

## SYSTEMATIC STUDY OF MOLLUSCAN FAUNA OF LAYARI RIVER

### Part-I. Archaeogastropoda (Aspidobranchia: Prosobranchia) from the Estuarine Region

FARIDA BEGUM AND SAIYIDA NAZNEEN

Department of Zoology, University of Karachi, Karachi-75270, Pakistan

(Received June 23, 1990; revised September 19, 1992)

This paper deals for the first time with the systematic accounts of the gastropod order Archaeogastropoda from the estuary of a river of Pakistan. Two families, 5 genera and 6 species of this order are found in the estuarine part of the Layari river. Among these, three species i.e. *Euchelus circulatus*, *E. atratus* and *Trochus stellatus* and a genus *Gibbula* Risso are new records for Pakistan.

**Key words:** Prosobranchia, Archaeogastropoda, Layari river.

#### Introduction

The knowledge about the molluscan fauna of Pakistan is very limited. The present attempt will be the first report about the estuarine molluscs of Pakistan. Khan and Dastagir [1] have reported 23 *Archaeogastropoda* species and Tirmizi and Zehra [2] have described 14 species of this order from Karachi and Mekran coasts.

The present paper deals with the systematic accounts of 6 species belonging to 2 families and 5 genera of this order. Among these only two species have been reported earlier, one species i.e. *Umbonium vestiarium* by Khan and Dastagir [1] and another species i.e. *Nerita undata* by Tirmizi and Zehra [2].

The classification adopted here is based on Taylor and Sohl [3]. All specimens were photographed with Nikon microscope adaptor model 2.

#### LIST OF ARCHAEOGASTROPODS REPORTED FROM THE ESTUARY OF LAYARI RIVER.

- Phylum : Mollusca  
 Class : Gastropoda  
 Subclass : Prosobranchia (=Streptoneura)  
 Order : Archaeogastropoda  
 Suborder : Rhipidoglossa  
 Family : Trochidae  
 (1) *Trochus stellatus* Gmelin. (2) *Gibbula* sp. (3) *Umbonium vestiarium* (Linnaeus). (4) *Euchelus circulatus* (Anton). (5) *E. asper* (Gmelin). (6) *E. atratus* (Gmelin)
- Family : **NERITIDAE**. *Nerita (Theliostyla) undata* Linnaeus.  
 Order : *Archaeogastropoda* (=Aspidobranchia).  
 Suborder : *Rhipidoglossa*.

This order is, relatively, a primitive group of the prosobranchs, as its name indicates. They are found in marine, freshwater and in the estuarine region of the river. The mem-

bers of this order possess two gills, two auricles and two kidneys, except the primitive forms in which right auricle and kidney are absent. In all archaeogastropods, siphon, proboscis or penis are absent (except Neritidae) and nervous system is not concentrated. Two families, 5 genera and 6 species of this order are found in the estuarine part of the Layari river.

#### Key to the Families of Archaeogastropoda

- Body whorl elongated with raised spire, usually with false umbilicus ..... Trochidae
- Body whorl globular or obliquely rounded with depressed spire, umbilicus absent ..... Neritidae

#### Superfamily: TROCHACEA

#### Family: TROCHIDAE. (= Top shell).

Four genera and 6 species of this family are collected from the Layari river.

#### Key to the Genera of Trochidae

1. Spire with pointed apex ..... 2
  - Spire without pointed apex ..... 3
  2. Columella denticulated. .... *Trochus*
  - Columella smooth. .... *Gibbula*
  3. Shell small (3-12mm long) smooth, much flattened, spire depressed. .... *Umbonium*
  - Shell usually large (5-32mm long) inflated, spire short, sculpture strong and spirally ridged ..... *Euchelus*
- Genus *Trochus* Linnaeus, 1758,  
 Type-species: *Trochus concavus* Montfort, 1810

The shell is conical with straight sides. The lower part of the body whorl is angular and its basal surface is more or less flattened. The columellar lip is twisted and often toothed. A false umbilicus is present.

Only one species is collected from the Layari river. *Trochus stellatus* Gmelin, 1971 (pl. 1, Figs. 1a and 1b) *Trochus stellatus* Gmelin, 1791, Syst. Nat. ed., 13,1 (6):

3571 sp. 26: Gravely, 1942, Bull. Madras. Govt. Mus. New Ser., 5 (2): 15-16; Satyamurti, 1952, Bull. Madras. Govt. Mus. New Ser., 1 (2), pt. 6:45, pl.2, Figs. 7a and 7b; Menon, Datta Gupta and Das Gupta, 1961, J. Bombay, Nat. Hist. Soc., 58 (2): 478, pl. 2, Fig. 10.

*Trochus stellaris*: Roeding, 1798, Mus. Boltenianum:81.

*Trochus incrassatus*: Reeve, 1861, Conch. Incon., 13, pl. 13, Fig. 77. *Trochus* (Intundibulum) *stellatus*: Rajagopal and Mookherjee, 1978, Rec. Zool. Surv. India. Occ. Paper No.12: 25.

**Material examined.** 1 specimen-30-1-1982 (Collector, Dr. F. Begum).

**Description.** The shell is thick, massive, conical with somewhat rounded sides. The sculpture consists of spiral rows of tubercles. Spiral ridges of the body whorl are angular. Apex is pointed with depressed spire. Umbilicus is quite large and deeply notched. The aperture is squarely ovate. The inner surface of the outer lip is transversely ribbed. The columella is denticulated. The colour of the shell is brown with reddish spots on the surface.

**Distribution.** It is collected for the first time from Pakistan (Layari river).

**Elsewhere.** India, Seychelles, Maldives, and Sri Lanka.

**Measurements.** Length of shell 13mm, breadth of shell 15mm, length of aperture 10 mm, breadth of aperture 8mm, length of spire 8mm.

**Remarks.** Found attached to the rock in the estuarine region of the river. The characteristic features are the coarsely granular sculpture, denticulated columella and transversely ribbed inner surface of the outer lip.

Genus: *Gibbula risso*, 1826,

Type-species: *Torchus maqus* Linnaeus, 1758

The shells are small, polished and conically ovate in shape, umbilicus narrow or absent. This genus is reported for the first time in Pakistan.

*Gibbula* sp. (pl. I, Figs. 2a and 2b)

**Material examined.** 2 specimens-25-2-1982 (Collector, Dr. F. Begum).

**Description.** The shell is thick and conical in shape. Apex is obtuse. The sculpture of the shell is trasversed by regular spiral rows of rounded tubercles. These tubercles are comparatively larger on the upper part of each whorl. The columella is smooth. The umbilicus is deep and notched. The basal part of the body whorl is strongly spirally ridged. The aperture is squarely ovate in shape. Inner surface of the outer lip is smooth and pearly. The colour of the shell is brown with reddish spots on the surface.

**Measurements.** Length of the shell 7-12mm, breadth of shell 7-12mm, length of aperture 5-8 mm, breadth of aperture

3 - 6mm, Length of spire 4-8mm.

**Remarks.** The distinguished characters are the presence of smooth columella and the inner surface of the outer lip is also smooth and pearly. It occurs in marine habitat but is also found in the estuary of the river on sandy beaches.

Genus: *Umbonium* Link, 1907.

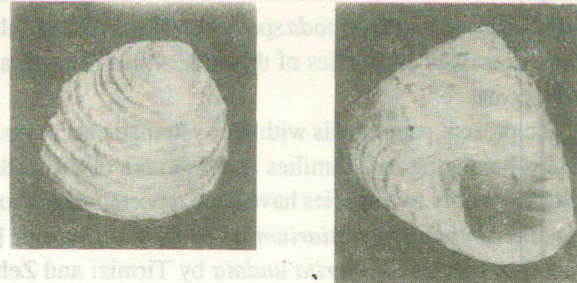
Type-species: *Trochus vestiarius* Linnaeus, 1758.

The shells are smooth, glossy, flattened and button shaped. The umbilicus is completely filled by a thick callus. This genus is represented in the Layari River by a single species.

*Umbonium vestiarius* (Linnaeus, 1758) (pl. I, Figs. 3a and 3b)

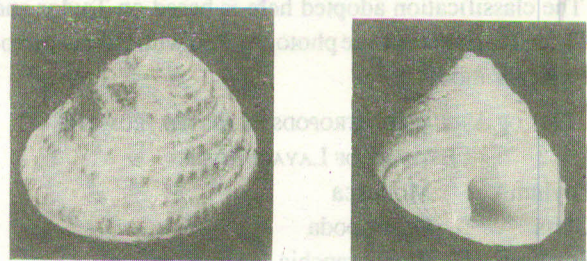
*Trochus vestiarius* Linnaeus, 1758, Syst. Nat. ed., 10: 758, No.515.

*Umbonium vestiarius*: Link, 1807, Besch. Nat. Samm. Univ. Rostock, pt. 3: 136; Melvill and Standen, 1898, J.



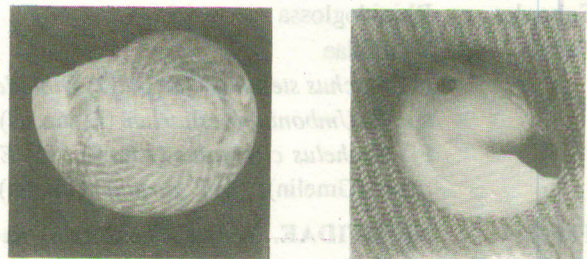
1 a

1 b



2 a

2 b



3 a

3 b

Plate I

Figs. 1a and 1b. *Trochus stellatus* Gmelin. (13x15mm). a. Abapertural view; b. Apertural view.

Figs. 2a and 2b. *Gibbula* sp. (Risso). (17x12mm). a. Abapertural view; b. Apertural view.

Figs. 3a and 3b. *Umbonium vestiarius* Linnaeus. (13x4mm). a. Abapertural view; b. Apertural view.

Conch. Lond., 9 (3): 77; Crichton, 1942, J. Bombay. Nat. Hist. Soc., 42: 338; Gravely, 1942, Bull. Madras Govt. Mus., 5 (2): 15-16; Ray 1948, Rec. Indian Mus., 46: 91; Satyamurti, 1952, Bull. Madras. Govt. Mus. New Ser., 1 (2), pt. 6: 47-48, pl.2, Figs. 11a-11e; Menon, Datta Gupta and Das Gupta, 1961, J. Bombay Nat. Hist. Soc., 58 (2): 480, pl. 2, Fig. 20 Khan and Dastagir, (1971) Rec. Zool. Survey, Pakistan, 2 (1): 23, pl.3, sp. 12, (1971); Rajagopal and Mookherjee, 1978, Rec. Zool. Surv. India, Occ. Paper No.12:29.

*Rotella lineolata*: Lamarck, 1822, Hist. Nat. Anim. Sans. Vert., 7:7. *Umbonium* (*Rotella*) *vestiarium*: Hornell, 1921, Madras Fish. Bull., 14: 105.

*Material examined.* 20 specimens-4 examples, 20-5-1982; 10 examples 12.2.1983; 6 examples, 27.2.1983 (Collector, Dr. F. Begum).

*Description.* The shells are small, button-shaped with depressed spire. The surface of the shell is smooth and glossy. The body whorl is large, broad, more or less flattened and angular below. The spire is much depressed with obtuse apex. Sutures are not much depressed. The aperture is D-shaped. The umbilicus is imperforate filled with whitish callus. The colour of the shell is variable. It may be reddish, whitish, greyish or brownish with numerous transpiral whitish wavy lines.

*Distribution.* Pakistan: Manora Island, Karachi Coast and it is reported for the first time from the estuarine part of the Layari river.

*Elsewhere.* India, Bangladesh, Persian Gulf, Sri Lanka to Malay Archipelago, Singapore, Philippines and Japan.

*Measurements.* Length of shell 3-12mm, breadth of shell 4-16mm, Length of aperture 2-6mm, breadth of aperture 2-7mm.

*Remarks.* This species is abundant on the sandy mud along the shores. It can easily be distinguished by its button-shaped appearance. Satyamurti [4] has described, in detail, the variations in colour pattern.

Genus: *Euchelus* Philippi, 1847.

Type-species: *Trochus quadricarinatus* Holten, 1802  
? = *Trochus asper* (Gmelin, 1791).

The shell is more or less ovate with inflated whorls. The body whorl is large and broader than those of the spire. The surface of the shell is traversed by spiral ridges which are usually granular or nodular. The aperture is somewhat rounded or roundly ovate. Outer lip is thickened and lirated within, inner lip usually with tooth below.

Three species of this genus are reported from the Layari river.

**Key to the Species of *Euchelus***

- 1. Sutures deeply set in narrow groove, granules on spiral

- ridges circular. ....2
- Sutural groove wider and shallow, granules on spiral .. ridges obliquely transpirally elongated... *E. circulatus*
- 2. The columellar surface broad, transversely ridged with a well developed tooth. ....*E. asper*
- The columellar surface narrow, smooth, bearing a small feebly developed tooth. ....*E. atratus*

*Euchelus circulatus* (Anton, 1848) (pl.II. Figs. 4a and 4b)

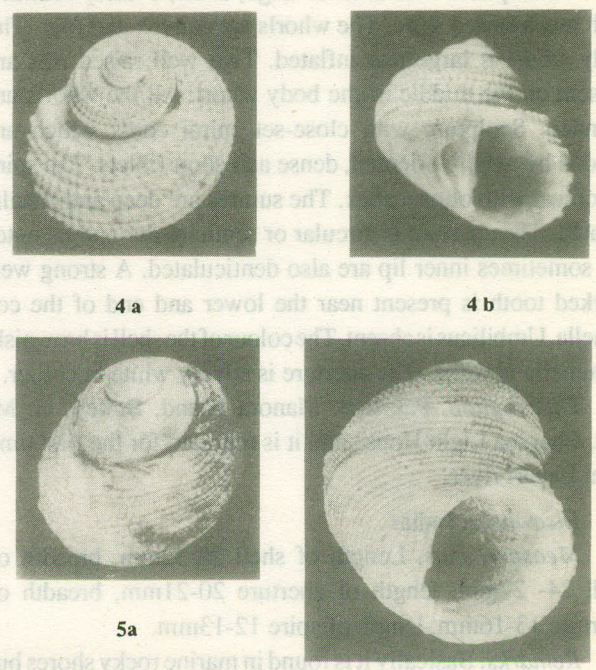
*Trochus circulatus* Anton, 1848, Zeitscher. F. Malak., 5: 103.

*Euchelus proxima*: Adams, 1854, Proc. Zool. Soc. Lond., 22: 316.

*Euchelus circulatus*: Pilsbry, 1889 in Tryon's Man. Conch., 10: 432, pl. 37, Fig. 16: Satyamurti, 1952, Bull. Madras. Govt. Mus. New Ser., 1 (2), pt. 6: 39-40; Rajagopal and Mookherjee, 1978, Rec. Zool. Surv. India, Occ. Paper No. 12: 19, pl. 1, Figs. 4 and 4a.

*Material examined.* 2 specimens-12-2-1983 (Collector, Dr. F. Begum).

*Description.* The shell is small, cone-shaped with depressed spire. Apex is obtuse. Whorls are four and convex. The body whorl is large and much inflated in the middle. The sutures are deep and canaliculated. The sculpture of the shell is



**Plate II**  
Figs. 4a and 4b. *Euchelus circulatus* (Anton). (5x6mm). a. Abapertural view; b. Apertural view.  
Figs. 5a and 5b. *E. asper* (Gmelin). (28x24mm). a. Abapertural view; b. Apertural view.

strong and spirally ridged. The granules on ridges are more or less obliquely and transpirally arranged. The aperture is semi-circular. The outer lip of the aperture is thick and its margin is obliquely denticated. Many transverse ridges are also present on the inner side of the aperture. The umbilicus is deep. The columella contains a denticle at the base. Interiorly pearly white. The colour of the shell is brownish.

**Distribution.** It is reported for the first time in Pakistan from estuary of the Layari river.

**Elsewhere.** India.

**Measurements.** Length of shell 5-6mm, breadth of shell 5.5-6mm, length of aperture 3-4mm, breadth of aperture 2.5-3mm, length of spire 2.5-3mm.

**Remarks.** Presence of granules on the ribs are the distinguishing features of this species.

*Euchelus asper* (Gmelin, 1791) (pl.II, Figs. 5a and 5b)

*Trochus asper* Gmelin, 1791, Syst. Nat. ed., 13: 3583; Fischer, 1878, in Kienen, Coq. Vine., 11: 287, pl.93.

*Euchelus indicus*. Adams, 1854, Proc. Zool. Soc. Lond., 22: 316.

*Euchelus asper*. Crichton, 1942, J. Bombay, Nat. Hist. Soc., 42: 336; Rajagopal and Mookherjee, 1978, Rec. Zool. Surv. India., Occ. Paper. No. 12: 16.

**Material examined.** 2 specimens-28-1-1982 (Collector, Dr. F. Begum).

**Description.** The shell is large, thick, ovately rounded with much raised spire, The whorls are convex and four. The body whorl is large and inflated. Two well raised ribs are present on the middle of the body whorl. All the whorls are rounded. Sculpture with close-set spiral cords which are beaded by axially oriented, dense and short riblets. The spire is conical with obtuse apex. The sutures are deep and canaliculated. The aperture is circular or semicircular and its outer lip, sometimes inner lip are also denticulated. A strong well marked tooth is present near the lower and end of the columella. Umbilicus is absent. The colour of the shell is brownish. Columella is white. The aperture is silvery white in colour.

**Distribution.** Pakistan: Manora Island, Bulleji, G. M. Hut, Charana Light House and it is reported for the first time from Layari river.

**Elsewhere.** India.

**Measurements.** Length of shell 28-32mm, breadth of shell 24-27mm, length of aperture 20-21mm, breadth of aperture 13-16mm, length of spire 12-13mm.

**Remarks.** Basically it is found in marine rocky shores but it has also been observed in the estuarine part of the Layari river. This species can be distinguished from others by having a strong tooth at the lower end of the columella.

*Euchelus atratus* (Gmelin, 1791) (pl.III, Figs. 6a and 6b)

*Turbo atratus* Gmelin, 1791, Syst. Nat. ed., 13, 1 (16): 3601. *Trochus* (*Euchelus*) *atratus*: Watson, 1866, Challenger Zoology: 15, Gastropoda: 52.

*Euchelus atratus*: Melville and Standen, 1898, J. Conch. Lond., 9 (3): 78; Schepman, 1908, *Siboga Exped.* Prosobranchia, 49: 70; Satyamurti, 1952, Bull. Madras. Govt. Mus. New Ser., 1 (2), pt. 6: 40; Rajagopal and Mookherjee, 1978, Rec. Zool. Surv. I, India. Occ. Paper No. 12: 20.

**Material examined.** 1 specimen-10-2-1982 (Collector, Dr. F. Begum).

**Description.** The shell is thick, ovate, moderate in size with much inflated body whorl. Spire is short, depressed, ovate and canaliculated. Apex is obtuse. The sculpture of the shell is strong and spirally ridged. The four whorls are convex. The body whorl is large, inflated and angular in the middle. Fine granulated ribs are also present in between strong spiral ribs. A depression of umbilicus is present at the columella. A feebly developed, small tooth is present on the columellar margin of the aperture. The aperture is ovate. The outer lip is thick and denticulated. The colour of the shell is brownish with oblique irregular transpiral rows of dark brownish spots on the surface.

**Distribution.** It is a new record for Pakistan.

**Elsewhere.** India, Singapore, Indonesia, Philippines and Pacific Ocean.

**Measurements.** Length of shell 20 mm, breadth of shell 17mm, length of aperture 12mm, breadth of aperture 9mm, length of spire 12mm.

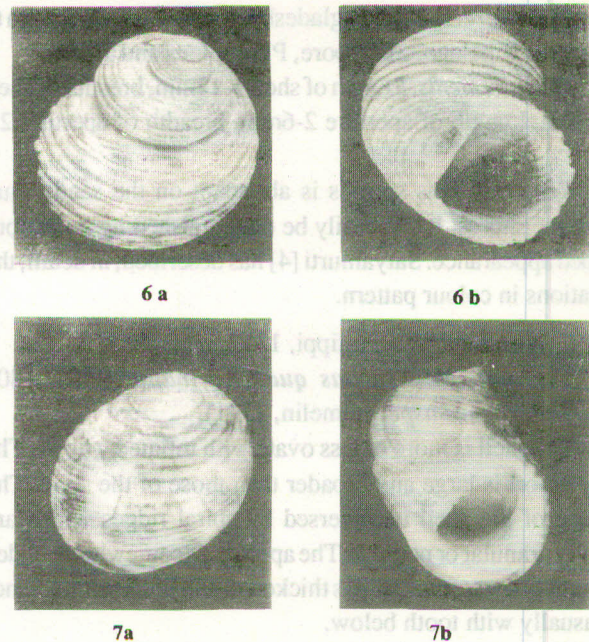


Plate III

Figs. 6a and 6b. *Euchelus atratus* (Gmelin). (20x17mm). a. Abapertural view; b. Apertural view.

Figs. 7a and 7b. *Nerita* (*Theliostyle*) *undata* Linnaeus. (14x12mm). a. Abapertural view; b. Apertural view.

**Remarks.** It can be easily recognised from other species of *Euchelus philippi* by its narrow and smooth columellar surface, bearing a small feebly developed tooth.

Superfamily: **NERITACEA**

Family: **NERITIDAE**

Only a single genus *Nerita* Adanson, is found in Layari river.

Genus: *Nerita* Adanson, 1757,

Subgenus: *Theliostyla* Moersch, 1852,

Type-species: *Nerita albicilla* Linnaeus, 1758.

The shell is thick, solid, ovately rounded, usually with a depressed or very short spire. The surface of the shell is ornamented with strong spiral ribs. The outer lip is thick and usually more or less denticulated. These dentition varies between 7-20th. Columella is flattened with a broad, wrinkled or granular callus. Columellar margin toward the aperture is sharp and normally toothed. The number of columellar teeth ranging from 1-6. Operculum is calcareous and paucispiral with excentric nucleus. Only a single species of the genus *Nerita* Adanson is collected from the Layari river.

*Nerita (Theliostyla) undata* Linnaeus, 1758 (pl.III, Figs. 7a and 7b)

*Nerita undata* Linnaeus, 1758, Syst. Nat, ed., 10, 779; Melvill and Standen, 1899. J. Linn. Soc. Lond, Zoology., 27 174; Tirmizi and Zehra, 1984, Marine Fauna, Pakistan 2, Mollusca, Gastropoda, Univ. Grants Commission., Sect. H-9, Islamabad, Pakistan: 27, Fig. 13.

**Material examined.** 4 specimens-26-9-1992 (Dr. F. Begum).

**Description.** The shell is thick, ovate with well raised spire. The apex is pointed, whorls 3 and 1/2 and convex. The body whorl is large and globular. Sutures are not deep. Sculpture of the shell is strong, spirally ribbed and the ribs are separated by deep interstices. The aperture is obliquely ovate. Columellar callus is broad, thickened and wrinkled with a gradual sloping inwards toward the aperture. The inner margin

of the columella bears two teeth in the middle. Outer lip is thick and expanded. Outer margin is slightly grooved and gradually sloping inside. Inner margin contains 14-16 marked elongated teeth. The colour of the shell is brownish and is marked with rows of dark brown bands.

**Distribution.** Pakistan: Manora Island, Paradise Point, Karachi and Gadani-Mekran Coasts. However, it is reported for the first time from Layari river.

**Elsewhere.** China, Hong Kong, India, Seychelles, Sri Lanka, Thailand, Indonesia, Malay Archipelago, Philippines, Red Sea, Pacific Ocean Australia and Japan.

**Measurements.** Length of shell 14-16mm, breadth of shell 12- 15mm, length of aperture 12-14mm, breadth of aperture 7 -7.5mm, length of spire 5-6mm.

**Remarks.** It occurs in the crevice of a rock in the estuarine region of the river. This species can be recognised by having three broad black bands on the body whorl and a conical spire. The inner margin of the outer lip contains 14-16 teeth and columellar margin bears two teeth where as the figure given by Tirmizi and Zehra [2] has shown smooth inner margin of the outer lip and columellar margin bears only three teeth. They have not given any specific characters of this species.

**Acknowledgement.** We earnestly acknowledge Dr. N. V. Subba Rao, Scientists-S E and K.U. Surya Rao - S D of the Zoological Survey of India, Calcutta for their help in the identification of species.

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