

Journal of
Threatened
Taxa

Building evidence for conservation globally



Open Access

10.11609/jott.2021.13.11.19431-19674

www.ithreatenedtaxa.org

26 September 2021 (Online & Print)

Vol. 13 | No. 11 | Pages: 19431-19674

ISSN 0974-7907 (Online)

ISSN 0974-7893 (Print)



ISSN 0974-7907 (Online); ISSN 0974-7893 (Print)

Publisher
Wildlife Information Liaison Development Society
www.wild.zooreach.org

Host
Zoo Outreach Organization
www.zooreach.org

No. 12, Thiruvannamalai Nagar, Saravanampatti - Kalapatti Road, Saravanampatti,
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Ph: +91 9385339863 | www.threatenedtaxa.org
Email: sanjay@threatenedtaxa.org

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Caption: Malabar Slender Loris *Loris lydekkerianus malabaricus* © Dileep Anthikkad.



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

Debolina Dey¹ , Shirang Ramchandra Yadav² & Nilakshee Devi³

^{1,3} Angiosperm Taxonomy Laboratory, Department of Botany, Gauhati University, Guwahati, Assam 781014, India.

² Angiosperm Taxonomy Laboratory, Department of Botany, Shivaji University, Kolhapur, Maharashtra 416004, India.

¹ devolinadey@rediffmail.com (corresponding author), ² sryadavdu@rediffmail.com, ³ devinilakshee@gmail.com

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, monoecious, 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,

Editor: Sanjaykumar R. Rahangdale, A.W. College, Otur, India

Date of publication: 26 September 2021 (online & print)

Citation: Dey, D., S.R. Yadav & N. Devi (2021). Rediscovery of *Aponogeton lakhonensis* A. Camus (Aponogetonaceae): a long-lost aquatic plant of India. *Journal of Threatened Taxa* 13(11): 19632–19635. <https://doi.org/10.11609/jott.7464.13.11.19632-19635>

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Funding: None.

Competing interests: The authors declare no competing interests.

Acknowledgements: The authors are grateful to: the director, Botanical Survey of India, Howrah (CAL); the curator, Gauhati University Botanical Herbarium (GUBH); Mr. Milon Doley, forester-I and member secretary, Murkongselek Biodiversity Management Committee, Dhemaji; Mr. Ramen Kutum, constable; other officials of the Department of Forest & Environment, Govt. of Assam for rendering help, facilities and encouragement during the field surveys; and Mr. Chandan Bhuyan, research scholar, Department of Geography, Gauhati University and to Mr. Hrisheekesh Dey of Guwahati. The first and third authors are grateful to the DST-FIST program, Govt of India at the Department of Botany, Gauhati University, Guwahati for necessary laboratory facilities. The second author is thankful to the University Grant Commission (UGC) for the award of BSR faculty fellowship.



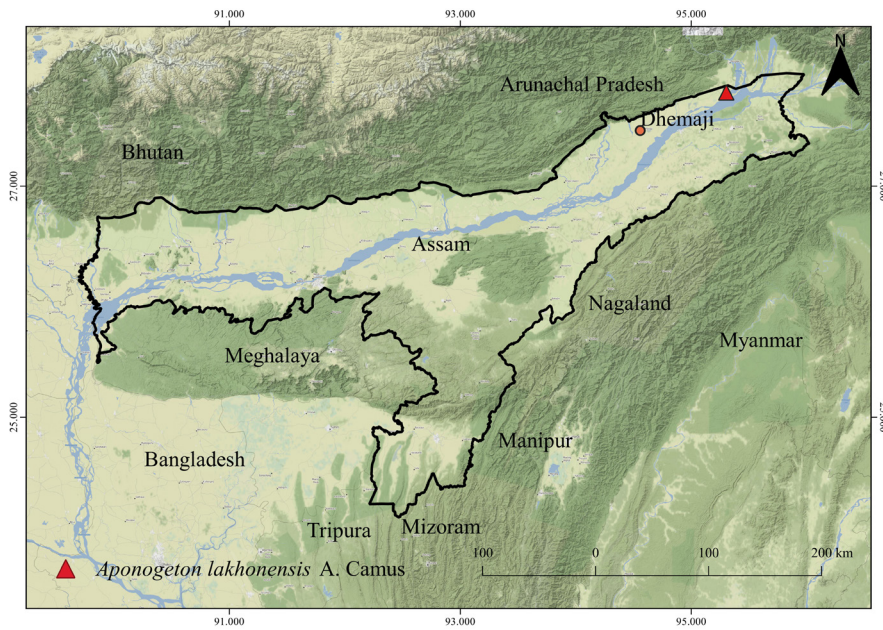


Figure 1. A map of northeastern India depicting the present collection site of *Aponogeton lakhonensis* (Map tiles by Stamen Design, under CC BY 3.0. Data by OpenStreetMap under ODbL).



Image 1. Habit of *Aponogeton lakhonensis*.



Image 2. Inflorescence of *Aponogeton lakhonensis* with floating leaves.

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,



Image 3. *Aponogeton lakhonensis*: A—Habit | B—E—Inflorescences in different stages (Scale 0.9 cm) | F—Enlarged portion of inflorescence (Scale 0.24 cm) | G—Enlarged portion of infructescence (Scale 0.6 cm) | H—Mature fruit (Scale 0.3 cm) | I—Seeds (Scale 0.2 cm) | J—Embryo with inner integument (Scale 0.3 cm) | K—Pollen grain (Scale 20 µm). © S.R. Yadav.



Image 4. *Aponogeton natans*: A—Habit | B—Habit | C & E—Inflorescence | G—Enlarged portion of infructescence | H—Mature fruit | I—L.S. of fruit showing seeds. *A. lakhonensis*: B—Habit | D & F—Inflorescence | H—Enlarged portion of infructescence | I—Mature fruit | J—L.S. of fruit showing seeds. © S.R. Yadav.

image!); Jaboka, Sivasagar district, Assam, 1898, M.A. Hock, CAL499690, image!; Poba Reserve Forest, Jonai, Dhemaji district, Assam, 132m, 13.iii.2021, 27.811N, 95.302E, D. Dey, DDM03 (GUBH!), (ASSAM!).

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

Table 1. A comparative analysis between *Aponogeton lakhonensis* A. Camus and *A. natans* (L.) Engler & Krause (Image 4).

Attributes	<i>Aponogeton lakhonensis</i> A. Camus (Bruggen 1970, 1985; Yadav & Gaikwad 2003; present study).	<i>Aponogeton natans</i> (L.) Engler & Krause (Bruggen 1970, 1985; Yadav & Gaikwad 2003; present study)
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.	0.16–0.18x 0.08–0.09 cm.

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



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).

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Journal of Threatened Taxa is indexed/abstracted in Bibliography of Systematic Mycology, Biological Abstracts, BIOSIS Previews, CAB Abstracts, EBSCO, Google Scholar, Index Copernicus, Index Fungorum, JournalSeek, National Academy of Agricultural Sciences, NewJour, OCLC WorldCat, SCOPUS, Stanford University Libraries, Virtual Library of Biology, Zoological Records.

NAAS rating (India) 5.64

Print copies of the Journal are available at cost. Write to:
 The Managing Editor, JoTT,
 c/o Wildlife Information Liaison Development Society,
 No. 12, Thiruvannamalai Nagar, Saravanampatti - Kalapatti Road,
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ISSN 0974-7907 (Online) | ISSN 0974-7893 (Print)

September 2021 | Vol. 13 | No. 11 | Pages: 19431-19674

Date of Publication: 26 September 2021 (Online & Print)

DOI: 10.11609/jott.2021.13.11.19431-19674

www.threatenedtaxa.org

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