

Clams of the Families Tellinidae and Veneridae and Blood Cockle of Family Arcidae From Phitti Creek and Sonmiani Along the Coast of Pakistan (Northern Arabian Sea)

Shahnaz Jahangir,¹ Ghazala Siddiqui,¹ * Muhammad Moazzam² and Zarrien Ayub¹

¹Center of Excellence in Marine Biology, University of Karachi, Karachi-75270, Pakistan

²Marine Fisheries Department, Government of Pakistan, Karachi Fish Harbour, West Warf, Karachi, Pakistan

Abstract.- In the present study eight species of clams and one species of blood cockle identified on the basis of their conchological features have been reported. The two genera, *Tellinimacra angulata*, *Gastrana multangula*, belongs to the family Tellinidae and *Cirrenita callipyga*, *Protapes cor*, *Marcia marmorata*, *opima*, *Amiantis umbonella* and *Meretrix casta* var. *ovum* are the member of family Veneridae. Only one species of blood cockle, *Anadara antiquata* of the family Arcidae was found at Phitti Creek and Sonmiani. Two species of clams, *A. umbonella* and *M. marmorata* and one species of blood cockle, *A. antiquata* are being reported for the first time from Pakistan.

Key words: Clams, blood cockles, taxonomy, Northern Arabian Sea.

INTRODUCTION

The area of Arabian Sea bordering the coast of Pakistan is known to be one of the most productive areas in the world (Melvill, 1928; Melvill and Standen, 1901; 1906; Khan and Dastagir, 1975). It is full of well-diversified molluscan fauna. About 1100 species of molluscs are known to inhabit the northern Arabian Sea of which 30 species could be regarded as commercially important (Moazzam and Ahmed, 1994).

The study of the systematics of Indo-Pakistani bivalves was first initiated by Melvill and Abercrombie (1893). Later on Gravely (1941), Hornell (1951), Satyamurthi (1930-56), and Subrahmanyam *et al.* (1949) made new additions to the list of bivalves found in the Indo-Pakistani region. Kundu (1965) further contributed to the identification of bivalve species and described species of blood cockles, *Anadara granosa* and *A. rhombea* from east and west coast of India, the Gulf of Mannar and Kutch.

Pakistan has an extensive coastline of about 1050 km, ramified with numerous creeks and

backwaters. A number of clam and cockle species are found along the coast of Pakistan. So far at least 68 species belonging to the Family Veneridae have been reported to occur in Pakistani waters, among these the species of commercial importance are *Tivela ponderosa*, *Meretrix tumida*, *M. meretrix*, *M. casta* var. *ovum*, *Lioconcha picta*, *Circe scripta*, *Hemitapes pinguis*, *Paphia malabarica*, *P. textile*, *Gafrarium divaricatum*, *Marcia cor* and *Callista erycina*. In addition to the above-mentioned species, the species of blood clam/cockles, *Arca* and *Cardium* spp. are also known to occur along the Sindh and Balochistan coast (Ranjha, 1960; Moazzam and Ahmed, 1994).

The present study describes species of clams and blood cockles from Phitti Creek and Sonmiani, the two sites situated along the Sindh and Balochistan coasts, respectively. Eight species of clams and one species of blood cockle was found at Sonmiani and six species of clams and one species of cockle were recorded from Phitti Creek.

MATERIALS AND METHODS

Sampling

The live samples of clams and cockles were collected from two localities, *i.e.*, Sonmiani and Phitti Creek during May 2004 to April 2005 (Fig. 1).

* Corresponding author: ghazala_siddiqui@hotmail.com
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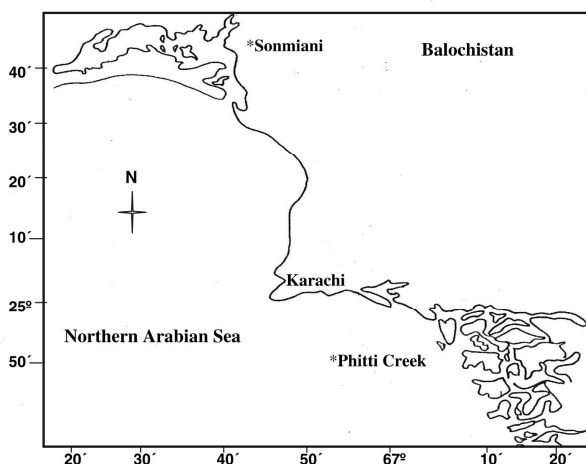


Fig. 1 Map showing sampling sites*.

Sites

Phitti Creek

The Phitti Creek system lies at 24° 48' N, 66° 14' E and is situated in the vicinity of Ibrahim Hydari and Rehri, fishing villages. The Phitti Creek network has a vast mangrove dominated area, which has a complex ecosystem that offers niches for free living, climbing, crawling, burrowing and sessile organisms. The diversified fauna in the Phitti Creek is supported by nutritionally rich environment that provides ideal habitat for breeding and nursing of number of vertebrate and invertebrate species. The creek waters also receive all sorts of industrial waste from the nearby Korangi industrial area. The bottom substrate of Creek is predominantly muddy with some patches of sandy or sandy-cum-muddy substratum. The salinity in the Creek is usually high except, during monsoon season.

Sonmiani

The Sonmiani Bay is located on the coast of Balochistan at 25° 25' N, 66° 35' E. The total area of the bay is 125.25 sq. km and the adjacent shelf is 80 km wide. The substrate of the area is sandy-cum-muddy. The Winder River is the only source of fresh water input and is dependent on rainfall. The mangrove forest in the area of Sonmiani is spread over an area of about 3000 ha (Mirza *et al.*, 1988). However, the sampling site is devoid of such forestation. Extensive beds of cockles and clams are found in the area.

Identification

The identification of clams and cockle species was done mainly through the study of their conchological characters such as the morphology of shells, their color, luster and teeth (cardinal and lateral). The literature used for the identification of clams and cockles species was that of Bosch *et al.* (1995), Tebano and Paulay (2001) and Yoosukh and Matsukuma (2001).

Measurements

The specimens were measured to the nearest millimeter (0.01 mm) with the vernier caliper. The length of shell was taken from the outer edge of the hinge to the outermost growth margin.

RESULTS

Classification

Phylum: Mollusca

Class: Bivalvia

Subclass: Heterodonta

Super family: Tellinoidea

Family: Tellinidae

Genus: *TELLINIMACTRA* (Deshayes, 1854)

Species: *Tellinimactra angulata* (Linnaeus, 1767)
(Fig. 2A)

Synonyms

Tellina angulata (Reeve, 1843-1878; Gravely, 1941; Khan and Dastagir, 1975, pg. 33, pl. XIX, fig. 68.), *Gastrana angulata* (Melvill and Standen, 1906, Subrahmanyam *et al.*, 1949, fig. 68. pl. V), *Gastrana polygona* (Melvill and Abercrombie, 1893), *Tellinimactra angulata* (Bosch *et al.*, 1995, pg. 275, fig. 1148).

Sample size: 7

Shell length: 40-66 mm

Locality: Sonmiani

Description

The description is similar to as described by Bosch *et al.* (1995)

Habitat

This species is found at about 0-tide level in the sandy-cum-muddy habitat.

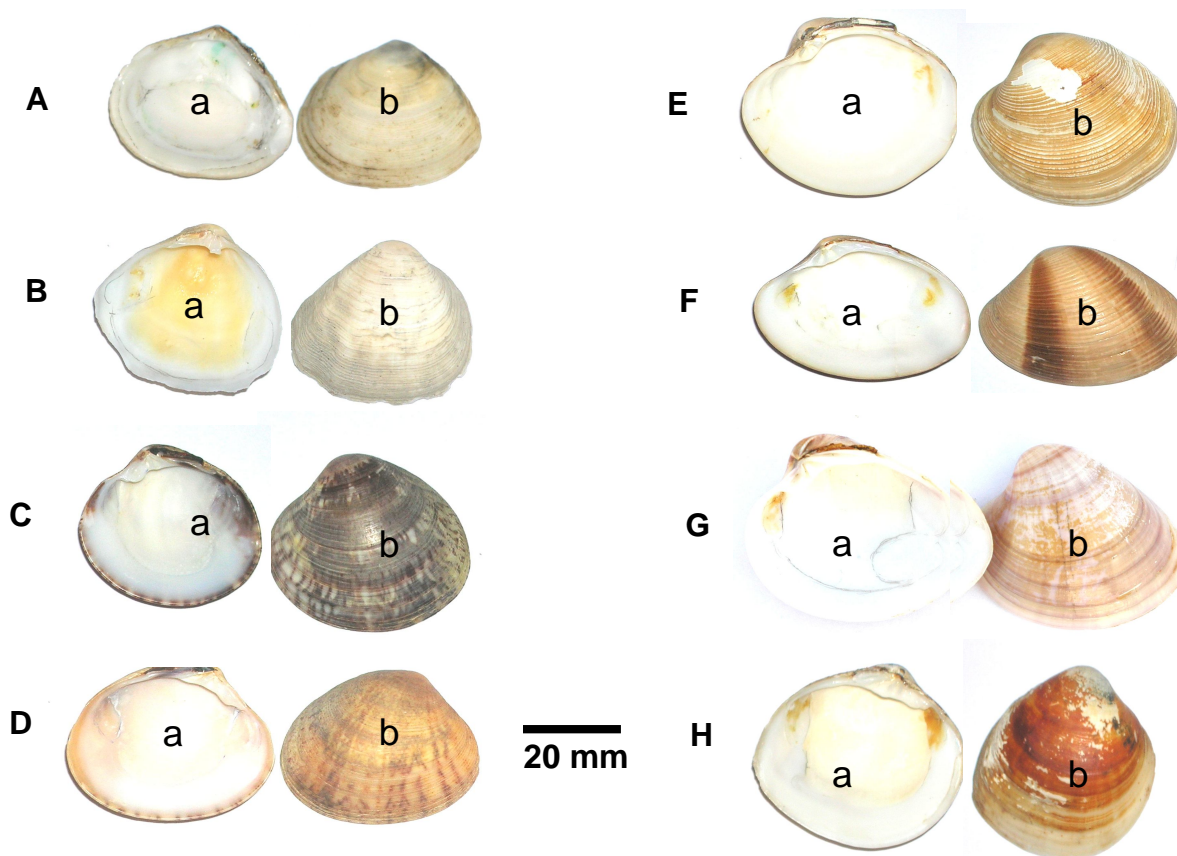


Fig. 2. Clams; A, *Tellinimacra angulata*; B, *Gastrana multangula*; C,D, *Cercenita callipyga*; E, *Protapes cor*; F, *Marcia opima*; G, *Amiantis umbonella*; H, *Meretrix casta* var *ovum*. a, inner left; b, outer right.

Remarks

This species has been previously described as *Tellina angulata* from Phitti Creek and Ibrahim Hydari by Khan and Dastagir (1975). In the present study this species has been identified as *Tellinimacra angulata* as mentioned Bosch *et al.* (1995).

Genus: *GASTRANA* (Schumacher, 1817)

Species: *Gastrana multangula* (Gmelin, 1791)
(Fig. 2B)

Synonyms

Gastrana (Metis) polygona (Melvill and Abercrombie, 1893, Subrahmanyam *et al.*, 1949, pl.V,fig.68.), *Tellina multangulata* Gmelin (= *polygona*), (Reeve, 1843-1878; Gravely, 1941), *Gastrana multangula* (Gmelin, 1791; Khan and Dastagir, 1975, pg. 34, pl. XX, fig.71a, 72b),

Gastrana multangula (Bosch *et al.*, 1995. pg. 258, fig. 1151).

Sample size: 26.

Shell length: 10-70 mm.

Locality: Sonmiani, Phitti Creek.

Description

The shell characteristics are similar to one described by Bosch *et al.* (1995).

Habitat

Found at sandy-cum-muddy beaches below 0-tidal level.

Remarks

During the present study the specimens were examined from Sonmiani and Phitti Creek. This species is also quite common on the coast of Bombay

(Subrahmanyam *et al.*, 1949) by the name of *Gastrana polygona*. In Pakistan Khan and Dastagir (1975) also reported this species by the same name. In the present study it is described as *G. multangula* based on the characteristics described by Bosch *et al.* (1995).

Super Family: Veneroidea

Family: Veneroidae

Genus: *Circenita* (Schumacher, 1817)
Species: *Circenita callipyga* (Born, 1780)
(Fig. 2C-D)

Synonyms

Meretrix pulchra auct.; *Circe semiarata* auct.; *Cytherea pulchra* auct.; *Cytherea (Lioconcha) deshaysiana* auct.; *Cytherea (Lioconcha) lentiginosa* auct.; *Cytherea arabica* auct.; *Gafrarium callipygum* auct.; *Lioconcha adenensis* auct.; *Circenita callipyga* (Born, 1778); *Venus callipyga* (Born, 1778); *Venus bicolorata* (Chemnitz, 1795); *Venus arabica* (Chemnitz, 1795); *Venus lentiginosa* (Chemnitz, 1795); *Circe crochrodii* (Gray, 1849); *Circe litturata* (Gray, 1838); *Cytherea pfeifferi* (Philippi, 1847); *Cytherea adenensis* (Philippi, 1848); *Cytherea splendens* (Sowerby, 1851); *Cytherea subelliptica* (Sowerby, 1851); *Cytherea elliptica* (Sowerby, 1853); *Circe pulchra* (Deshayes, 1854); *Cytherea (Circe) paralytica* (Romer, 1860); *Cytherea (Lioconcha) doritis* (Romer, 1860); *Circe abbreviata* (Reeve, 1856); *Circe fumata* (Reeve, 1863); *Tapes amphidesmoides* (Reeve, 1864); *Lioconcha funiculata* (Romer, 1864); *Lioconcha limenia* (Romer, 1864); *Circenita callipyga* (Bosch *et al.*, 1995, pg. 267, fig. 1198).

Sample size: 26.

Shell length: 38-68 mm.

Locality: Sonmiani, Phitti Creek.

Description

All these specimens irrespective of their sizes, showed close resemblances to the description given by Bosch *et al.* (1995).

Habitat

Occur in sandy-cum-muddy habitat at below 0-tidal level.

Remarks

During the present study the specimens were studied from Sonmiani and Phitti Creek. This species has been previously reported from Korangi Creek, Baba Island; Bhit Island, Manjia Island along the Karachi coast (Khan and Dastagir, 1975). Moazzam and Ahmed (1994) found this species on Manora, Buleji, Cape Monze, Ormara (Pedi zur), Taq, Sakoni, Ras Juddi, Astola Island, Sur, Gawader and Jiwani. Bosch *et al.* (1995) reported this species to be frequent in the muddy-cum-sandy bottoms, whereas, Moazzam and Ahmed (1994) have found this species underneath the boulders on the intertidal rocky shores.

Genus: *PROTAPES* (Schumacher, 1817)
Species: *Protapes cor* (Sowerby, 1853)
(Fig. 2 E)

Synonyms

Venus cor (Melvill and Abercrombie, 1893, Khan and Dastagir, 1975, pg 26, fig. 54, pl. XIII), *Paphia malabarica* (Dillayan, 1817, Subrahmanyam *et al.*, 1949, pg. 68, 79, fig. 52. pl. XV), *Tapes malabarica* (Melvill and Abercrombie, 1893), *Tapes cor*, (Melvill and Standen, 1906). *Protapes cor* (Bosch *et al.*, 1995, pg. 273, fig. 1228).

Sample size: 50

Shell length: 30-71 mm.

Locality: Sonmiani, Phitti Creek.

Description

All specimens showed close resemblance to characteristics described by Bosch *et al.* (1995)

Habitat

Found in muddy and muddy-cum-sandy substratum in abundance at low water mark.

Remarks

In the present study it was studied from Phitti Creek and Sonmiani. Previously this species has been reported from the Creek system and

mangroves areas near Karachi and from various locations along the Balochistan coast (Khan and Dastagir, 1974; Barkati and Tirmizi, 1986; Moazzam and Ahmed, 1994).

Genus: *MARCIA* (Adams and Adams, 1857)
Species: *Marcia (Marcia) opima* (Gmelin, 1791)
(Fig. 2F)

Synonymy

Tapes ceylonensis auct.; *Catelysia opima* auct.; *Eumarcia opima* auct.; *Venus triradiata* (Chemnitz, 1782); *Venus opima* (Gmelin, 1791); *Marcia opima* (Gmelin, 1791) *Katelysia opima* (Subrahmanyam *et al.* 1949, pg. 67, 79 fig. 46); *Marcia opima* (Bosch *et al.*, 1995, pg. 273, fig. 1226).

Sample size: 13.
Shell length: 39-70mm.
Locality: Sonmiani, Phitti Creek.

Description

Closely resemble the description of *Marcia (Marcia) opima* (Gmelin, 1791) described by Bosch *et al.* (1995).

Habitat

Burrows in muddy and sandy-cum-muddy bottoms at 0-m tidal level.

Remarks

This species has been earlier identified by Subrahmanyam *et al.* (1949) as *Katelysia opima*, whereas, Bosch *et al.* (1995) reported this species as *Marcia opima*.

Species: *Marcia marmorata* (Lamarck, 1818)
(Fig. 3 A-D)

Synonyms

Katelysia (Hemitapes) marmorata (Lamarck, 1818, Subrahmanyam *et al.* 1949, pg. 67, 79, fig. 47, fig.47,pl.IV), *Venus radiata* (= *Tapes marmorata*) (Reeve, 1864; Melvill and Abercrombie, 1893), *Tapes radiata* (Melvill and Standen, 1906), *Paphia marmorata* (Reeve, 1843 -1878; Gravely, 1941). *Marcia marmorata* (Bosch *et al.*, 1995, pg.

272, fig. 1224).

Sample size: 18.
Shell length: 35-73mm.
Locality: Sonmiani, Phitti Creek.

Description

The characteristics are similar to those described by Bosch *et al.* (1995).

Habitat

Occur in sandy-cum-muddy habitat in the low tidal area.

Remarks

This species is first time reported from Pakistani waters. Previously it has been identified by Subrahmanyam *et al.* (1949) as *Katelysia marmorata* from Bombay coast.

Genus: *AMIANTIS* (Carpenter, 1817)
Species: *Amiantis umbonella* (Lamarck, 1818)
(Fig. 2 G)

Synonyms

Meretrix umbonella auct.; *Callista umbonella* auct.; *Cytherea umbonella* (Lamarck, 1818); *Cytherea isselina* (Jousseume, 1888). *Amiantis umbonella* (Bosch *et al.*, 1995, pg. 262, fig. 1205).

Sample size: 61.
Shell length: 33-77mm.
Locality: Sonmiani, Phitti Creek.

Description

Shell characteristics are similar to one described by Bosch *et al.* (1995).

Habitat

Found in sandy-cum-muddy and muddy bottoms at Sonmiani and Phitti Creek below 0-m tidal level.

Remarks

This species have been reported for the first time from Pakistan.

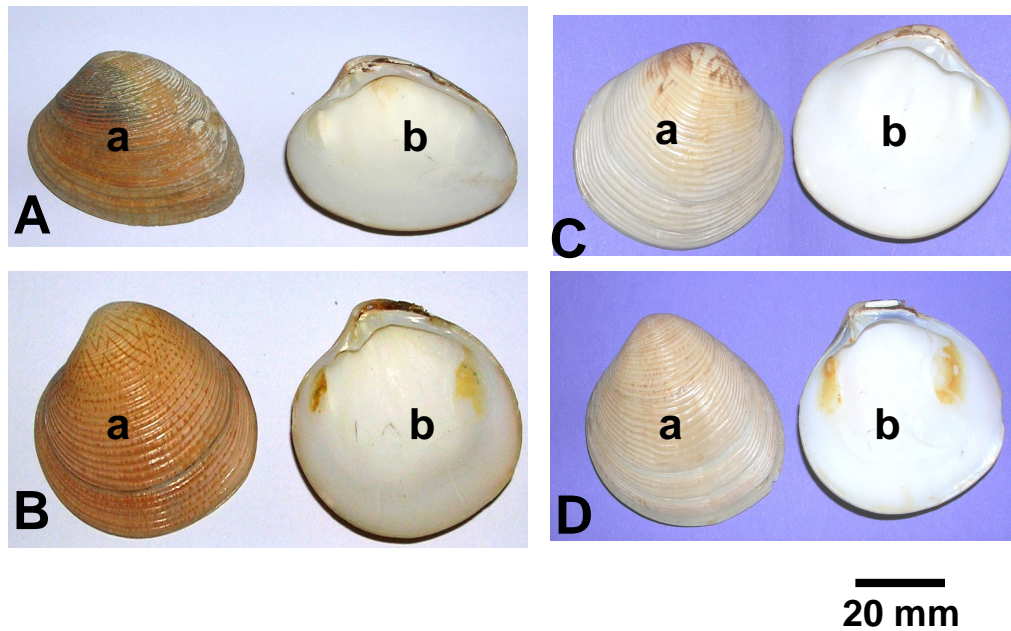


Fig. 3. Morphological variation in the shell of *Marcia marmorata* (A-D). a, outer left; b, inner right.

Genus: *MERETRIX* (Lamarck, 1799)

Species: *Meretrix casta* var. *ovum* (Hanley, 1845)
(Fig. 2H)

Synonyms

Cytherea ovum (Hanley, 1845, p. 21, Reeve 1864, pl.6, fig. 19); *M. ovum* (Deshayes, 1853, pg. 34-35) *M. casta* var. *ovum* (Hornell, 1917, pg. 171, Pl. IV, figs. 1-4, Pl.V. figs 23-26, pl. VI figs 34 - 38), *Meretrix ovum* (Yoosukh and Matsukuma, 2001, pg. 454, pl. 4 fig.5-8, pl.5 fig. 7-6)

Sample size: 250.

Shell length: 30-70mm.

Locality: Sonmiani.

Description

Shell showed close resemblance to characteristics describe by Hornell (1917) and Yoosukh and Matsukuma (2001)

Habitat

Found in low tidal areas at 0-m tidal level in the muddy-cum-sandy substratum.

Remarks

The extensive beds were reported by Moazzam and Ahmed (1994) from the mouth of estuaries especially at river Hingol, Ormara (Demi Zur), Shadi Khor, Jiwani, Juddi Khor and at Pasni in Balochistan area. In the present study this species was found at Sonmiani. Hornell (1917) considered it to be the variety of *M. casta* whereas, Yoosukh and Matsukuma, (2001) classified it as *M. ovum*.

Super Family: Arcoidea

Family: Arcidae

Genus: *ANADARA*

Species: *Anadara antiquata* (Linnaeus, 1758)
(Fig. 4A-C)

Synonyms

Arca scapha auct.; *Arca hankeyana* auct.; *Arca antiquata* (Linnaeus, 1758); *Arca maculosa* (Reeve, 1844); (*Arca novaecaledoniae* (Baird, 1873); *Anomalocardia transversialis* (Adams, 1872) *Anadara antiquata* (Linnaeus, 1758); *A. maculosa* (Iredale, 1939, p. 275); *A. suggesta* (Iredale, 1939, p. 277); *A.nugax* (Iredale, 1939, p279); *Anadara antiquata* (Bosch *et al.*, 1995, pg. 210, fig. 921).

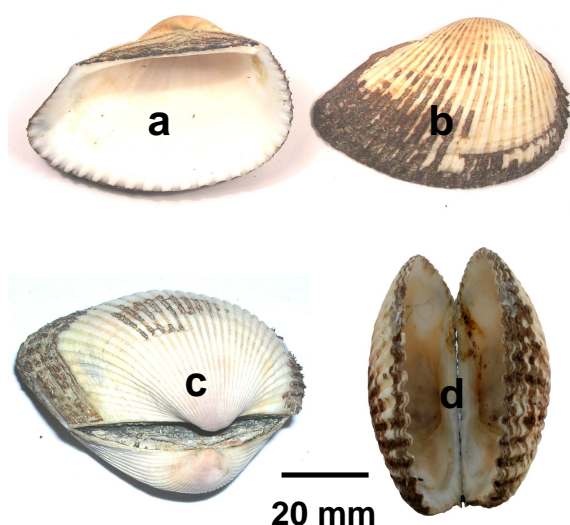


Fig. 4. *Anadara antiquata*: a, inner left; b, outer right; c, anterior view of shell; d, lateral view of shell.

Sample size: 630.

Shell length: 28-96 mm.

Locality: Sonmiani, Phitti Creek.

Description

Characteristics similar to that described by Bosch *et al.* (1995) and Tebano and Paulay (2001). This species is being first time identified as *Anadara antiquata* from Pakistan

Habitat

Occur in sandy and muddy habitats. In Phitti Creek it was found on the mud flats attached to the roots of mangroves.

Remarks

Moazzam and Ahmed (1994) have reported extensive beds of *Anadara* spp. from littoral zone down to depth of 12 meters and beyond in the areas between Ormara, Bhatti, Dab in Pasni Bay and at Kalmat Khor located in Balochistan. During the present study in specimens the number of ribs was 35-39 as reported by Tebano and Paulay (2000) from South Tarawa Atoll, Republic of Kiribati.

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(Received 28 March 2010, revised 23 April 2011)