an anonymous collector from Assam and again in 1898 by M.A. Hock from Jaboka, Sibsagar district, Assam post which there has been no further sightings nor any recollections from the entire country making it a regionally threatened plant species.

During a recent botanical survey to Dhemaji district of Assam conducted during 2020–2021, the authors came across an extremely striking aquatic plant with floating leaves and yellow inflorescence. On extensive studies and consultation with the existing literatures (Yadav & Gaikwad 2003; Tanaka et al. 2007; Youhao et al. 2010) and herbarium specimens (CAL499688, image!; CAL499690, image!), the aquatic plant was identified as *Aponogeton lakhonensis* A. Camus.

*Aponogeton lakhonensis* A. Camus, Not. Syst. 1: 273. f. 18. 1909; Lecomte in Fl. Gen. Indo Chine. 6: 1226. 1942; Bruggen in Blumea 18: 479, f.2, 12, 3a. 1970; Biblioth. Bot. 51. 1985; Aqua Planta. 2: 51. 1990; Steenis, Fl. Males. 1, 7: 216. F. 1 & 3. 1971; S. Kartikeyan et al. Fl. Ind. Enum. Monocot. Sr 4. 4. 1989; C.D.K. Cook, Aquat. Wetl. Pl. India 48. 1996; Sundararagh. In Hajra & Sanjappa, Fasc. Fl. India 22: 129. 1996. (Figure 1, Image 1–4)

Aquatic, monococious, tuberiferous, robust perennial herb, c. 30–50 cm tall. Tubers elongate or obovoid, 5.7–6.2 x 2–2.5 cm; roots slender, fibrous, golden to black,
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from top of tubers. Leaves both submerged and floating, petiolate. Submerged leaves brittle, petiolate; petioles 10–12 cm long, sheathing at base; lamina 9.22 x 4.3–5 cm, oblong-lanceolate, round at base, round to obtuse at apex, midrib prominent with 6–8 parallel nerves. Floating leaves slender, terete; petiolate; petioles 35–40 cm long; lamina 13.5–26 x 4.6–5.2 cm, oblong, cordate at base, narrow to round at apex, midrib prominent with 6–8 parallel nerves. Spathe c 2.2 cm long, membranous, caducous and acute. Peduncles 20–30 cm long, 0.4 cm in diameter, cylindrical, green, slightly thickening towards inflorescence. Spike simple, greenish-yellow, 8–9 cm long, flowers yellow, spirally arranged all around inflorescence, extending to 7–14 cm in infructescence. Tepals 2, equal, persistent, obovate, 0.1–0.2 x 0.07–0.15 cm long, rounded at the tip, yellow. Stamens 6, exserted, filaments c. 0.1–0.12 cm long, widened at base, anther 2–celled, pale yellow to grey, globose, dehiscing longitudinally; pollens 19–22 µm in diam. Carpels 3, rarely 4, yellow, stigma decurrent, style short, thick, ovules 7–10 per carpels. Follicles c. 0.4–0.6 x 0.2–0.3 cm, beaked. Seeds 0.35–0.4 x 0.1 cm, with a double testa, outer testa loose, ca 9 ridged, membranous, reticulately veined, inner testa smooth, greenish, closely fitting the embryo. Embryo cylindrical, 0.25–0.3 x 0.05–0.06 cm, minute, whitish, plumule not visible.

Flowering: March to October.
Specimen examined: India, Assam, 1836 (CAL499688,
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Distribution: India (Assam); Cambodia, China, Laos, Myanmar, Thailand, Indonesia, and Vietnam.

Population and habitat: A total of seven to eight individuals including three young plantlets were spotted blooming in a freshwater natural pond deep inside the Poba Reserve Forest of Dhemaji district, Assam. The plants were growing in association with other aquatic species like *Azolla pinnata* R.Br., *Lemna perpusilla* Torr., *Ceratophyllum demersum* L., and *Colocasia esculenta* (L.) Scott.

Discussion: On the basis of the existing literatures and herbarium specimens, it can be concluded that only two collections of *Aponogeton lakhonensis* have been made so far from India (viz. in 1836 and in 1898). The present sighting of *A. lakhonensis* is a rediscovery of the species from India after 123 years. The plant has been located from the Poba Reserve Forest of Dhemaji district, Assam making it a new report of occurrence apart from

| Attributes | *Aponogeton lakhonensis* | *Aponogeton natans* (L.) Engler & Krause |
| --- | --- | --- |
| Flower colour | Yellow. | White, pink to purple. |
| Tepals | Obovate, yellow. | Ligulate, white, pink, purple. |
| Stamens | Filaments 0.1–0.12 cm long, broad, anthers pale yellow. | Filaments 0.2–0.25 cm long, not broadened; anthers dark blue. |
| Style | Short, thick, yellow. | Long, thin, white to pink. |
| Ovules | 7–10 per carpel. | 4–8 per carpel. |
| Ovaries | Yellow. | White, pink to purple. |
| Fruits | Beak short. | Beak elongated. |
| Seeds | 0.35–0.4 x 0.1 cm. | 0.16–0.18 x 0.08–0.09 cm. |
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the previous two localities in Assam. Pictures depicting its habit (Image 1,2) and a photo plate depicting the different parts of the plant (Image 3) along with a map (Figure 1) citing the present study location are provided to aid in its proper identification.

Voucher specimens (DDM03) have been deposited at the Gauhati University Botanical Herbarium (GUBH), Gauhati University, Guwahati and at the ASSAM Herbarium, Botanical Survey of India, Eastern Regional Centre, Shillong. Aponogeton lakhonensis A. Camus and Aponogeton natans (L.) Engler & Krause are very similar in appearance and sometimes misidentified. Therefore, a comparative analysis between both the species has been studied and enumerated in Table 1 along with a photographic presentation (Image 4).

References

Bruggen, H.W.E. van (1970). Revision of the genus Aponogeton L.f. IV. The Species of Asia and Malesia. Blumea 18: 457–486.

Bruggen, H.W.E. van (1985). Monograph of the genus Aponogeton L.f. (Aponogetonaceae). Bibliotheca Botanica 137: 51–52.

Bruggen, H.W.E. van (1990). Die guttang Aponogeton L. f. (Aponogetonaceae). Aqua Planta 2: 1–84.

Camus, A. (1909). Notulae Systematicae. Herbar du Museum de Paris 1(9): 273–274.

Camus A. (1942). Aponogetonacées, pp. 1223–1227. In: Lecomte, M.H. [ed.]. Flore Générale de L’indo-Chine 6. Masson et Cie Éditeurs, Paris.

Chen, L., G.W. Grimm, Q. Wang & S.S. Renner (2015). A phylogeny and biogeographic analysis for the Cape-Pondweed family Aponogetonaceae (Alismatales). Molecular Phylogenetics and Evolution 82: 111–117. https://doi.org/10.1016/j.ympev.2014.10.007

Cook, C.D.K. (1996). Aquatic and Wetland Plants of India. Oxford, 48pp.

De Silva, M.A., K.M.S. Deshaprema & J.P.I. Nanamperi (2016). Aponogeton kannangarae, a new species of Aponogeton (Aponogetonaceae) from Rakwana hills, Sri Lanka. Phytotaxa 272(2): 220–224. https://doi.org/10.11646/phytotaxa.272.3.7

Engler, A.G.H. & K. Krause (1906). Das Pflanzenreich 4 (13) Verlag von Wilhelm Engelmann, Leipzig, 11pp.

Karthikeyan, S., S.K. Jain, M.P. Nayar & M. Sanjappa (1989). Flora of India – Series 4. Flora Indicae Enumeration: Monocotyledoneae. Botanical Survey of India, Calcutta.

Linnaeus, C. (1782 [1781]). Supplementum Plantarum Systematis Vegetabilium Editionis decimae tertiae, Generum Plantarum Editiones sextae, et Specierum Plantarum Editionis secundae. Editum a Carolo a Linné. Impensis Orphanotrophei, Brunsvigae, 32pp.

Linnaeus, C. (1771). Mantissa Plantarum Altera. Generum editionis VI & specierum editionis II. Laurentii Salvii, Holmiae, 227pp.

Steenis, C.G.G.J. van (1997). Aponogetonaceae. Flora Malesiana Series 1 (7): Wolters-Noordhoff Publishing, Groningen, 216pp.

Sundararaghavan, R. (1996). Aponogetonaceae, pp. 123–136. In: Hajra, P.K. & M. Sanjappa (eds.). Fascicles of Flora of India 22, Botanical Survey of India, Calcutta, 143pp.

Tanaka, N., N. Tanaka, T. Ohi-Toma & J. Murata (2007). New or noteworthy plant collections from Myanmar (2) Aponogeton lakhonensis, Cryptocoryne cruddasiana, C. crispatula var. balansae and Stichoneuron membranaceum. The Journal of Japanese Botany 82: 266–273.

Yadav, S.R. & S.P. Gaikwad (2003). A revision of the Indian Aponogetonaceae. Bulletin of the Botanical Survey of India 45 (1–4): 39–76.

Yadav, S.R., V.S. Patil, A.R. Gholve, A.N. Chandore, U.S. Yadav & S.S. Kambale (2015). Aponogeton nateshii (Aponogetonaceae): a new species from India. Rheedea 25(1): 9–13.

Youhao, G., R.R. Haynes & C.B. Hellquist (2010). Aponogetonaceae. In: Wu, Z.Y., P.H. Raven & D.Y. Hong (eds.). Flora of China Vol. 23. Science Press, Beijing and Missouri Botanical Garden Press, Beijing and St. Louis, 104pp.
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