



ISSN : 0973-7057

Int. Database Index: 663 www.mjl.clarivate.com

## Taxonomic studies of Shell fish fauna of Madhepura, Bihar

Kumari Shashi Prabha\* & Arun Kumar

University Department of Zoology, B.N.Mandal University, Madhepura, Bihar, India

Received : 3<sup>rd</sup> November 2018 ; Revised : 18<sup>th</sup> February 2019

**Abstract :** In the present study the different species of shell fishes were considered for the taxonomic study in Madhepura. 15 species of shell fishes belonging to different class such as Gastropoda, Malacostraca and Bivalvia were studied. Among these classes of species the species belonging to the class Gastropoda were found to be 8 in number were dominant and outstanding shell fishes of the of Madhepura, North Bihar. Of Gastropoda, the species belonging to genera *Bellamya*, *Pila*, *Gyraulus*, *Indoplanorbis* were founded. Among Bivalvia species belonging to the genera *Parreysia*, *Lamellidens*, *Corbicula* were recognized but were only 4 in number. Finally among Malacostraca the species belonging to genera *Sartoriana*, *Penaeus* and *Macrobrachium* comprising of about 3 species. The region is biogeographically diversified to sustain a rich shell fish population which increases the ecological richness of the environment. Thus the result of the present study indicated that the Madhepura region of North Bihar is endowed with rich shell fish fauna.

**Key words:** *Heteropneustes fossilis*, Deltamethrin, Effect, Hematological parameters, Toxicity.

### INTRODUCTION

Shellfish is a colloquial and fisheries term for exoskeleton-bearing aquatic invertebrates used as food, including various species of molluscs, crustaceans, and echinoderms. The term is often used for the edible species of the groups, especially those that are fished or raised commercially. Although most kinds of shellfish are harvested from saltwater environments, some are found in freshwater. In addition, a few species of land crabs are eaten, for example *Cardisoma guanhumi* in the Caribbean. Shellfish are among the most common food allergens. Despite the name, *shellfish* are not actually fish, but are simply water-dwelling animals. Shell fishes belong to Arthropoda and Mollusca which has been containing highest

animal biodiversity of the biosphere. They form an important component of the food chain for the higher animal taxa transferring energy and matter from phytoplankton, macrophytes, and zooplankton to fishes, amphibians, reptiles, birds and mammals and other form of wild life. Despite the name shell fish are not actually fish but are simply water dwelling animals.

Considerable work has been done on the taxonomy, biology, ecology and behaviour of molluscs of Indian sub-continent (Hornell, 1921; Hora, 1925; Prasad, 1932; Tonapi, and Mulherkar, 1963; Tonapi 1971; Rao *et al.*, 1971; Subba Rao and Mitra, 1982; Sharma *et al.*, 1983; Singh, 1990; Roy, 2003)<sup>1-10</sup> but practically no information is available on the shell fisheries potential of the different areas of Madhepura district. The objective of this study

\*Corresponding author :

Phone : 9006991000

E-mail : prf.arunkumar@gmail.com

was to know the taxonomic diversity of shell fishes of wetlands of Madhepura.

## MATERIALS AND METHODS

North-Bihar comprising districts of Madhepura was selected for the present study. Shell fishes exploited by different categories of people in these five districts were investigated. Extensive field trips were conducted regularly and data were collected after survey, interviews and on spot enquiries. The shell fishes were collected and preserved in 10% formalin and brought to the laboratory.

Each of the containers was labeled properly against the physical data sheet of sampling and brought to the laboratory for the identification and species confirmation. The intact animals were washed thoroughly in running tap water and slightly decalcified in aqueous acidic medium to find out growth rings. The specimens were identified with the help of available literature (Sharma *et al.*, 1983)<sup>8</sup>. The collected specimens were submitted in the museum of the University Department of Zoology, Madhepura.

## STUDY AREA

North-Bihar situated at 83°21' to 88°17' NL and 24°55' to 27°31' EL has vast lentic resources in the form of ponds, tanks, ox-bow lakes, swamps, chauris, canals, road and railway side depressions, flood plains and these water bodies have enormous potential for fish culture (Dehadrai, 1994; Verma, 1994)<sup>11,12</sup>.

## RESULT AND DISCUSSION

The following species were found during the study

**1. Materials:** *Bellamyia bengalensis* race *mandiensis* (Kobelt)

**Collection Site:** Collected from the ponds and rivers of Haraili

**Biology:** Inhabit fresh water ponds, rivers, reservoirs, ditches and lakes and abundant in water having detritus, rich in macrovegetations on which they lay eggs specially on *Eichhornia crassipes*.

### Taxonomic description

- (i) Shell moderately thick globosely turbinata, broadly ovate and conic.
- (ii) Whorls 4-5 regularly increasing convex with spaced spiral striae or bands, i.e. 5 in 4th whorl and 9th

in body whorl and with transverse stripes of reddish brown.

(iii) Foot is of moderate size and does not extend beyond the snout.

**Niche:** They were located on algal mat in abundance.

**2. Materials:** *Bellamyia variata* (Viviparous) (Frauenfeld)

**Collection site:** Collected from canals and ponds of Madhepura districts of North Bihar.

**Biology:** Same as other *Viviparous* sp.

### Taxonomic description

- (i) It is smaller than other species of the genus.
- (ii) Shell light to dark green in colour.
- (iii) Whorls are 5 in number and moderately inflated or slightly convex.
- (iv) Bands are absent.
- (v) Body whorls are with well developed spiral keel at its middle level.

**Niche:** Located on decomposed materials of ponds and slow running water canals and covered with algae and adjacent materials of aquatic plants.

**3. Materials:** *Pila globosa* (Bolten)

**Collection site:** Collected from the paddy fields, Baiwah of Madhepura North Bihar

**Biology:** It inhabits freshwater ponds, lakes, rivers, tanks and quite abundant in water having succulent aquatic vegetations on which it feeds. It lives both in aquatic and terrestrial environments. During prolonged drought they may remain in diapause for a long time and after rains they return to normalcy.

**4. Materials:** *Paratelphusa spinigera*

**Collection site:** Collected from Budhma river in Madhepura.

**Biology:** It makes burrows on banks of rivers and ponds. These crabs come out for feeding from burrows but with the slightest disturbance swiftly return to their hole. It feeds not only aquatic plants but also different kinds of smallest animals.

### Taxonomic description

- (i) Dorso-ventrally compressed and consist of a large, broad cephalothorax and stumpy abdomen.
- (ii) The carapace is fused with epistome at the side and nearly always in the middle.
- (iii) Rostrum absent.

(iv) Antennules and eye stalks are contained in the sockets of carapace.

(v) Third maxillipedes are broad, flat, valve-like covering the mouth parts.

(vi) Five pairs of thoracic legs are well developed.

(vii) Abdomen is reduced and fixed under cephalothorax.

(viii) Pleopods are greatly reduced, present only two pairs in male and 4 pairs in female.

**Niche:** Live in the burrow or holes present in banks of rivers, ponds and lakes.

**5. Materials:** *Lamellidens corrianus* (Lea)

**Collection site:** Collected from freshwater ponds, rivers, and lakes of Madhepura.

**Biology:** Bottom dweller of fresh-water ponds, rivers and lakes, usually burrows in the mud at the bottom of ponds by large ventral foot. It does not go deep in the burrow because the posterior extremities of the valves remain exposed for the inhalent and exhalent respiratory water currents and omnivorous in nature.

**Taxonomic description**

(i) Two pseudo cardinals present on left and right valve, bears two parallel lamellar pseudo cardinals.

(ii) Shell is strongly in equilateral, transverse, large and thinner.

(iii) Left valve is with single thin lamella-like cardinal teeth and the right valve is with two elongated, straight lateral teeth.

(iv) Umbos are slightly elevated and bear coarse ridges.

**Niche:** Located in mud of the ponds and were surrounded by different kinds of aquatic vegetations.

**6. Materials:** *Lamellidens marginalis* (Lamarck)

**Collection site:** Collected from the Loram river of Madhepura

**Biology:** Same as *Lamellidens corrianus*.

**Taxonomix description**

(i) Shell is transversely oblong, ovate or oval.

(ii) The umbos are swollen, knoblike placed much near the anterior end of each shell valve and bears coarse ridges.

**Niche:** It remains 1.5" deep inside the bottom.

**7. Materials:** *Gyraulus convexiusculus* (Hutton)

**Collection:** Collected from the ditches present besides river of Duas.

**Biology:** This snail is found in most of water bodies specially where there is plenty of aquatic weeds and plants. It is entirely herbivorous.

**Taxonomic description**

(i) It has thin transparent shell with very fine transverse striations and spiral ridge marking the shell.

(ii) The shell is small and discoidal with the whorls rounded to carinate.

(iii) The aperture is oblique and somewhat deflected.

**Niche:** It is located on aquatic weeds and macro vegetations of ditches.

**8. Materials:** *Indoplanorbis exustus* (Deshayes)

**Collection site:** Lacustrine habitats.

**Biology:** It is most common freshwater air-breathing gastropod found in grass- lands, ponds and lakes and herbivorous in habits.

**Taxonomic description**

(i) It is enclosed in brown, stout and spirally coiled shell.

(ii) Shell is sinistral and discoidal having a depressed spire.

(iii) Whorls of spire are 3 in numbers with transverse striations.

**Niche:** It is located on herbaceous grasses found besides rivers and ponds.

**9. Materials:** *Corbicula striatella* (Deshayes)

**Collection site:** Collected from the Koshi rivers of Khagaria

**Biology:** Inhabits in rivers and streams, where the sand or gravel at the bottom act as a substratum. It is omnivorous in nature.

**Taxonomic description**

(i) Dark brown and strongly striated shell.

(ii) The shape is triangular and outer surface usually sculptured with concentric ridges and covered with greenish and shining peristracum.

(iii) There are two cardinal teeth in each valve, lateral teeth serrated.

(iv) Lines of growth well marked.

**Niche:** Located near bottom on substrate free from rooted green algae.

**10. Materials:** *Melanoides tuberculatus* (Muller)

**Collection site:** same as above.

**Biology:** Same as *Melanoides lineatus*.

**Taxonomic description**

- (i) The shell is highly elongated with many transverse ridges.
- (ii) The average shell length is about 20–27 mm Glöer P. (2002)<sup>13</sup>. or 30–36 mm, but exceptional specimens may be up to 80 mm long.
- (iii) The whorls of spire is convex and 8-9 in number.
- (iv) Spire is strongly depressed.
- (iv) Body whorl small and oval.
- (v) Radula has a less broad and denticulate central tooth.

**Niche:** They were located from the bottom of ponds and were surrounded by different kinds of aquatic vegetations.

**11. Materials:** *Achatina (Lissachatina) fulica* (Bowdich)

**Collection Site:** Collected from gardens and grasses of river bank of Koshi.

**Biology:** It is primarily terrestrial pulmonate inhabiting open grasslands. It prefers humid area, specially the bank vegetations. They are mostly nocturnal and spend the day time under plants and aestivate during summer. They are herbivorous and eat the vegetations available in the area.

**Taxonomic description**

- (i) Shell is elongated, thick and light horny colour.
- (ii) Collumella and whorl of the shell is whitish with brown bands in adults.
- (iii) Whorls of spire are 6 in numbers in which body whorl is oval and elongate.
- (iv) Operculum absent.
- (v) Foot is flat and modified for creeping by the large ventral sole.
- (vi) The foot is provided with a large tubular slime gland, which produce profuse quantity of slime.

**Niche:** They were located on the garden plants including small to large vegetations.

**12. Materials:** *Pila virens* (Lamarck)

**Collection site:** Same as *Achatina (Lissachatina) fulica*

**Biology:** Same as *Pila globosa*

**Taxonomic description**

- (i) Shell smaller than *Pila globosa*.
- (ii) Spine more strongly depressed about ¼th of total length of shell
- (iii) Whorls of the spire less marked and inflated.

- (iv) Umbilicus is smaller and narrowly perforated.

- (v) Operculum is horny, pale, fleshy brown and concave externally.

**Niche:** Present abundantly on detritus rich ponds, canals and paddy fields and were surrounded by carrions and humus.

**13. Materials:** *Sartoriana spinigera*

**Collection site:** Same as *Achatina (Lissachatina) fulica*

**Biology:** Same as *Pila globosa*

**Taxonomic description**

- (i) *S. spinigera* possess brownish yellow, orange, brown or dark brown carapace colour and orange to brown chillete colour.

- (ii) The carapace texture of the crab is very much oily.

- (iii) A large 'V' shaped patten with dark brown spot present on the carapace of the crab. The crab is commonly known as Wood Meson crab.

- (iv) These crabs are found crawling, burrowing and even buried in the mud soil of the littoral region of wetlands.

- (v) The carapace of the crab is oily and smooth in texture; semi-triangular in shape which has many spines often camouflaged with algae and other encrusting species.

**Niche:** Present abundantly on detritus rich ponds, canals and paddy fields .

**14. Materials:** *Macrobrachium rosenbergii*

**Collection site:** Same as *Achatina (Lissachatina) fulica*

**Biology:** Same as *Pila globosa*

**Taxonomic description**

- (i) *M. rosenbergii* is a striking looking prawn in which the second pair of walking legs can really justify the genus name meaning 'large arms'.

- (ii) In the males these walking legs can have a vibrant shade of blue and can also be twice the body length.

- (iii) The largest males can attain a total length from tip of rostrum to the end of the telson of 320 mm compared to 250 mm for the largest females (Holthuis, 1980).<sup>14</sup>

- (iv) The rostrum at the front end of the cephalothorax is very prominent with 11-14 dorsal teeth and 8-10 ventral teeth.

(v) The abdomen of the male is narrower and the female, as well as having a wider abdomen, has longer pleura.

**Niche:** found in rivers, ponds by river edges, up vertical surfaces (small waterfalls, weirs, etc.) and across land.

**15. Materials:** *Penaeus monodon*, (giant tiger prawn or Asian tiger shrimp, *Tresaugue*)

**Collection site:** Same as *Achatina* (Lissachatina) *fulica*

**Biology:** Same as *Pila globosa*

#### **Taxonomic description**

(i) Females can reach about 33 cm (13 in) long, but are typically 25–30 cm (10–12 in) long and weigh 200–320 g (7–11 oz); males are slightly smaller at 20–25 cm (8–10 in) long and weighing 100–170 g (3.5–6.0 oz).

(ii) The carapace and abdomen are transversely banded with alternative red and white.

(iii) The antennae are grayish brown.

(iv) Brown pereopods and pleopods are present with fringing setae in red. Motoh, H (1981).<sup>15</sup>

**Niche:** Present abundantly on detritus rich ponds, canals.

## **DISCUSSION**

The present study on the status of shell fisheries inhabitants of the area of Madhepura of North-Bihar reveals that the river basin of this region is rich in diversity of molluscan and crustacean fauna. The diversity of shell fishes in this region indicates well established balanced ecosystem. The abundance of shell fishes in terms of taxonomic diversity indicated a good life support system for fishes and birds. Shell fishes are the major component of the macro-invertebrates, they form link between zooplankton and vertebrate taxa, such as fishes and birds and play a key role in the energy flow and bio-geochemical cycle of the wetland habitats.

Total number of species collected were about 15 from the different parts of Madhepura. Among these 15 species 8 belonged to the class Gastropoda, 4 belonged to the class Bivalvia and 3 belonged to the class Malacostraca. The taxonomic diversity in terms of number and abundance is more in Gastropoda and dominant species and were also among the edible aquatic animals while species belonging to Malacostraca were found to be least. It was

observed that the appreciable seasonal changes of their population may be correlated with the appearance and disappearance of macrovegetations of the habitat. The emergent portion of the plants affords shelter to the adult stages of Mollusca. The floating vegetations constitute a biotope with varied ecological niches for almost all types of shell fishes found. Most of the molluscs were also found among the submerged parts of plants such as Gastropods. The free-floating vegetations such as *Eichhornia crassipes* afford the colonization of molluscs such *Bellamya bengalensis*, *Lamellidens marginalis*, *Corbicula* and others. Thus, macrophytes provide shade, shelter and site for oviposition and development of these shell fishes. A number of fish and avian fauna diversity directly depend upon the molluscs population of these habitats. The commercial aspect of shell fishes as raw material for food, finance, recreation, medicines, vitamins and minerals supplements etc., for local human population and ecological aspect for increasing biological diversity and maintaining ecological balance for the animals occupying the higher trophic level of the food chain. Thus, the considerable scope with respect to the shell fisheries for their medicinal value and these resources need judicious utilization on commercial basis to generate employment opportunity and enhance the income of the local people (Rao 1969).<sup>16</sup>

## **ACKNOWLEDGEMENT**

Authors are thankful to Head, B.N. Mandal University Madhepura Bihar for providing necessary laboratory facilities and for immense co-operation and motivation to complete this research paper.

## **REFERENCES**

1. **Hornell, J. 1921.** Common Mollusca of South India. Madras, *Fish Bull.* **16:** 10-14.
2. **Hora, S.L. 1925.** On the succineid Molluscs from the Western Ghats. *Rec. Ind. Mus.* **27:** 401-403.
3. **Prasad, B. 1932.** *Pila*, *The Indian Zoological Memories.* 4.
4. **Tonapi, G.T. & Mulherker, L. 1963.** On the freshwater Mollusca of Poona. *J. Bombay Natural. Hist. Soc.* **60(1):** 104-170

## Biospectra : Vol. 14(1), March, 2019

*An International Biannual Refereed Journal of Life Sciences*

5. **Tonapi, G.T. 1971.** Studies on the freshwater and amphibious Mollusca of Poona with notes on their distribution. Part II. *J. Bom. Nat. Hist. Soc.* **68**: 115-176.
6. **Rao, Vasishta, H.S. & Gulati, S. 1971.** The freshwater molluscs of North India: *Res. Bull (N.S.) Punjab Univ.* **22(3 and 4)**: 465-467.
7. **Subba Rao, N.V. & Mitra, S.C. 1982.** Bioecology of two Malaniid Snails (Mollusca: Gastropoda) in a pond near Calcutta. *Bull. Zool. Surv. India.* **34 (1 and 2)**: 21-34
8. **Sharma, U.P., Roy, S.P. & Rai, D.N. 1983.** Aquatic Molluscs of Bhagalpur, *J. Biol. Bull. India.* **5(2)**: 147-155.
9. **Singh, R. 1990.** Density, biomass and secondary productivity of the Prosobranchs *Pila globosa* and *Bellamya bengalensis* in a feeder Tank, Jamalpur. *J. Fresh-water Bio.* **2(2)**: 251-256.
10. **Roy, S.P. 2003.** Secondary productivity of fresh water ecosystem. In: *Advances in fish Research.* J.S. Datta Munshi, J. Ojha, T.K. Ghosh (Eds). Narendra Publishing House, Delhi. **3**: 99-108.
11. **Dehadrai, P.V. 1994.** Swamps of North-Bihar. *Bulletin of National Institute of Ecology, New Delhi.* **7**: 17-21
12. **Verma, A.M. 1994.** Socio-economic study of Inland fish culture in Kosi division. *Seminar on Pisciculture in North-Bihar with special emphasis on fish diseases.*
13. **Glöer P. 2002.** *Die Süßwassergastropoden Nord- und Mitteleuropas.* Die Tierwelt Deutschlands, ConchBooks, Hackenheim, 326 pp.
14. **Holthuis, L. B. 1980.** FAO species catalogue. Volume 1 - Shrimps and prawns of the world. An annotated catalogue of species of interest to fisheries. FAO Fisheries Synopsis 125.
15. **Motoh, H 1981.** "Studies on the fisheries biology of the giant tiger prawn, *Penaeus monodon* in the Philippines" (7). Aquaculture Department, Southeast Asian Fisheries Development Center.
16. **Rao K: 1969.** Mollusca have many uses. *Indian Farming*, **29(9)**: 41-45 and 62.

\*\*\*

