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On the occurrence of *Nitella myriotricha* A.Braun ex Kützing, 1857 ssp. *acuminata* D.Subramanian, 1999 (Charophyceae: Charales: Characeae), from eastern India

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Abstract: *Nitella myriotricha* A.Braun ex Kützing ssp. *acuminata* D.Subramanian 1999 has been recorded from different localities of West Bengal, eastern India. It is the first report of the taxon outside its original locality of occurrence at Kummidipoondi (Tamil Nadu) by Subramanian in 1999. The possibilities of endemism and origin of variations in this species have been discussed.

Keywords: Charophyceae, eastern India, endemism, new record, *Nitella myriotricha* ssp. *acuminata*.

Nitella Agardh (1824) is a cosmopolitan genus of Charophyta that grows in undisturbed aquatic ditches, lakes, and bogs. It is easily identified due to the position of its reproductive organs even in macroscopic form. In comparison to its sister genus *Chara* L. it prefers to grow in low nutrient, soft and slightly acidic waters (Bryant & Stewart 2011; Graham et al. 2016). In contrast to *Chara* it is either slightly lime-encrusted or un-encrusted genus (John & Rindi 2015). It is less rigid, excorticated and lack spines. If we consider the position of reproductive organs it is just reverse to that of *Chara*. In both the genera sex organs are lateral in position, in *Chara*, nucule is above & globule is below while position is just reverse in *Nitella*.

Nitella Agardh (1824) is recognized by 237 species, four subspecies & 27 forms World over (Guiry & Guiry 2022). In India, it is represented by 74 taxa belonging to 38 species & infraspecific taxa (Sundaralingam 1957; Subramanian 2002; Gupta 2012). *Nitella myriotricha* A.Braun ex Kützing is a species unique for the presence of mucilage cloud around the thallus (Wood 1962; Wood & Imahori 1965). Currently, three subspecies are recognized under this species, viz., *Nitella myriotricha* ssp. *acuminata* D.Subramanian, 1999, *N. myriotricha* ssp. *incurvata* D. Subramanian 1999, and *N. myriotricha* ssp. *huillensis* A.Braun & Welwitsch. Of these *N. myriotricha* ssp. *huillensis* has been elevated to the species level, *N. huillensis* (A.Braun & Welwitsch) T.F.Allen, 1968 (WoRMS 2022).

Certain other taxa of *Nitella*, viz., *N. batrachosperma* (Reichenbach) A.Braun, *N. hyalina* (DeCandolle) C.Agardh, *N. pseudoflabellata* A.Braun f. *multipartita* (T.F.A.) R.D.W, *N. pseudoflabellata* A.Braun var. *mucosa* (Nordst.) Bailey, *N. pseudoflabellata* A. Braun f. *imperialis* T.F.A., and *N. wattii* J.Groves also hold mucilaginous cloud (Sundaralingam 1957; Wood & Imahori 1965; Krause

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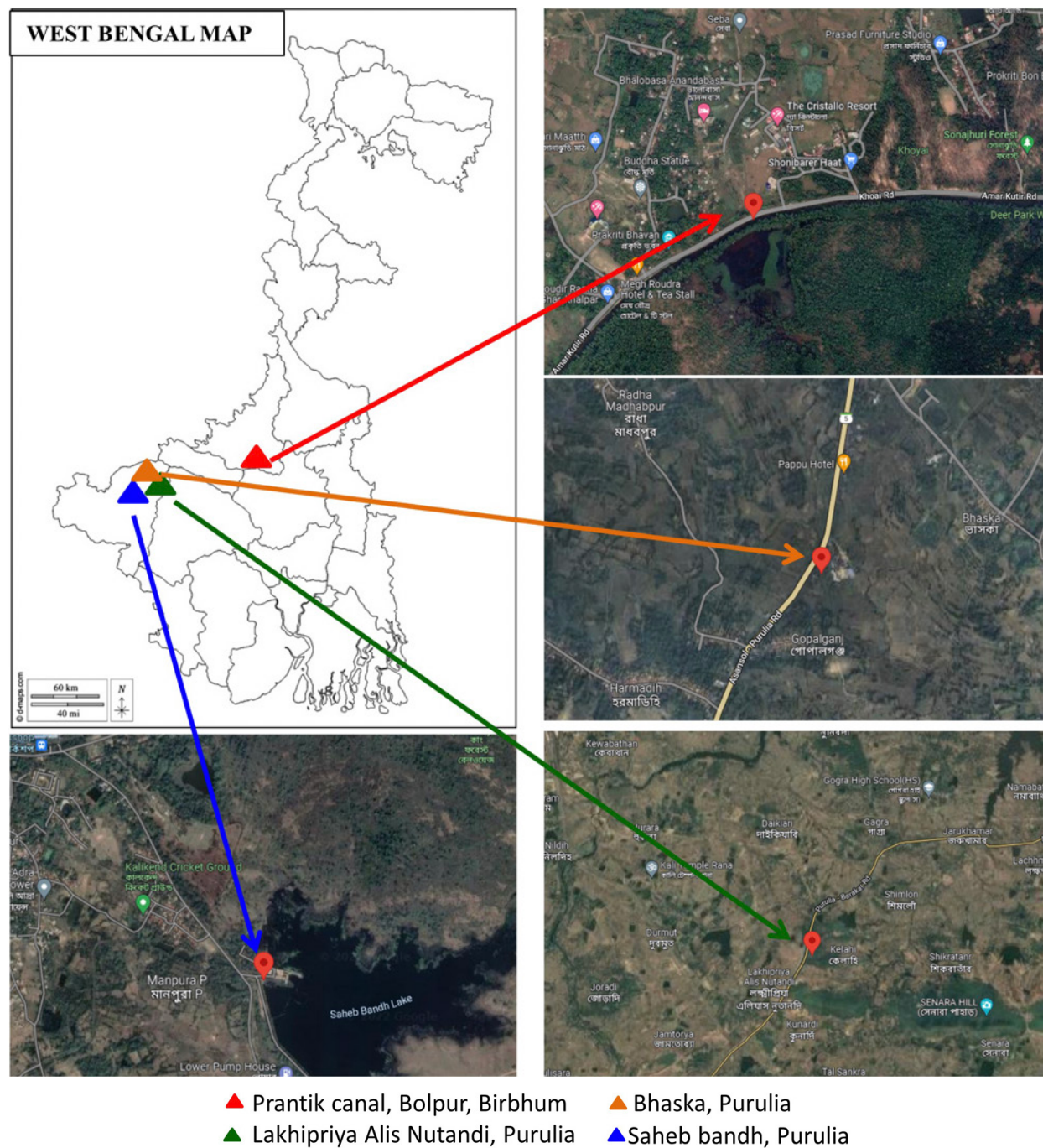


Image 1. The different collection spots in West Bengal. Source: Google.com.

1997; Subramanian 2002) but our specimen fits well with *Nitella myriotricha* ssp. *acuminata* D.Subramanian.

During the systematic study on the charophytes of eastern India the authors recorded *N. myriotricha* ssp. *acuminata* D.Subramanian from several localities of West Bengal (Image 1).

MATERIAL AND METHODS

The samples were collected from Prantik canal, Bolpur, Birbhum District, West Bengal, India. Similar populations of the taxon were also recorded from Bhaska, Lakhpriya Alis Nutandi & Saheb Bandh, Purulia District, West Bengal. Ten samples from these four localities have been studied. Samples were washed vigorously by gentle cleans in running water and preserved in 4%

formalin. Conductivity, pH, water temperature, salinity, TDS, and habitat were also recorded at the time of sample collection. Multi-parameter PCSTestr™ 35 device was used to measure the ecological data. Dissolved sodium, potassium, and calcium of the water sample were measured with the help of flame photometer 128 and dissolved oxygen was measured with titration method. A small portion of the sample was taken on a clean petridish and set under the Zeiss Stemi 508 stereozoom research microscope having digital camera attachment with standard scale. Microphotography was done and measurements were taken with the Zeiss Zen 2.6 software. Detailed taxonomic study was done by microscopic observations for identification of species. The identification of species was done with the help of standard monograph (Subramanian 2002).

RESULTS

Nitella myriotricha A.Braun ex Kützing ssp. *acuminata* [Subramanian D., 2002. Plate 14 Figs.- 1–4] (Image 1 A–F)

Plant body 8–12 cm in height; monoecious; bright green in colour; whole plant body entirely covered with dense mucilaginous cloud; axes 400–630 µm in diameter, internodes longer than branchlet, 6 branchlets, unequal in length; 7 dactyles, acute in shape; nucule and globule are present at the second and third branchlet nodes: no sex organs at shorter branchlets; antheridium large, one per node, orange in colour, 320–470 µm in diameter; oogonium large, 332 µm long, 240 µm broad, yellowish green in colour, convolutions 8–9; corona cells in two tiers 40–43 µm in broad & 42–45 µm long.

Our specimen appears to be narrower, may be due to different climatic regime.

A comparative account of the specimen with the

holotype is given (Table 1):

Distribution in India: Tamil Nadu (Subramanian 1999, 2002).

Ecological data (Table 2): GPS Location -23°41'24.5"N, 87°40'02.1"E; 23°29'00.0"N, 86°42'14.9"E; 23°36'46.9"N, 86°48'14.3"E; 23°34'36.1"N, 86°41'56.8"E.

DISCUSSION

As far as the distribution of *Nitella myriotricha* is concerned, it is known from very few localities of the world, viz.: *N. myriotricha* A.Braun ex Kützing (Australia- Casanova 2009); Queensland (Phillips 2002; Bostock & Holland 2010); *N. myriotricha* ssp. *acuminata* D.Subramanian (Tamil Nadu, India, Subramanian 1999, 2002); *N. myriotricha* ssp. *incurvata* D.Subramanian (Tamil Nadu, India, Subramanian 1999, 2002). Since *N. myriotricha* ssp. *huillensis* A.Braun & Welwitzch (1868) has been considered as a separate species, i.e., *N. huillensis* (A. Braun & Welwitzch) T.F. Allen, 1888; only three taxa of this species is now recognized. As per IUCN Red List (Mani 2013) *N. myriotricha* ssp. *acuminata* is considered synonymous to the main species. From the above records it appears that the species has a very restricted distribution. According to IUCN Red List (Mani 2013) it is treated a species under 'Least Concern' (LC) category. We have studied well developed plants that tallies with the description of Subramanian (1999, 2002). Our plants have been found inhabiting the ponds and ditches of dry lateritic soils of Purulia and Birbhum districts of West Bengal where ecological conditions are unique having alkaline pH. It is our observation that such specific ecological niche is the preferred situation of these plants. But the plants are not infrequent in these regions. Our taxon is known from India only, wherever the original taxon is known from Australia & New

Table 1. Comparative account of the specimen with the holotype.

Name of the species	Height	Axis	Branchlets	Dactyles	Antheridium	Oogonium	Corona cells
Holotype							
<i>Nitella myriotricha</i> ssp. <i>acuminata</i> D. Subramanian	Plant body 9–10 cm high	1,100 µm	Not mentioned	Not mentioned	450–500 µm in diameter	300 µm long, 280 µm broad	Not mentioned
Our specimen	Plant body 8–12 cm high	400–630 µm	6 in number	7 in number	320–470 µm in diameter	332 µm long, 240 µm broad	Two tiers, 42.743 µm in diameter, 44.960 µm in length

Table 2. Ecological data

Locality	pH	TDS (ppm)	Salinity (ppm)	W.T. (°C)	Cond. (µs)	Na (ppm)	Ca (ppm)	K (ppm)	D.O. mg/L (ppm)
Prantik Canal	7.71	144	87.4	20.4	204	15.43	51.96	1.30	8

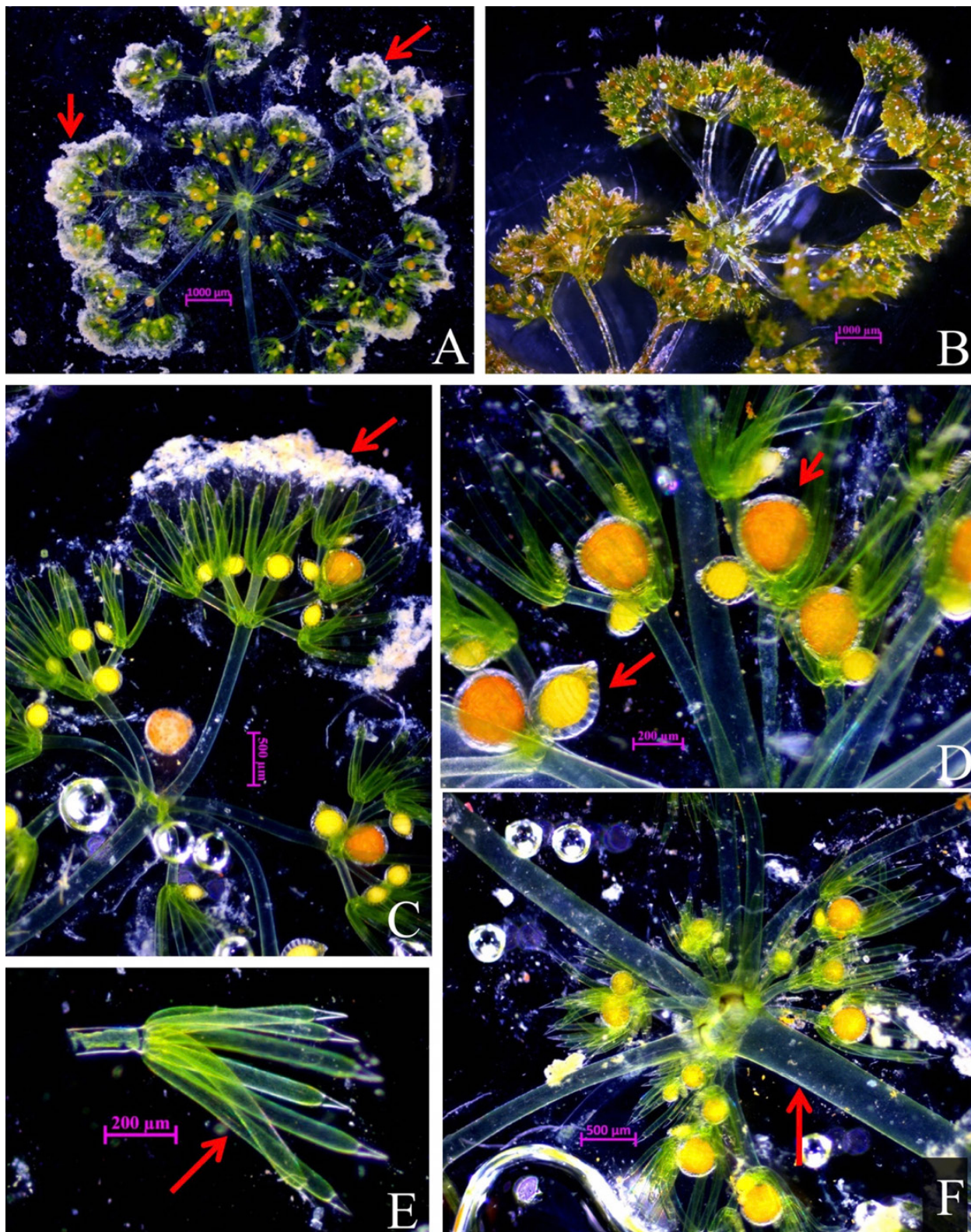


Image 1. *Nitella myriotricha* A.Braun ex Kützing ssp. *acuminata*: A,C—arrows showing mucilaginous cloud | B—showing whole plant body | D—Arrow showing antheridia and oogonia | E—arrow showing dactyl with the pointed apex | F—arrow showing the smooth transparent main axis and node. © Jai Prakash Keshri.

Zealand. It reveals two possibilities: 1. Endemism may be a key factor for its occurrence, 2. Continental drift may be another factor when actually the Indian and Australian subcontinents were united (Wegner 1924, 1929; Demhardt 2005) and separation of these subcontinents may have provided opportunity to the Indian species to evolve into two new subspecies. The possibility of endemism is guessed due to the fact that the occurrence of the species has been noted in India and Australia only. If we apply the Vavilov's (1926) principle here the origin of this species may have occurred in Indian subcontinent because variations into subspecies have been noted in India only.

CONCLUSION

In India, species of Characeae are poorly described and more extensive floristic studies need be undertaken, particularly in remote areas of the country. Only few taxa have been reported from southern India. But in eastern India particularly in West Bengal floristic study is very poor. In this study *Nitella myriotricha* ssp. *acuminata* have been collected from Prantik, Bolpur, Birbhum District, West Bengal. This is the first report of the taxa outside the original site. A mucilaginous cloud was present over here. This is the unique identifying character of this species.

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