3. TAXONOMY

INTRODUCTION

Phylum Mollusca is the second largest group in the animal kingdom (Subba Rao, 1991) and encompasses vast and widespread varieties of organisms. Among the molluscs, the Class Bivalvia is the second largest, comprising of some forty-one super families, one hundred families and approximately 8000 species (Morton, 1996). This diverse group, distributed throughout the tropical and temperate seas, is a successful taxon comprising of clams, scallops, shipworms, coquinas, mussels, oysters, cockles etc.

Scallops are the marine bivalves found distributed all over the world oceans. They have beautiful shells which are sculptured with radiating striations. They are distinct and unique from other bivalves in that they actively swim by ejecting rapid jet propulsion of water. They possess well developed sensory organs, musculature for swimming and light sensitive ‘eyes’ around the mantle margins.

Scallops belong to the subclass Pteriomorphia and order Ostreoida. Smith (1904) has made a report on the molluscs from Bay of Bengal and Arabian Sea. The super family Pectinoidae comprises the extant families of Propeamussidae, Entoliidae, Spondylidae and
Pectinidae (Hertlein, 1969). Shumway (1991) has reviewed the literature on scallops. Dakin (1909)’s description on *Pecten maximus* is considered as one of the first detailed report on scallops. The evolutionary relationship of the super family Pectinoidae was discussed by Waller (1991).

Monographs on the genus *Pecten* was given by Reeve (1852-53) and Locard (1888). Bavay (1905) has described the genus *Pecten* of Indian Museum at Calcutta. Preston (1908 and 1909) described new species of shells from Ceylon, South India and the Andaman Islands. In 1912, Dautzenberg and Bavay have described Pectinidae. Dall (1925) has described the species of *Pecten* from East America. Satyamurthi (1952) followed the Thiele’s “Handbuch der systematischem Weichtierkunde” and included the genera *Pecten, Plicatula* and *Spondylus* under the family Pectinidae, under the subfamily Pectininae, Plicatulinae and Spondylinae. He has recorded *Pecten tranquebaricus, P. splendidulus, P. crassicostatus* and *P. plica*.

Masuda (1962) described the Tertiary Pectinidae of Japan. Waller (1972) described the Pectinidae of Eniwetok Atoll of the Marshall Islands and in 1991, discussed the evolutionary relationships among the commercial scallops. Wagner (1991) reviewed the European Pectinidae. Lucas (1979 a, b, c & 1980 a, b, c) has described the
Pectinoidae from the European coast. Linnaeus (1758 and 1771) has recorded nine species of scallops from Indo-Pacific region. Preston (1908 and 1909) described new species of shells from Ceylon, South India and the Andaman Islands. Hornell (1948) has reported the occurrence of *Chlamys senatoria* and *Amusium pleuronectes* in deeper waters of the Bay of Bengal off the Ganjam and Orissa Coast.


Waller (1972) has recorded seven species of Pectinidae in Eniwetok Atoll, Marshall Island. They are *Chlamys coruscans coruscans* (Hinds, 1845), *C. marshallensis* (Waller, 1972), *Gloripallium pallium* (Linnaeus, 1758), *Comptopallium vexillum* (Reeve, 1853), *Excillichlamys spectabilis* (Reeve, 1853), *Juxtamusssium maldivense*
(E.A. Smith, 1903) and Pedum spondyloideum (Gmelin, 1791). Waller and Marincovich (1992) have reported two pectinids Camptochlamys alaskensis and Chlamys aquilona near ocean point, Alaska.

The Gulf of Mannar, the first Marine Biosphere Reserve established in South Asia in 1989 and located in Southeast coast of India, occupies an area of 10,500 sq. km. It is one of the richest regions from a marine biodiversity point of view and possesses unique and diversified habitats such as corals reefs, sea grass beds and mangroves, which in combination with the vast diverse flora and fauna residing within create a marine environment of great complexity. The pectinids have achieved a commercial status all over the world. But in India, it has attracted less attention and only the shells are used in ornamental industry. Except in Satyamurthy (1952) and Hylieberg and Nateewathana, 2002 no records on the scallops exists in India (apart from the report of Standen and Leicester (1906) from Sri Lankan side of Gulf of Mannar.

Twelve species of Pectinidae (Azumapecten squamatus, Decatopecten amiculum, D. plica, Bractechlamys noduliferus, Excelliclamys spectabilis, Felxopecten pesanatis, Gloripallium pallium, Mimachlamys sanguinea, M. splendidula, Minnivola pyxidata, Scaeochlamys irregularis and Volachlamys tranquebaria) have been reported in Gulf of Mannar which include the Sri Lankan side (TMMP,
2002). But in the field survey in 2002 by the Tropical Marine Mollusc Programme (TMMP), only six species were recorded. They are Bractechlamys noduliferus, Excellichlamys spectabilis, Mimachlamys sanguinea, M. splendidula, Minnivola pyxidata and Volachlamys tranquebaria. Azumapecten squamatus, Decatopecten amiculum, D. plica, Felxopecten pesanatis, Gloripallium pallium, Scaeochlamys irregularis were reported from Sri Lankan side of Gulf of Mannar (Standen and Leicester, 1906). Among these six species, Mimachlamys sanguinea, Minnivola pyxidata and Volachlamys tranquebaria are the common forms and have been selected for the detailed study. Bractechlamys noduliferus and Excellichlamys spectabilis were not found in live condition during the present study.

MATERIAL AND METHODS

The scallops were monitored in the fish landings of Mandapam, Rameswaram, Taruvaikulam, Vellapatti, Thirespuram, Pattanamputhur and Tuticorin fishing harbour of Gulf of Mannar, Tamil Nadu, Southeast coast of India from June 2000 to May 2002. The specimens were collected, identified by following the standard keys and taxonomical details have been compiled (Satyamurthy, 1952; Hylleberg and Nateewathana, 2002; Personal communication from Dr. Henk H.
RESULTS AND DISCUSSION

*Mimachlamys sanguinea* (Linnaeus, 1758)

**Synonyms**

*Ostrea sanguinea* Linnaeus, 1758: 698; Dijkstra, 1999:413; fig. 4A-B, Indonesia

*Ostrea senatoria* Gmelin, 1791:3327, no.61, living, “mari rubro” (= Indo-Pacific)

*Ostrea porphyrea* Gmelin, 1791:3328, No.65, living "mari rubro" (=Red Sea)

*Pecten aurantius* Lamarck, 1819:175, No.45

*Pecten florens* Lamarck, 1819:175, No.46, Deshayes, 1836: 147; Kuster and Kobelt, 1882: 82, pl. 16, fig.8, pl.20, fig. 3

*Pecten indicus* Deshayes, 1832:410, pl.3, fig.5, living, Sri Lanka, Indian Ocean

*Pecten pseudolima* G.B. Sowerby II, 1842:78, pl.20, fig 235, living, Jacna, Bohol, Philippines

*Pecten layardi* Reeve, 1853: species 80, pl.21, fig.80a, b, living Sri Lanka

*Pecten fricatus* Reeve, 1853: species 161, pl.34, fig.161, living, locality unknown

*Pecten blandus* Reeve 1853: species 162, pl.34, fig.162a, b, living, Australia

*Pecten raffraysi* Jousseaume, 1886:221, fig, living Zanzibar
Mimachlamys ellochena Iredale, 1939:349, pl.5, fig.24, living, N of North Direction Isle, N Queensland, Australia

Chlamys (Mimachlamys) asperrimoides, Powell, 1958: 70, pl.11, figs. 3, 4, text fig.3, Lamprell and Whitehead, 1992, pl.10, fig.57

Mimachlamys sanguinea, Linne 1758:698, No.167, pl. fig 4A, B; Dijkstra and Kilburn, 2001:305, figs.44-45


Pecten senatorius Lamarck, 1819: 174; G.B. Sowerby 2nd, 1842: 74, pl. 17, fig.151, pl.18, figs, 188-192. Paes da Franca, 1960: 90, pl.21, fig 1

Chlamys senatoria, Lamy, 1928: 166; 1935: 307; 1938:12; Cox, 1929:206; Viader, 1937: 62; Eames and Cox, 1956: 14,40; Barnard, 1964: 430; Spry, 1964: 15, pl.2, fig 71; Smythe, 1972: 495; Mastaller, 1979:141; 1987:210; Abbott and Dence, 1982: 309; Bosch and Bosch, 1982: 160; Sharabati, 1984: pl.44, fig. 8; Rombouts, 1991: 30, pl.11, figs 6, 6a; Oliver, 1992: 72, text figs. 17a-c, 18a-b; 74, pl.13, figs 1a-b; 1995: 230, fig 1003; Steyn and Lussi, 1998: 212, fig 61

Chlamys senatoria (sic), Boshoft, 1965: 135

Pecten testudineus Reeve, 1853: pl.34, fig.160

Chlamys testudineus (sic), Smith, 1910: 212

Pecten porphyreus – Philippi, 1845: 101: Martens, 1880: 314; Tillier & Bavay, 1905: 178; Melvill, 1909: 127; Pallary, 1926: 121, pl.13, fig.5

Chlamys porphyrea – Pallary; 1926: 121, pl.17, figs. 5. 1-4

Chlamys porphyreus – Tomlin, 1927: 300; Pallary, 1932: 317
Systematics

Phylum : Mollusca Cuvier, 1797
Class : Bivalvia Linnaeus, 1758
Subclass : Pteriomorpha Beurlen, 1994
Superorder : Eupteriomorpha Boss, 1982
Order : Ostreoida Ferussac, 1822
Suborder : Pectinina Waller, 1978
Super family : Pectinacea Rafinesque, 1815
Family : Pectinidae Rafinesque, 1815
Subfamily : Chlamydisae
Tribe : Mimachlamydisi
Genus : *Mimachlamys* Iredale, 1929
Species : *sanguinea* (Linne, 1758)
Description

The shells of *Mimachlamys sanguinea* are thick, equivalved and equilateral, polymorphic, reaching up to 67 mm in length and 67 mm in width. The left valve is slightly more convex than the right valve. Auricles are unequal in size having an umbonal angle of 85°. Both the valves have about 20-24 regularly arranged radial ridges. Hinge line is straight and byssal notch is deep. Ctenolium is well developed with 6 to 11 teeth. The colour of the shell is usually reddish brown with pale radial streaks and is mottled.

Material: Tuticorin (78°46' E; 8°45' N), Gulf of Mannar, Tamil Nadu, India

Distribution

*Mimachlamys sanguinea* is found in tropical Indo-West Pacific from Philippines to Australia, Papua New Guinea and the Solomon Islands to New Caledonia. It is also known from the Indian Ocean including the Red Sea (Dijkstra, 1997). They are found amongst coral rubble on the sandy bottom in the littoral sublittoral zone. They are usually found covered with sponges. In Gulf of Mannar, they are found in Mandapam and Tuticorin.

Current Taxonomic Position

Iredale (1929) introduced the genus *Mimachlamys* with the type species *P. asperrimus* Lamarck, 1819. Waller (1993) has placed
Mimachlamys under a new tribe Mimachlamydini of the subfamily Chlamydinae von Teppner, 1922. *Mimachlamys sanguinea* better known as *Chlamys senatoria* has attracted many synonyms. *Mimachlamys sanguinea* (Linnaeus, 1758) has been quoted as the current taxonomic combination for *Ostrea sanguinea*.

**Volachlamys tranquebaria (Gmelin, 1791)**

**Synonyms**


*Pecten tranquebaricus*, Reeve, Conch. Icon. VIII, 1853, Pecten, pl. iii, fig.14.


*Chlamys tranquebaria*, Gmelin, 1791, Indo- Pacific.

Systematics

Phylum : Mollusca Cuvier, 1797
Class : Bivalvia Linnaeus, 1758
Subclass : Pteriomorphia Beurlen, 1994
Superorder : Eupteriomorphia Boss, 1982
Order : Ostreoida Ferussac, 1822
Suborder : Pectinina Waller, 1978
Super family : Pectinacea Rafinesque, 1815
Family : Pectinidae Rafinesque, 1815
Genus : Volachlamys Iredale, 1939
Species : tranquebaria (Gmelin, 1791)

Description

*Volachlamys tranquebaria* shell is thick, reddish brown in colour, reaching a length upto 67 mm and width of 70 mm. The valves have a
characteristic V-shaped marking with their apices of ‘V’ pointing towards the umbo. The valves are equilateral, but their auricles are unequal. The anterior auricle is much longer than the posterior. The radial ribs (18-20) on the valves are highly developed and are separated by deeply excavated interstices. The ribs at the margins are finely serrated. The ctenolium comprises of six teeth.

Material: Tuticorin (78°46’E; 8°45’N), Gulf of Mannar, Tamil Nadu, India

**Distribution**

*Volachlamys tranquabarica* is found in the North and North Eastern Indian Oceans and it is by far the commonest species of scallop in Arabian Sea and Bay of Bengal collected on South Indian shores. In Gulf of Mannar, they are found in soft sediments of the littoral-sublittoral zones of Mandapam, Rameswaram, Koswari Island, Vellapatti, Pattanamputhur and Tuticorin Coastal waters.

**Current Taxonomic Position**

Satyamurthy (1952) has first recorded this species from Krusadai island of Gulf of Mannar and named it *Pecten tranquabaricus*. It resembles that of *Volachlamys tranquabarica* and is considered as the synonym. It also closely resembles *Volachlamys fultoni* Sowerby 3rd, 1904.
**Minnivola pyxidata** (Born, 1778)

**Synonyms**

*Ostrea pyxidata* Born, 1778: 93; 1780: 108, pl.6, figs. 5-6. Holotype: NHMW 1822

*Pecten pyxidata* Born, 1778; Indo-Pacific

*Pecten sulcatus* Lamarck, 1819

*Ostrea sulcata* Gmelin, 1791: 3325

*Pecten crebricostatus* Philippi, 1845: 100, pl.1, fig.2

*Minnivola isomers* Iredale, 1939

**Systematics**

Phylum : Mollusca Cuvier, 1797

Class : Bivalvia Linnaeus, 1758

Subclass : Pteriomorphia Beurlen, 1994

Superorder : Eupteriomorphia Boss, 1982
Order : Ostreoida Ferussac, 1822
Suborder : Pectinina Waller, 1978
Super family : Pectinacea Rafinesque, 1815
Family : Pectinidae Rafinesque, 1815
Genus : Minnivola Iredale, 1939
Species : pyxidata (Born, 1778)

Description

The shell of Minnivola pyxidata is typically scallop shaped i.e. the lower, right valve is bowl-shaped and the upper, left valve is flat, which fits within the borders of the right valve. The shell reaches to about 52 mm in length and 58 mm in width. The auricles of both the valves are straight edged. Both the valves have about 30 ridges on each valve. The ctenolium is formed of 5-6 pointed teeth. The hinge is straight and has a fibrous amphidetic ligament.

Material: Rameswaram (79°14'E; 9°14'N), Gulf of Mannar, Tamil Nadu, India

Distribution

It is found in the tropical Indo-West Pacific regions. In Gulf of Mannar, it is found (in littoral-sublittoral zone) living on soft sediments of sand and
mud of the littoral sublittoral zone. They are abundant in Rameswaram and Mandapam areas.

*Mimachlamys sanguinea, Volachlamys tranquebaria and Minnivola pyxidata*