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Research Article

NYMPHAEA ABHAYANA SP. NOV. OF NYMPHAEACEAE FROM DUARS OF WEST BENGAL, INDIA

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ABSTRACT
Nymphaea abhayana sp. nov. Anurag & M. Chowdhury, a new species is described from the road side ditches of Gorumara National Park, Duars of West Bengal. Its distinctive submerged delicate lamina, perianth and androecium, linear deep blue appendages distinguish it from the closely related species *Nymphaea nouchali*. Information on habitat, distribution, phenology and conservation status are also provided.

***Keywords*:** *Nymphaea abhayana, Gorumara National Park, New Species, India*

INTRODUCTION
The genus *Nymphaea* Linnaeus (1753) representing around 50 species with a cosmopolitan distribution (Mabberley, 2005). This number represents more than half of the species in Nymphaeales, which comprises the Nymphaeaceae, Cabombaceae and Hydatellaceae (Bosch *et al.*, 2008; APG III, 2009). Species number of water lilies in India is controversial, though earlier seven species of *Nymphaea* were reported from India by various authos (Hooker 1872; Sharma *et al.*, 1993; Cook, 1995) and latest report indicated an increase in the number of *Nymphaea* species available in India from 10 to 16 (Ansari and Jeeja, 2009) and are mostly grown in water bodies of Himalayan and sub-Himalayan Ganga-Brahmaputra flood plains. During the floristic and ecological explorations, since 2010, in different water bodies in Terai and Duars region of West Bengal, some interesting specimens of *Nymphaea* were collected from a small shallow ditch inside the Gorumara National Park (Near Murti bridge). On critical investigation, it was revealed as a new species of *Nymphaea.* The species appears quite close to *N. nouchali* which is highly variable, but remains distinct with characters like submerged leaves, petal structure and anther appendages. Dkhar *et al.*, (2013) studies the phylogeny among the 7 species of Indian water lily from North-east India and found significant interest among two sympatric races of *N. nouchali* (JD 06 & JD 07) resembling each other entirely except flower colour polymorphism that is blue and white respectively. This new species is named as *Nymphaea abhayana*.

MATERIALS AND METHODS
The fertile fresh specimens of new species were collected from its actual natural habitat, photographed and described.

RESULTS & DISCUSSION
Nymphaea abhayana Anurag & M. Chowdhury, ***sp. nov.***
Type: INDIA: West Bengal, Gorumara National Park (88° 50' 23.45" E Longitudes and 26° 50'23.45 N Latitudes) Jalpaiguri, dated 16th Nov, 2014, *Anurag et al.*, 01631, (HOLOTYPUS; CAL); dated 16.11.2014 *Anurag et al.*, 01633, (ISOTYPUS; NBU).
Aquatic submerged annual herbs. *Leaves* mostly submerged, very few floating; petioles long, green, glabrous; lamina rounded-ovate, peltate, notch not reaching to petiole, 13 – 15 x 16 – 18 cm entire but repund; base deeply cordate and basal lobes slightly spreading [keeping V-shaped space in between] with rounded tips; submerged lamina thin, membranous; floating lamina delicate, scarcely peltate, abaxially glabrous, shiny, light bluish-purple. *Flowers* base partially submerged, never on long pedicel above water, 5 – 6 cm in diameter. *Outer tepals* 4, sepaloid, 3.7 – 4 x 0.8 – 1.2 cm, subulate-ovate, acuminate, lower

part green, gradually turning violet upwards, veins prominent; *inner tepals* 7, petaloid, gradually transforming to stamens, bluish-purple, broadly subulate with broader base, 2.9 – 3.5 x 0.5 – 0.7 cm, veins distinct, reddish. *Stamens* 13, outer ones (5) longer, ± 0.8 cm, gradually smaller inwards, ± 0.5 cm; filaments slightly wider than anther; lobes long, parallel with prominent connective; appendages long, 0.01 – 0.6 cm, produced apically, deep blue, nearly terete, tips rounded. *Ovary* with numerous parietal ovules; stigmatic rays 6 – 7. *Fruits* globose. *Seeds* small, globose.

Some known wild species of study area can be clearly distinguished through the following key:

1a. Lamina entire; anthers appendaged … ……..… …… …… …… ……. 2
1b. Lamina toothed and/or repund; anthers with no appendage….. …. …….. ……..……. 3
2a. Submerged lamina thick, soft, abaxially green, adaxially purple-red, peltate; filament of inner stamens ± as wide as anther; appendages slightly compressed, creamy white … …… *N. nouchali*
2b. Submerged lamina abaxially green, adaxially purple; filament of inner & outer stamens slightly wider than anther; appendages, long, 0.01 – 0.6 cm, terete, deep blue ……. …… N. *abhayana*
3a. Stigmatic head cream in colour; flowers white …… …….. … ….. *N. pubescens*
3b. Stigmatic head not distinct; flowers red …… …… …… *N. rubra*

Table 1: Morphological Differences between *Nymphaea abhayana* from *Nymphaea nouchali*

Characters			***Nymphaea abhayana***	***Nymphaea nouchali***
Habit			Rooted herbs, mostly submerged, rarely with 1-2 floating lamina	Rooted herbs, all floating lamina
Rhizome			Never found	Prominent
Leaf	Petiole		Greenish	Bluish-purple
	Lamina	Shape	Rounded-ovate; base peltate	Elliptic-orbicular
		Colour & texture	Submerged lamina abaxially green, adaxially purple, membranous; floating lamina abaxially reddish-purple, shiny, glabrous, thin, delicate	Thick, soft, abaxially green, adaxially purple-red, glabrous, peltate
		Notch	Not reached to petiole	Reached up to petiole
		Size	13 – 15 x 16 – 18 cm diam.	7– 45) cm diam.
		Margin	Entire; base deeply cordate	Sub-entire or with broad obtuse teeth
	Size		5 – 6 cm in diam.	3 – 15 cm in diam.
Flowers	Outer tepals		4, sepaloid; 3.7 – 4 cm x 0.8 – 1.2 cm, subulate-ovate, upper part bluish, prominently reddish veined, persistent	4-5, sepaloid, lanceolate to oblong - lanceolate, 2.5–8 cm, green, upper part cremy, not prominently veined, persistent.
	Inner tepals		7, petaloid; transition to stamens regular, bluish-purple, broadly lanceolate or obovate, 2.9 – 3.5 x 0.5 – 0.7 cm	10 – 17, petaloid, white tinged with purple, blue, or light pink, linear – oblong to lanceolate, 4.5 – 5 cm x 0.9 – 1 cm.
	Stamens		Filament of inner & outer stamens slightly wider than anther; appendages, long, 0.01 – 0.6 cm, terete, deep blue	Filament of inner stamens ± as wide as anther; appendages slightly compressed, creamy white
	Carpels		Stigmatic rays always 6-7	Stigmatic rays 8–30
Fruit			Globose, 0.7 – 2 cm in diam.	Globose, 1.5 – 4.5 cm in diam.
Seed			Seeds globose	Seeds ellipsoid – globose

Phenology: The plants appear during July-August, starts flowering in September, found in full bloom during October – November and the mature fruits are found during October – December. Plants found dead along with the drying up of the habitat in December.

Habitat & Distribution: The distribution of the species is restricted to two ditches, i.e. ephemeral water bodies, each of ±250 meter long and 8 meters wide area on both sides of metaled road within the Gorumara Nation Park [88° 45' 19" to 88° 51' 18" E Longitudes and 26° 48' 05" to 26° 41' 20" N Latitudes] in the Jalpaiguri district of West Bengal. The appearance and disappearance of these small wetlands are linked to the arrival and withdrawal of monsoon in the area. These are not connected to any perennial wetland system.

Etymology: The specific epithet is *abhayana* is given after the name of our teacher, as well-known plant taxonomist, Prof. Abhaya Prasad Das, who is looking after the plants of this entire region for over 30 years.

Diagnosis*: Nymphaea abhayana* can be easily recognized with characters: annual non-rhizomatous plants; leaves mostly submerged, membranous, floating lamina few; flowers small, on full-bloom never open broadly wih basal part remain in water; outer tepals subulate-ovate, upper part deep-blue, lower part prominently veined; inner tepals bluish-purple, broadly subulate with broader base; anther appendages elongated, deep blue, nearly terete, tips rounded; stigmatic rays 7.

Affinity: This new species is closely related *Nymphaea nouchali* but can be distinguished easily as detailed in Table 1.

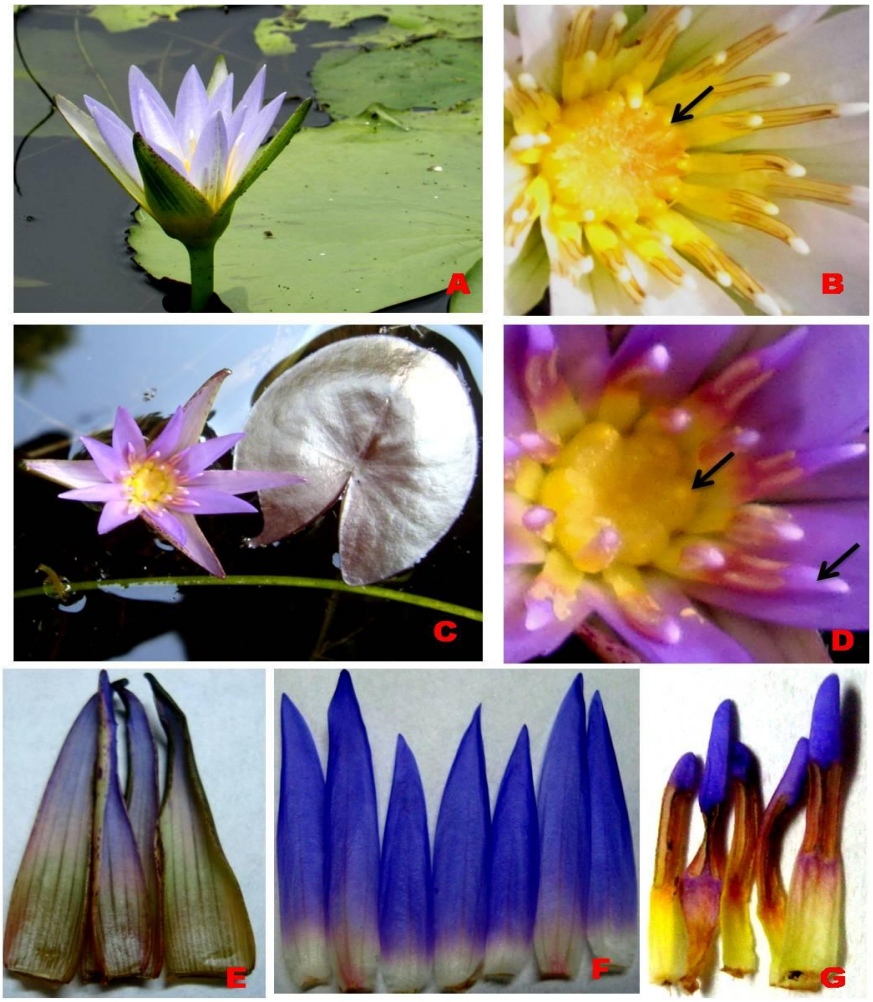

Figure 1: A. *Nymphaea nouchali* Burman *f.* B. Stigmatic rays; C. *Nymphaea abhayana sp. nov.* Anurag & M. Chowdhury D. Stigmatic rays E. Outer tepals F. Inner tepals and G. Stamens with appendages

Conservation Status: The distribution of the new species is very much localised, found so far only in two ditches, situated on both sides of a road at one location. Being located inside the Gorumara National Park, the area is now well protected. However, it is one beautiful plant and can be introduced into parks and gardens and to other *ex situ* conservatories for its proper conservation.

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REFERENCES
Ansari R & Jeeja G (2009). *Waterlilies in India: Taxonomy and Cultivation of the Genus Nymphaea L. (Nymphaeaceae)*, (Indian Association for Angiosperm Taxonomy, Calicut, India).
APG III (2009). An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants. *Botanical Journal of the Linnean Society* **161** 105–121. http://dx.doi.org/10.1111/j.1095-8339.2009.00996.x
Bosch T, Löhne C & Wiersema JH (2008). Phylogeny and evolutionary patterns in Nymphaeales: integrating genes, genomes and morphology. *Taxon* **57** 1052–1081.
Cook CDK (1995). *Aquatic and Wetland Plants of India*, (Oxford University Press, Oxford, UK) 385.
Dkhar J, Kumaria S, Rao RS & Tandon P (2013). New insights into character evolution, hybridization and diversity of Indian *Nymphaea* (Nymphaeaceae): evidence from molecular and morphological data. *Systematics and Biodiversity* **11**(1) 77-86.
Hooker JD (1872). *Nymphaeaceae: Flora British India* **1,** 114, (L. Reeve and Co., London, UK).
Linnaeus C (1753). *Species Plantarum*, **2**, (L. Salvius, Stockholm, Sweden).
Mabberley DJM (2005). *The Plant Book – A Portable Dictionary of the Vascular Plants* 2nd edition, (Cambridge University Press, Cambridge, UK) 354.