Journal of Threatened Taxa

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www.threatenedtaxa.org

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

SHORT COMMUNICATION

OBSERVATIONS ON THE ASSOCIATION OF *SCAPHULA DELTAE* BLANFORD (MOLLUSCA: BIVALVIA) IN GARANGA WETLAND OF POBITORA WILDLIFE SANCTUARY, ASSAM, INDIA

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26 May 2017 | Vol. 9| No. 5 | Pp. 10194–10197

10.11609/jott.3512.9.5.10194-10197

Journal of Threatened Taxa | www.threatenedtaxa.org | 26 May 2017 | 9(5): 10194–10197

Observations on the association of *Scaphula deltae* Blanford (Mollusca: Bivalvia) in Garanga Wetland of Pobitora Wildlife Sanctuary, Assam, India

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

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Abstract: During a survey of the Garanga wetland of Pobitora Wildlife Sanctuary, *Scaphula deltae* Blanford (Mollusca: Bivalvia) was recorded for the first time. Most examples were found over *Lamellidens corrianus* (Lea) in a firmly attested position. Some were also found clinging to the roots of *Eichhornia crassipes*. These findings establish a new record of freshwater mollusc association in the study area. Some of the physico-chemical parameters of the study area were also investigated.

Keywords: Assam, freshwater parasitic molluscs, Pobitora Wildlife Sanctuary, *Scaphula deltae*.

Indian freshwater molluscs are highly diverse, with 199 species in 59 genera, 29 subgenera and 26 families having been so far reported (Ramakrishna & Dey 2007), many of which are endemic (Rao 1989; Ramakrishna & Dey 2007). The members of the family Arcidae are primarily marine inhabitants, however, a few species of *Scaphula* are found in fresh and brackish water habitats in India, Myanmar and Thailand (Rao 1989). *Scaphula* species reported in this region include *S. celox* Benson reported from Hugli, North 24 Paraganas (Ramakrishna & Dey 2007), Rabindra Sarobar and Kidderpore Dock of West Bengal (Rao 1989; Ramakrishna & Dey 2007); River Cane, near Banda, Bundelkund of Madhya Pradesh (Preston 1915; Rao, 1989; Ramakrishna & Dey 2007); Mahanadi of Odisha and Uttar Pradesh (Ramakrishna & Dey 2007) *S. deltae* Blanford reported from the Gangetic Delta, Rabindra Sarovar of Kolkata (Rao 1989; Ramakrishna & Dey 2007); Mahanadi River of Odisha; and also from Myanmar (Preston 1915; Rao 1989; Ramakrishna & Dey 2007); *S. nagarjuni* described from Guntur and Khammam of Andhra Pradesh (Rao 1989; Ramakrishna & Dey 2007) and *S. pinna* Benson reported from Tenasserim River of Myanmar (Preston 1915; Rao 1989); and Thailand (Junk 1977; Rao 1989). The present communication deals with the distribution of *S. deltae* in Pobitora Wildlife Sanctuary of Assam, India with a note on its association with another bivalve species, *Lamellidens corrianus* (Lea), and with *Eichhornia crassipes*.

Description of the studied area

Scaphula deltae was recorded from Garanga wetland, located at the southern boundary of Pobitora Wildlife Sanctuary in the district of Morigaon, Assam. The water body is a channel-type wetland connected with the Kolong River, a tributary of the Brahmaputra, and has a slow flow of water. Pobitora Wildlife Sanctuary (91^{0}59'48"–92^{0}5'0"E & 26^{0}15'36"–26^{0}13'0"N) is located

DOI: http://doi.org/10.11609/jott.3512.9.5.10194-10197 | **ZooBank:** urn:lsid:zoobank.org:pub:421B9B9D-2E19-4112-B9A7-08F8E79CF9ED

Editor: S. Arularasan, Annamalai University, Parangipettai, India. **Date of publication:** 26 May 2017 (online & print)

Manuscript details: Ms # 3512 | Received 07 December 2015 | Final received 06 May 2017 | Finally accepted 10 May 2017

Citation: Kalita, G. (2017). Observations on the association of *Scaphula deltae* Blanford (Mollusca: Bivalvia) in Garanga Wetland of Pobitora Wildlife Sanctuary, Assam, India. *Journal of Threatened Taxa* 9(5): 10194–10197; http://doi.org/10.11609/jott.3512.9.5.10194-10197

Funding: Self-funded.

Competing interests: The authors declare no competing interests.

Acknowledgements: Author is thankful to (a) The Research Education Working Plan, Department of Forest, Assam specially to Mr. M.K. Yadava, IFS, APCCF REWP and Mr. S.S. Baruah, GIS Analyst, PMU, APFBCS, (b) Ms. Pinku Mani Talukdar, PhD Research scholar, Department of Human Genetics, (NIMHANS), Bengaluru (India) for their help at various level. Author is also thankful to the DBT, Govt. of India for establishing a Biotech hub in Guwahati College.

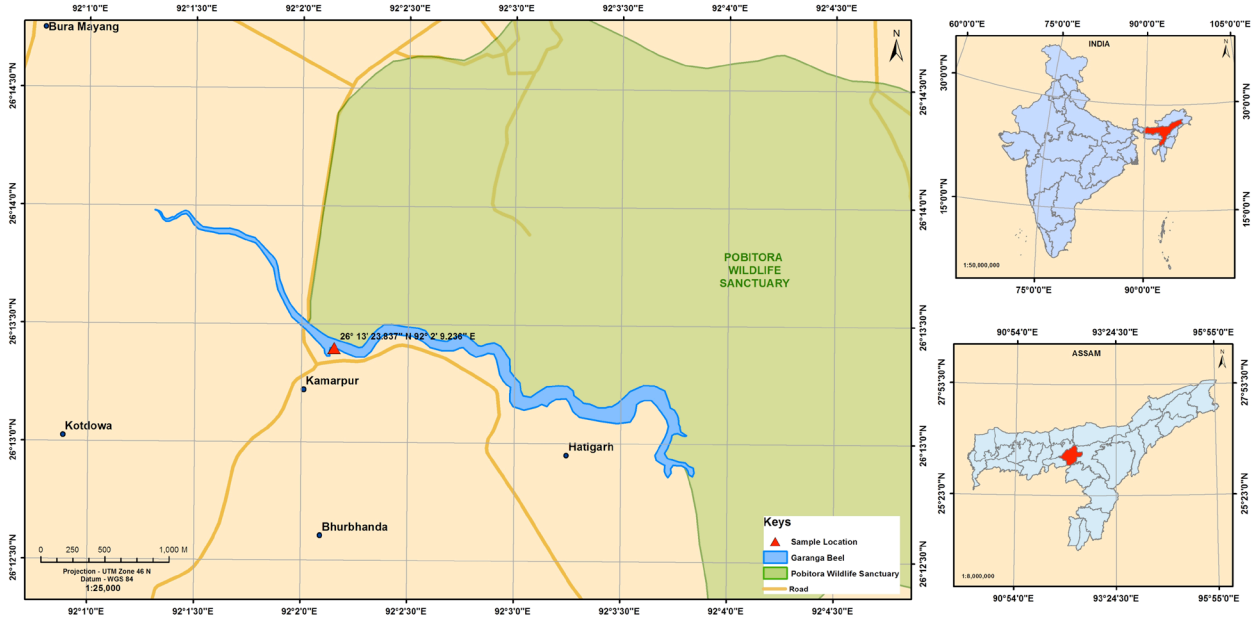

Figure 1. Map of Garanga wetland (Beel) indicating sample site (Courtesy: Research Education Working Plan, Department of Forest, Assam)

50km east of Guwahati, Assam. Most of the sanctuary is covered with grassland, swampy vegetation, wetlands and woodland. There are nine naturally-occurring major wetlands: *Haduk, Garanga, Tamulidova, Pagladova, Chitalmari, Solmari, Jogdol, Lambadova* and *Bordova*. Most of the wetlands are channel type and they are well connected with either the Brahmaputra or the Kolong. There is no major river passing through the sanctuary (Source: Guwahati Wildlife Division- Dated 29/9/2011) (Fig. 1).

Presently the sanctuary covers an area of 38.81km^2 and was declared a wildlife sanctuary in 1971 to protect the Indian one-horned Rhinoceros. It is also a prominent habitat for migratory and resident birds.

Methods

A *S. deltae* shell was initially located on the bank of the *Garanga* wetland. After it was identified a search was undertaken using a long-handle D shaped net 25x25 cm. Floating vegetation including *Eichhornia crassipes, Salvinia cucullata, Azolla pinnata, Pistia stratiotes* and *Lemna* sp. was collected, as was submerged vegetation including *Vallisneria spiralis* and *Utricularia* sp. Live samples of molluscs were photographed using a digital camera and identified following Rao (1989). Ten live animals were collected, and observed in the laboratory of the Institutional Biotech Hub, Guwahati College for two weeks. The animals were kept in a 1,000ml beaker containing water and vegetation collected from the original habitat. The water was changed at two day intervals. Some of the water quality parameters of the wetland were studied following Trivedy et al. (1987). Plant species were identified following Biswas & Calder (1987).

Observation

Altogether we recorded 16 species of mollusca: *Angulyagra microchaetophora* (Annandale), *Bellamya bengalensis* (Lamarck), *Bithynia (Digoniostoma) pulchella* (Benson), *Gabbia orcula* (Nevill), *Pila globosa* (Swainson), *Lymnaea acuminata* Lamarck, *Ferrissia verruca* (Benson), *Indoplanorbis exustus* Deshayes, *Gyraulus labiatus* (Benson), *Gyraulus convexiusculus* (Hutton), *Segmentina calatha* (Benson), *Brotia costula* Rafinesque, *Corbicula striatella* Deshayes, *Parreysia* (*Parreysia*) *gowhattensis* (Theobald), *Scaphula deltae* Blanford and *Lamellidens corrianus* (Lea). The individuals of *S. deltae* collected (Image 1) had shells that were small, equivalve, sub-trapezoidal, elongate and covered with a thick dark epidermis (Preston, 1915) which was rather rough and radiantly ribbed behind the keel. The valves were round in front. The ventral margin was convex anteriorly and sub-concave posteriorly. The keel was high and sharp, separating the valves into two subdivisions. Each valve was of about 13mm in length and 5mm in breadth.

A unique fact was that most of the individuals of *S. deltae* were found clinging over a Unionide species, *Lamellidens corrianus* (Image 2). The association of this species led to deep incisions and lesion on the shells

Image 1. Shell of *Scaphula deltae*

Image 2. Association of *S. deltae* with *L. corrianus*

Table 1. Water quality parameters of *Garanga* wetland studied during the year 2010

Parameters	Pre-monsoon	Monsoon	Post-monsoon	Average	St. Dev	Maximum	Minimum
Temperature ^{0}C	19	22	18	19.7	2.08	22	18
Turbidity (N.T.U)	25	10	20	18.3	7.64	25	10
pH	7.8	7.3	7.8	7.6	0.29	7.8	7.3
DO (mg/l)	12.7	12	9.8	11.5	1.51	12.7	9.8
CO_2 mg/l	6.9	7.6	12	8.8	2.76	12	6.9
Total hardness as $CaCO_3$ (mg/l)	36	30	30	32.0	3.46	36	30
Total Alkalinity as $CaCO_3$ (mg/l)	38	40	36	38.0	2.00	40	36
Calcium as $CaCO_3$ (mg/l)	26	20	22	22.7	3.06	26	20
Magnesium (mg/l)	10	10	8	9.3	1.15	10	8

of *L. corrianus*. It was very difficult to detach *S. deltae* from the shells of *L. corrianus* due to their firm hold on the surface. Some *S. deltae* were found on the roots of *Eichhornia crassipes*.

The water quality parameters of the wetland that were studied during the year 2013 (Table 1) indicated an average 7.6pH; 7.6mg/l dissolved oxygen; 8.8mg/l free carbon dioxide; 32.0mg/l total hardness; 38.0 total alkalinity; 22.7mg/l Calcium (as $CaCO_3$) and 9.3mg/l Magnesium.

Discussion

Sixty-seven species of freshwater molluscs have been reported in Assam, including both Gastropoda and Bivalvia (Preston 1915; Bhattacharyya 1977; Rao 1989; Goswami 1985; Goswami et al. 1999; Nath 2002; Kalita & Goswami 2006, 2007; Kalita 2008). There is, however, a dearth of information with respect to the occurrence of *S. deltae* in the study area. The present findings may establish a new occurrence record of *S. deltae* in Pobitora Wildlife Sanctuary, Assam. Ghosh (1922) studied the anatomy of the genus, *Scaphula,* but the detailed microhabitat ecology and species association of *S. deltae* is yet to be fully understood. Blandford (1867) recorded *S. deltae* from under stones in creeks adhering by their byssus (Preston 1915; Rao 1989). The observed association of *S. deltae* with *Lamellidens corrianus* is remarkable. It is inferred that the incisions and lesions over the shells of *L. corrianus* have occurred due to damage caused by *S. deltae*. Its association however with *L. corrianus* may not be obligatory as *S. deltae* was also found to be present on the roots of *E. crassipes*.

It is well known that bivalves have a parasitic mode of association with fish and other aquatic species during their larval stage (Nagabhushanam & Sarojini, 1985); however, some marine molluscs were also reported as parasites during their adult stage with corals and sea cucumbers as their hosts (Hoeksema & Gittenberger 2008; Nekhaev 2011). The present observation on the animal associated with the roots of *Eichhornia crassipes* corroborate the earlier report on an allied species, *S. pinna* described from Bung Borapet reservoir of central Thailand (Junk 1977). The long hairy roots of *E. crassipes* make an ideal habitat for many invertebrates (Junk

1976; Bhattacharya 1998; Kalita 2008). *E. crassipes* is also a good source of various nutritive minerals including calcium, which is utilized by aquatic organisms including molluscs for growth.

The general importance of chemical and physical parameters on the distribution of aquatic organisms is well known. The alkaline pH of water ranging between 7.5–8 was regarded as the determining factor for the occurrence of the allied species, *S. pinna* in Bung Borapet reservoir of central Thailand (Junk 1976), which upholds the present findings of pH range in between 7.8–7.3 maximum and minimum limit in the study area.

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OPEN ACCESS

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

May 2017 | Vol. 9 | No. 5 | Pages: 10141–10248
Date of Publication: 26 May 2017 (Online & Print)
DOI: 10.11609/jott.2017.9.5.10141-10248
www.threatenedtaxa.org