

IX OTHER COMMERCIAL MOLLUSCS

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In addition to the molluscan species dealt with in the preceding chapters, there are several others which are also of commercial value but have not so far received much attention from biologists in our country. In this chapter an account is given of what is known about the identity, habits, biology, distribution and utilization of these shell-fish.

WINDOW-PANE OYSTERS

The window-pane oysters occur in good abundance in a few places on the Indian coasts. They are so called because of their thin translucent flat valves with iridescent lustre which are utilized as window-panes. The window-pane oysters come under the family Anomiidae included in the order Anisomyaria. Members of the family Anomiidae have thin, flat shells, the inner surface of which have iridescent lustre and the body is asymmetrical. Two species of window-pane oysters are represented on Indian coasts, *Anomia achaeus* Gray and *Placenta placenta* Linnaeus. *A. achaeus* is comparatively a rare species recorded from Madras harbour (Gravely, 1941) while *Placenta placenta* Linnaeus is a commercially important species. In *Anomia achaeus* the left valve is somewhat irregular and it completely covers the right, which is much thinner and closely adheres to the substratum. The right valve has a deep cleft in the young stage which closes in the adult, forming a perforation. Hornell (1909 a, b, c) has given a detailed account of the anatomy, distribution and utilization of *Placenta placenta*.

PLACENTA PLACENTA (Linnaeus)

SYNONYMS

Anomia placenta Linnaeus 1758
Placenta orbicularis Retzius 1788
Placuna placenta Lamarck 1819
Placuna placenta Reeve 1873
Placuna placenta Hornell 1909 a
Placenta placenta Gravely 1941
Placenta placenta Satyamurthi 1956
Placenta placenta Rao 1969

COMMON NAME

English — *Window-pane oyster*.

DESCRIPTION

SHELL

The shell of adult oyster is free, very much compressed, slightly inequivalve, sub-orbicular in shape, the height and length approximately equal.

The shell valves are slightly unequal, very flat, rounded and translucent. The inner surface of the valves is pearly. The adductor impression is at about the centre. The umbo is small. Two thin ridge like teeth diverge from the umbo making a characteristic inverted V shaped angle. The shell is fairly large with a diameter of 14 cm or even more. It bears numerous concentric lines of growth on the exterior consisting of slightly projecting lamellae the margins of which are minutely uneven with finger-like or spatulate processes. The shell of the adult window-pane oyster is white in colour (Fig. 19 A).

BODY

The body is very much laterally compressed (Fig. 19 B) and is covered by two folds of mantle. Anteriorly on either side of the visceral mass is a pair of elongated, narrow labial palps between which is the mouth. There is a pair of gills (gl.) on either side of the visceral mass. The foot (f.) is cylindrical, flattened laterally and attached to the anterior surface of the visceral mass and its tip has a deep cup-like sucker which facilitates dispersal of foreign matter settling on the body. The alimentary canal consists of a slit-like mouth, oesophagus, a large stomach surrounded by the digestive gland, a well-developed pyloric caecum with crystalline style, a short intestine and a rectum which ends by anus in the centre of a broad everted membranous collar. The vascular system consists of the heart with a ventricle (v.) and two auricles (au.), the right auricle being bigger than the left, a single aorta, the anterior aorta, arteries and venous sinuses. The nervous system consists of a pair of widely separated and asymmetric cerebral ganglia, a pedal ganglion formed by the fusion of paired, pedal ganglia and a single parieto-splanchnic ganglion, from which nerves lead to different parts of the body. The

Fig. 19. A. *Placenta placenta* (Linnaeus). B. *Placenta placenta* Anatomy with the left mantle and distal half of left gill having been removed. (after Hornell, 1909c). ad., adductor muscle; an.f., anal funnel; a.o., aorta; au., auricle; f., foot; gl., gills; mt., mantle; neph., nephridia; l.p., labial palps; int., intestine; v., ventricle. C. *Modiolus tulipa* (Lamarck). D. *Modiolus undulatus* (Dunker). E. *Cardita bicolor* Lamarck. F. *Cardium assimile* Reeve. G. *Cerithium trailli* Sowerby. H. *Cymbium melo* (Solander). I. *Umbonium vestiarium* (Linnaeus). J. *Conus amadis* Gmelin.

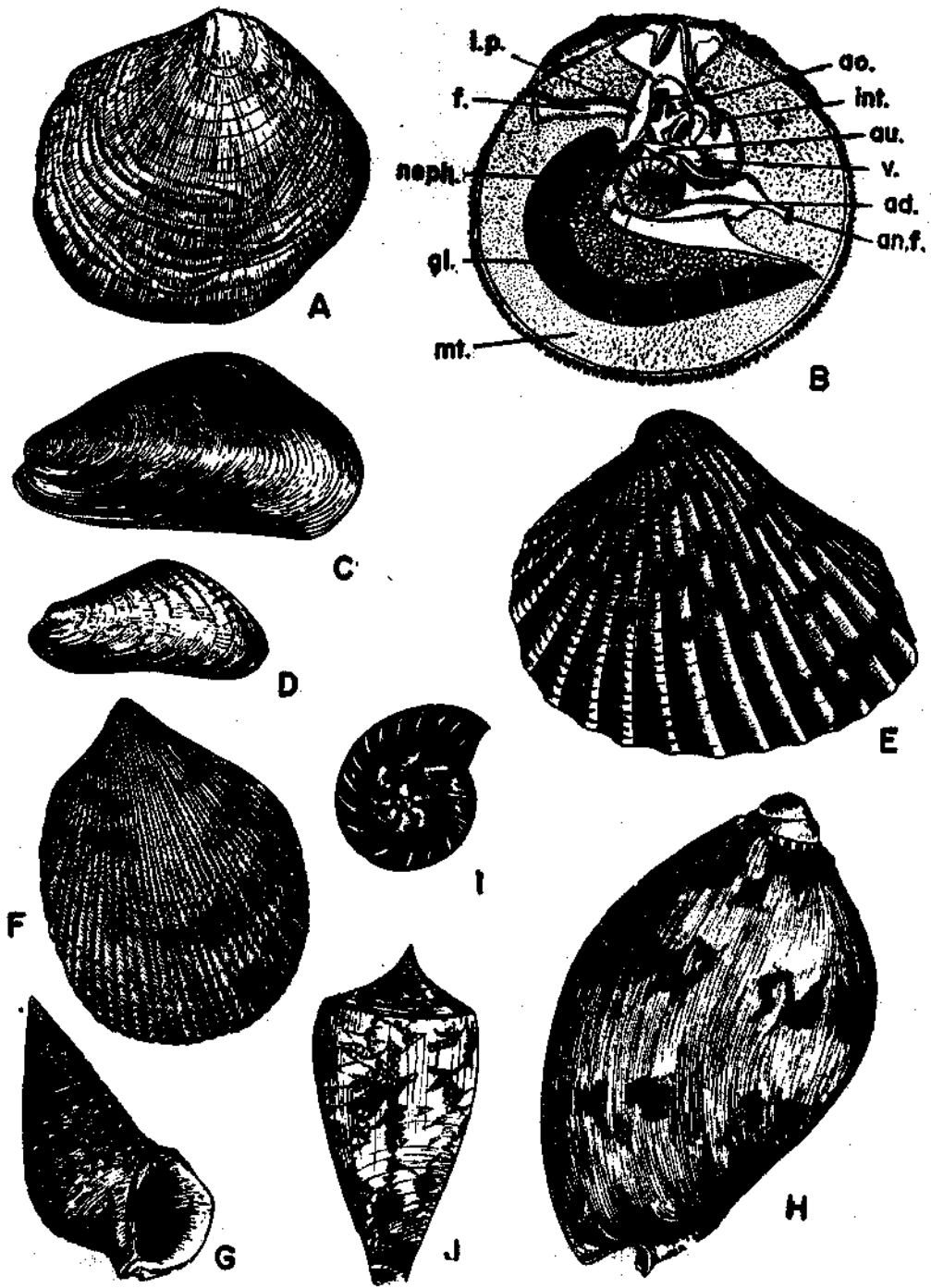


Fig. 19

excretory system is composed of a pair of asymmetric nephridia (neph.) which are connected dorsally by a short, transverse channel; the right nephridium has a long caecum posteriorly while the left one has only a short caecum. The nephridia open separately to the exterior at the ventral extremity of each renal tube near the parietosplanchnic ganglion. The gonad of the left side is suppressed and that on the right side is a highly irregular mass composed of a large lobe covering the stomach, digestive gland and coil of the intestine and a number of other lobes spread out in various directions in the right mantle. The gonad opens into the internephridial passage by a small aperture. Sexes are separate.

DISTRIBUTION

In the Indian sub-continent it occurs in the Gulf of Kutch in Balapur Bay and Harbour and Rann Bay in Okha district, Bombay harbour and its neighbourhood, Malabar coast, Tuticorin, Buckingham Canal, Pulicat Lake, Korangi Bay (Andhra Pradesh), Ennore (near Madras), Nagapatnam, Mandapam area Karachi Harbour and numerous creeks of Sind coast. Shells of dead oysters are washed ashore at Pamban, Kundugal point and Athankarai Estuary (near Mandapam). Outside India, in Ceylon the window pane oysters are found in Tampalakam Lake, Sambore River and backwaters, Nilaveli, Deft Island and Palk Bay; the species is also well represented in Indonesia, Philippines, Cochin China, Southern China and Mergui archipelago.

HABITS

The window-pane oysters inhabit muddy bottom of bays and creeks which are more or less land-locked. Usually the habitat is subjected to wide changes in salinity due to the opening of streams or rivers into them. The species can tolerate large variations in salinity. The oysters usually lie on their convex left valve. Observations made off Nagapatnam and Periapar off west coast of Ceylon (Hornell, 1909a) show that the species is capable of surviving at depths of six to seven fathoms.

REPRODUCTION

The reproductive cycles and breeding periodicity have not been studied. Hornell (1909b) has stated that the species appears to spawn at the onset of the north-east monsoon in October. He opines that the fall in the specific gravity of the water in October following rains acts as a stimulus for spawning to take place.

GROWTH

Growth also has not been studied. Hornell (*loc. cit.*) has observed young oysters 15 mm in diameter in Rann Bay in Okha district in January and considered that they are about three months old.

YOUNG OYSTERS

The shells of young oysters up to about one year age are almost transparent with the soft parts seen through the shells. When the oysters grow further the shells are thicker and usually become white and translucent. Some of the young oysters possess pale pink bands radiating from the hinge while the shells of a few are suffused with pale pink colouration. But most of the young oysters are colourless.

PARASITES AND PESTS

Larval cestodes and trematodes parasitize the window-pane oysters and lie encysted in the mantle edges. Fishes are infected when they attack the oysters and ingest fragments of the mantle with the parasites. The parasites become sexually mature in the vertebrate host. The polychaetes *Polydora* and *Eunice indica* have been recorded on the surface of window-pane oysters. The crab *Pinnotheres placunae* with a body highly compressed dorsoventrally is common in the mantle cavity of window-pane oysters in Okha and is a commensal of the oysters (Hornell and Southwell, 1909). *Pinnotheres placunae* has been recorded in window-pane oysters of Mandapam area also.

FISHERY

Although *Placenta placenta* is widely distributed on the Indian coasts only in Balapur Bay and Rann Bay in the Gulf of Kutch it occurs in large quantities from the low tide mark to one and half fathoms. The window-pane oysters are fished in the Gulf by skin-diving. High rentals were got for the window-pane oyster fisheries of the Gulf of Kutch about 1914 but in recent times the fishery has declined. Hornell (1909a) has made some suggestions for the conservation of the window-pane oysters of the area viz., 1. teaching boys of the area swimming and diving 2. keeping watch for large beds of mature oysters and then attempt to lease them to a contractor, 3. stipulating that oysters below 11.4 cm (4½ inches) in length should not be fished, 4. oysters below this size should be relaid with the convex side downwards in the fishing ground if captured, 5. the lease of the beds should be given for a term of three or five years rather than for one year since in the former case the lessee will have more interest in the prosperity of the fishery and overcome loss incurred in a bad season. Window-pane oysters are found on Jamnagar coast, Thana creek in Bombay, and Korangi Bay in Andhra Pradesh in appreciable numbers and are fished.

UTILIZATION

The thin, flat, iridescent shells of the window-pane oysters are used for glazing windows and doors. The shells are also used as decorative pieces in gardens (Rai, 1932). Pearls are formed by mature oysters. The pearls are not

of good quality as they are small and irregular in shape. They lack hardness and have poor lustre. They were used by Chinese in making medicinal preparations for diseases of eye and other ailments. In Ceylon the pearls are used in making a costly kind of slaked lime for applying on betel leaves for chewing. The meat of the window-pane oysters is not eaten in our country but is edible. When window-pane oyster shells are washed ashore in stray numbers they are used along with other molluscan shells in manufacturing lime. In Philippines extremely fine lamp shades and lamp stands are made out of this shell.

WEAVING MUSSELS: MODIOLUS SPP.

Many species of mussels belonging to the genus *Modiolus* occur in the Indian coasts, estuaries and brackish waters. The mussels are known as weaving mussels as they attach themselves to substratum by means of thin byssus threads. There is disagreement in regard to the identity of some of the species (*vide* Annandale and Kemp, 1916). *Modiolus tulipa*, *M. metcalfei*, *M. perfragilis*, *M. trailli*, *M. undulatus*, *M. striatulus* and *M. barbatus* are well-known species of the Indian region. *M. auriculatus* (Krauss) has been recorded from the Madras harbour by Gravely (1941). *M. tulipa*, *M. undulatus* and *M. striatulus* occur in good quantities in some areas and are of commercial value. *M. tulipa* could be used for food by man (Hornell, 1951). All the three species could be utilized as poultry feed and fertilizer.

MODIOLUS TULIPA (Lamarck)

Shell moderately thick, outer surface traversed by concentric striae, there is a prominent oblique keel running from the umbo to the posterior side, the lower margin of the shell is slightly concave in the middle, the outer surface of the shell is glossy and yellowish brown in colour, the portion below the keel is usually marked off from the rest of the surface as a broad conspicuous, radiately widening whitish band. On the inner surface of the shell the upper half is purplish and demarcated from the lower half which is bluish white by an oblique line passing from the umbo to the posterior lower corner of the shell (Fig 19 C).

The mussels grow to a size of 7 cm. in length and are abundant in Palk Bay forming dense beds (Hornell, 1951).

MODIOLUS UNDULATUS (Dunker)

Shell thin, semi-transparent, upper margin strongly elevated at or near the middle and is sometimes subangulate, lower margin of shell straight or slightly concave, one of the two valves is slightly more inflated in some specimens. There are transversely striated costae in front of and below the umbo. Similar costae are present on the posterior edge of some of the shells and also sometimes

along its whole length. Preston (1914) has recognized mussels with the last mentioned type of ornamentation as var. *crassicostata*. The shell is yellowish green in colour with zig-zag purple lines which run transversely and are frequently interrupted and there are finer straight radiating lines of the same colour. Lines of both kinds frequently disappear almost completely on the lower half of the shell and the longitudinal ones are sometimes well developed in the posterior half. In some rare cases the entire surface with the exception of the extreme margin is suffused with purple pigmentation (Fig. 19 D).

These mussels have been reported by Annandale and Kemp (1916) on *Potamegaton* algae or submerged structures like ropes of fishing traps. The present author recorded the species in abundance as epifauna on *Crassostrea madrasensis* in Athankarai estuary. The mussels have been found to grow very rapidly and attain a maximum size of 11.4 mm in the estuary. Hundreds of spat of the mussel settled and grew on tiles dropped in the estuary for catching oyster spat. The mussels are to some extent harmful to the oysters as they colonise almost every available piece of hard substratum to the disadvantage of oyster spat. It is possible to obtain large quantities of this weaving mussel for being used as poultry feed and fertilizer by laying cheap cultch like old tiles in large numbers in sites where good spatfall is known to take place. The writer found that dried meat of this mussel is readily eaten by domestic fowls, when fed along with wheat flour or cooked rice.

MODIOLUS STRIATULUS (Hanley)

After carefully studying shells of species recognised by previous workers Annandale and Kemp (1916) have included a number of nominal species viz., *M. jenkinsi* Preston, *M. cochitensis* Preston, *M. taprobanensis* Preston, *M. emarginata* Benson and *M. celator* Preston under *M. striatula*. This step is acceptable in view of the extreme variability of the shell characteristics of specimens from the same locality which show similarity to characteristics of specimens from other localities which have been recognized as different species.

Shell opaque, upper margin elevated and evenly arched, height of shell low, ventral margin concave or emarginate and in some it is almost straight, posterior margin rounded, radial ridges usually well developed. Colouration very variable. The colours are diffuse and dull, zigzag transverse purple lines and longitudinal striae may be detectable but the purple is not bright red and the ground colour is blue green. Fully developed shells are almost uniformly dull brown in colour. The species has been reported from Philippines, Gulf of Siam, Singapore, Ceylon, Burma and India. It is extremely abundant in Chilka Lake. It is represented also in the Gangetic delta, Calcutta docks, Bombay, Madras harbour and backwaters, Cochin backwaters and Pudumadam near Mandapam. At Pudumadam the species has been recorded by the present author, attached to rocks or branches of *Sargassum wightii* and is common in some seasons of the year.

MODIOLUS BARBATUS (Linnaeus)

Hornell (1951) states that *Modiolus barbatus* (Linn.) called *suran* by Tamil divers is very abundant in the Palk Bay and pearl banks of the Gulf of Mannar and several square miles of the sea bottom is covered with these bivalves. He says this mussel is a serious enemy of the pearl oyster as the two species have identical feeding habits and the rapidly multiplying *M. barbatus* has a blighting effect on the pearl oysters. Standen and Leicester (1909) have also recorded the mussel in the Palk Bay and Gulf of Mannar. The above authors have not given a description of this species.

In *Modiolus metcalfei* (Hanley) the shell is thin, anterior margin bluntly angular and rounded, dorsal margin angular in the middle, there is a keel running from umbo to posteroventral margin and the surface is covered with a fine brownish hairy periostracum. The shell of *M. perfragilis* (Dunker) is narrow, elongated and thin with anterior margin narrowed and obtusely angular and posterior margin broader and rounded. In *M. trailli* (Reeve) the shell is fairly thick, umbo almost terminal in position, anterior margin inclined, dorsal and ventral margins almost straight and the valves are markedly inflated posteriorly (Satyamurthi, 1956). The three species occur at Pamban and its neighbourhood.

MOLLUSCS USED IN MANUFACTURING LIME

The molluscan shells used in making lime in India are predominantly those of edible oysters (*C. madrasensis*, *C. gryphoides*, *C. cucullata* and *C. discoidea*) and clams especially *Meretrix* spp. Empty shells in large quantities are collected from the inshore areas at low tide and from the sub-fossil deposits lying below the ground surface which are several feet in thickness. There are rich sub-fossil molluscan shell deposits in the neighbourhood of Pulicat Lake, Surla in Orissa and Vembanad Lake in Kerala. On the Maharashtra coast huge amounts of oyster and clam shells are gathered in the southern creeks and backwaters and sent to Bombay after meeting local demand for conversion into lime. The lime is made by burning the shells in kilns constructed with brick and mortar or mud with bamboo supporting structures inside the walls. Molluscan shells of several species other than oysters and clams are suitable for preparing lime viz., *Mytilus* spp., *Cardita bicolor* (Fig. 19 E), *Cardium* spp. (Fig. 19 F), *Placenta placenta*, *Oliva* spp. (Fig. 20 G), *Cerithium* spp. (*C. trailli*, (Fig. 19 G); *C. clypeomorus*, *C. morus*), *Cerithidea fluviatilis*, *Conus* spp. (Fig. 19 J), *Murex* spp. etc. The lime is used for preparing mortar and for whitewashing buildings. Some quantities of molluscan shells are also used in the manufacture of cement.

MOLLUSCAN SHELLS OF VALUE AS CURIOS

Shells of a number of species of molluscs belonging to the classes Pelecypoda, Gastropoda and Cephalopoda are cleaned, polished and sold as curios.

In this respect the gastropod shells rank first fetching good prices. The Melon shell *Melo indica* and *Turbo marmoratus* are large, beautiful shells which are treasured as mantel pieces and table decoratives. The shell of adult *Cymbium melo* (Solander) (Family Volutidae) which grows to 20 cm in height is almost globular in shape and pale reddish brown blotched with darker spots in natural condition and handsome with lustrous orange red colour when polished (Fig. 19 H). The melon shells live at depths of five to six fathoms in muddy sand in Palk Bay (Hornell, 1951). An interesting feature of this gastropod is that the eggs are deposited in a large egg mass of the shape of pine-apple and the parent carries the egg mass till the young ones leave it. The melon shells are carved and polished and table lamps made with its bright shell as lamp shade. A large *Cymbium* shell costs as much as Rs. 6 or 8. *Turbo marmoratus* possesses a large thick shell which is iridescent (Fig. 4 D) when the periostracum is removed by keeping the shell in water containing a little Hydrochloric acid. This shell which is common and fished in large numbers in Andaman Islands costs Rs. 15.

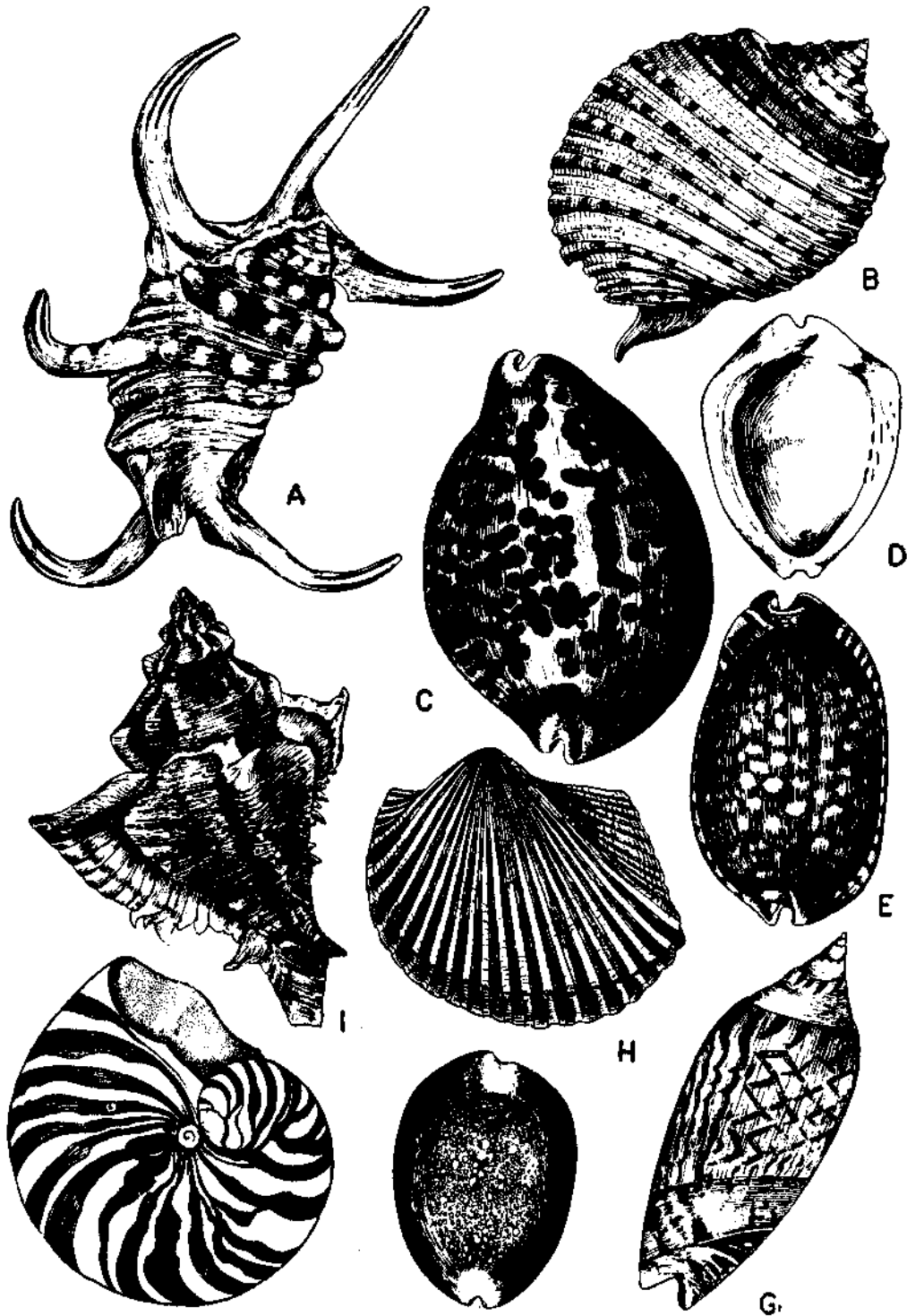
The five fingered chank *Lambis lambis* Linnaeus, the scorpion shell *Lambis chiragra* Linnaeus (Fig. 20 A), the sacred chank *Xancus pyrum* Linnaeus and the tun-shell *Tonna dolium* Linnaeus (Fig. 20 B) are other important large ornamental molluscs. *Lambis lambis* (Fig. 4 G) is found on east and west coasts and is very common in shallows in Palk Bay where there is good growth of algae. *Lambis chiragra* is common in the Laccadive Islands. The tun shells which have got their name due to their light, fragile shells (tun means light in Burmese) drift to the shore on the Indian coasts. They are also got in trawl catches in Mandapam area.

The cowries are shells of good commercial value. Several species of cowries are found on our coasts. The important species are the money cowry *Cypraea moneta* (Fig. 20 D), eye-cowry *C. ocellata*, black cowry *C. mauritiana*, tiger cowry *C. tigris* (Fig. 20 C), the Arabian cowry *C. arabica* (Fig. 20 E) and the serpents' head cowry *C. caput-serpentis* (Fig. 20 F).

The cowries inhabit rocky areas especially on and in the vicinity of coral reefs. They are common in Laccadive Islands. Many species are represented in the Gulf of Mannar and Bombay coast.

The money cowry *C. moneta* is common on reefs near Pamban. This cowry is purchased in dozens by people in India for dice-playing. The money cowries which were once employed in place of small money are used as ornaments in chains by tribal people and as an amulet (Hornell, 1951). The tiger-cowry *C. tigris* covered with large brown spots and the black cowry *C. mauritiana* with streaks and spots are beautiful, glossy shells that are used for interior decoration on tables and shelves.

Shells like olives (*Oliva gibbosa* and *O. nebulosa*), *Strombus canarium*, *Cerithium* spp., *Umbonium vestiarium*, (Fig. 19 I), *Arca* spp. (Fig. 20 H), *Cardita*



F
Fig. 20

bicolor, *Dentalium* spp. etc. are made into toys and dolls as figures of birds, human beings etc. by gluing the shells together. The figures so made are sometimes also painted. There is demand for such curios in cities, towns and coastal pilgrim centres.

Some utility articles are also made from some gastropod shells. By boring an opening at the top of the spire of the chank *Xancus*, baby milk feeders and blowing conches are made. Ash trays are made by mounting shells of *Xancus*, *Trochus niloticus* and *Murex virgineus* (Fig. 20 I) on wooden bases. Rings made out of shells of *Strombus canarium* are worn on fingers by some people in Tamil Nadu and in chains in Malabar and Kanara. Pearl buttons are manufactured from the thick and glossy mother-of-pearl of *Trochus niloticus* and *Turbo marmoratus*. The beautiful shells of *Nautilus pompilius* (Fig. 20 J) are thrown ashore on Indian coasts in the monsoon period. These shells are discoidal, coiled and divided by concave septa with a number of chambers. The inner part of the shell is pearly and the outer layer is porcellanous and pigmented with irregular, wavy, reddish brown bands on a whitish background. The shells which attain a size of 10–12.5 cm in diameter are ornamental molluscs.

At the present time decorative molluscan shells are fished and traded mainly by a small number of whole-sale agencies who sell them to the retail merchants. In the outer corridors of Sri Ramanatha Temple in Rameswaram there are a number of shops where beautiful ornamental molluscan shells and fancy articles like table-lamps, ash-trays and dolls made with shells are sold. Large quantities of shells of various species such as *Cypraea* spp., *Cassius rufus* etc. are also imported from Ceylon and Africa. There is good scope for the shell-craft industry to establish itself as a profitable industry if attempts are made to locate areas of abundance of different species, if fishing is done without causing large-scale destruction of stocks and last but not the least important if attempts are made to rear and culture some of the more common species.

Fig. 20. A. *Lambis chiragra* Linnaeus. B. *Tonna dollum* (Linnaeus). C. *Cypraea tigris* Linnaeus. D. *Cypraea moneta* Linnaeus. E. *Cypraea arabica* Linnaeus. F. *Cypraea caput-serpentis* Linnaeus. G. *Oliva nebulosa* Lamarck. H. *Arca inaequivalvis* Bruguiere. I. *Murex virgineus* (Roding). J. *Nautilus pompilius* Linnaeus.