IV EDIBLE GASTROPODS

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Marine gastropods form the largest group of species in the phylum Mollusca in shallow seas. Of these only a small number of species are suitable for being utilized as food by man. The univalves are fished in many parts of the world for bait, for their beautiful shells and manufacture of lime. Since the animals are passive, simple methods are used in collecting them.

The edible gastropods limpets, trochids, whelks, the sacred chank (*Xancus pyrum*), olives (*Oliva* spp.), the green snail (*Turbo*) etc. are represented in different regions of the Indian coasts in the intertidal zone and shallow waters. They are fished by fishermen and poor coastal people for food usually when fish are not available. In India the above mentioned edible gastropods are generally collected for their shells which are cleaned, polished and sold as ornamental articles. Gastropods are seldom sold in the markets for being used as food. The button-shell *Umbonium vestiarium* is the only species that finds a place in fish-stalls in Malwan in Maharashtra.

The habits, ecology and economics of the edible gastropods of Indian coasts have been dealt with by Hornell (1917, 1951). Rai (1932), Setna (1933), Rao (1939, 1941) and Rao (1958, 1969) have made contributions on the shell-fish and their fisheries in general and stressed the importance of the shell-fish in the economy of the fishermen. The descriptions of a number of commercial gastropods have been given by Satyamurthi (1952). Rao (1969) has pointed out the non-availability of statistics of molluscan shell-fish production and recommended the survey of molluscan resources, estimation of annual production, studies on the biology of commercially important species and governenmtal control over shell-fish resources.

The following account deals with the eleven important species of edible prosobranch gastropods of Indian coasts belonging to eight genera and seven families. The salient features of the gastropods, their habits and habitats, information available on the life-history and biology of the species, utility and food value are briefly mentioned.

Class	GASTROPODA
Subclass	PROSOBRANCHIA
Order	Archaeogastropoda
Family	Patellidae

CELLANA RADIATA (Born)

COMMON NAME

English – *Limpet*

Tamil – *Unai*

The shell is conical or cup-shaped and the apex is placed more or less in the middle. The inner surface has a pearly lustre; the outer surface is light or dull brown with whitish rays (Fig. 4 A).

The limpets inhabit the intertidal zone, adhering to rocks and feed on the minute algae present on them. They are mainly eaten by the poorer classes of people at Covelong, Tamil Nadu (Hornell, 1917).

DISTRIBUTION IN INDIA

Gulf of Kutch, Cochin, Madras, Mahabalipuram, Gulf of Mannar and Palk Bay.

FAMILY Trochidae

TROCHUS NILOTICUS Linnaeus

The shell is conical or pagoda-like, white with many reddish-brown longitudinal bands (Fig. 4 B). The mother-of-pearl underlines the shell surface. The shell attains a size of 8 cm to 12 cm and the period of longevity is about ten years. The sexes are separate and cannot be determined externally. The mature gonads are creamy white in males and green in females. Sexual maturity is reached when the animals are between 6 cm and 7 cm in diameter. This is a continuous breeder and intensive breeding activity is noticed during the warmer months.

The food of the species includes brown and green algae. Sharks and rays are the common predators of this large trochid. Boring bivalves (*Lithophaga* spp.) and some gastropods (*Saptadanta nasika* and *Patella*) have been observed to bore into the periostracal and nacreous layers of the shell and damage it (Rao 1936, 1937).

In India *Trochus niloticus* is found in the Andaman Nicobar group of islands. Fishing of the species can be done in the islands only on obtaining licence from the government. The shells are obtained by diving to depths of one to three fathoms. The divers reach the shell beds by means of a kind of dinghy called *sampan*. The flesh of the animal is removed by a sharp pointed instrument resembling a gimlet bent at the end. The anterior portion of the animal mainly

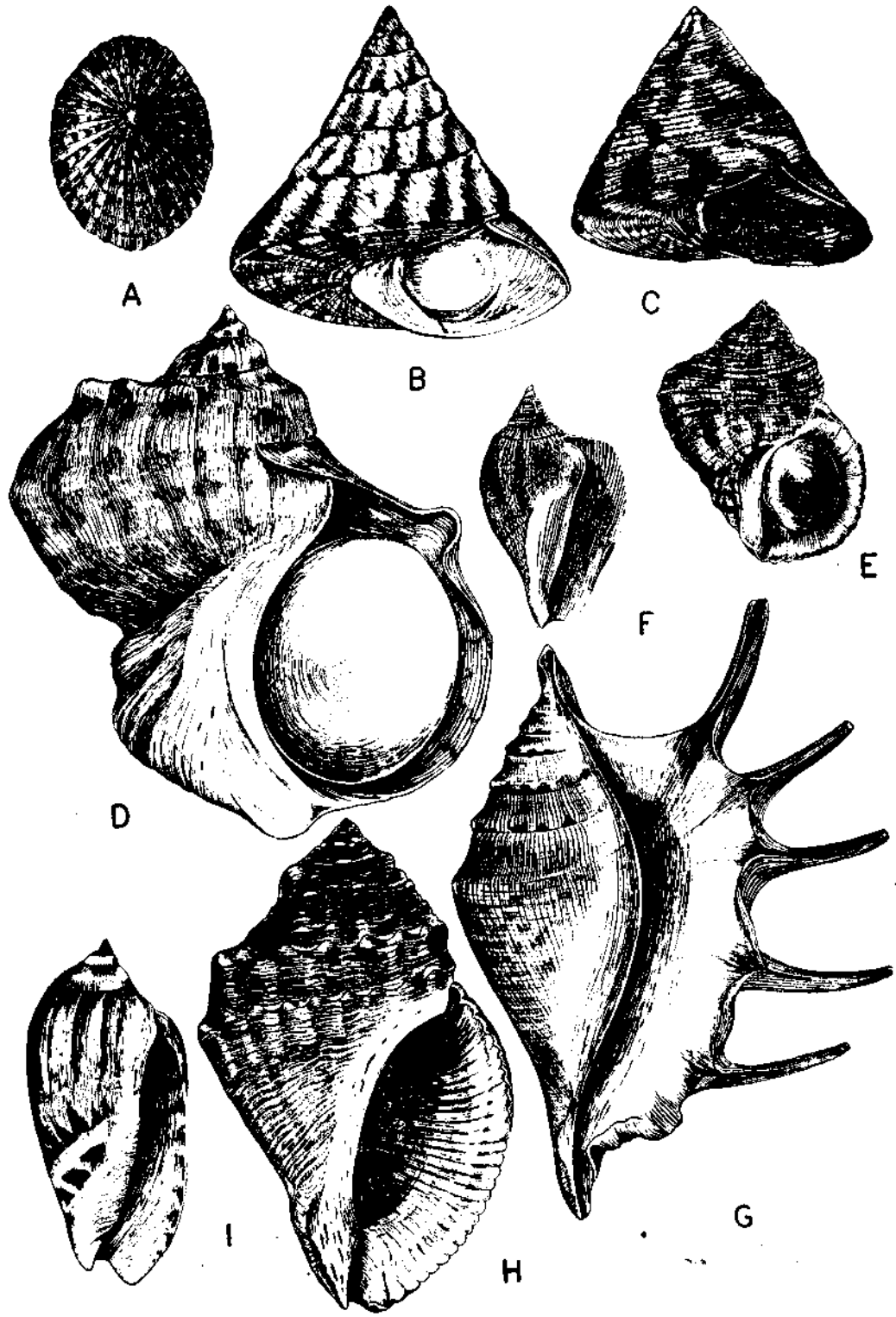

Fig. 4

the foot is boiled, salted and dried for local consumption and export. The shells are used for making buttons and art objects (Rao, 1939, 1941; Setna, 1933; Mukundan, 1968).

DISTRIBUTION

Ceylon, Mergui, Andaman and Nicobar Islands to Samoa, Queensland, Western Australia, New Caledonia, Philippines, Fiji to Japan.

TROCHUS RADIATUS Gmelin

The shell is conical with regular rows of spiral tubercles. The columella is devoid of denticulation. The shell is whitish and marked with transparent reddish bands (Fig. 4 C).

DISTRIBUTION IN INDIA

Gulf of Kutch, Bombay, Gulf of Mannar, Palk Bay, Laccadives and Andamans.

UMBONIUM VESTIARIUM (Linnaeus)

The shell is small and button-like, with highly polished surface, the spire is depressed; the body whorl is broad and flattened and the umbilical callosity large and thick. The general colouration and pattern of colour design of this beautiful button-shell presents a wide range of variation from pale brown or greenish or reddish brown with transpiral wavy lines to white and light pink with spiral bands or fine dark spots (Fig. 19 I).

These univalves are capable of burrowing rapidly in sand with the help of their slender, pointed foot. Hundreds of them can be collected if the sand in the littoral region is dug up.

Large quantities of *Umbonium* are sold at Malwan in Maharashtra in the months of March, April and May. The shellfish are boiled in fresh water and the meat is extracted with the help of a needle and used in curry or soup (Rai, 1932).

DISTRIBUTION IN INDIA

Gujarat, Maharashtra, Goa Gulf of Mannar and Palk Bay.

Fig. 4. A. *Cellana radiata* (Born). B. *Trochus niloticus* Linnaeus. C. *Trochus radiatus* Gmelin. D. *Turbo marmoratus* Linnaeus. E. *Turbo intercostalis* Menke. F. *Strombus canarium* Linnaeus. G. *Lambis lambis* (Linnaeus). H. *Thais rudolphi* (Lamarck). I. *Oliva gibbosa* (Born).

Family Turbinidae

TURBO MARMORATUS Linnaeus

The giant member of the family commonly called 'green snail', has a thick and massive shell with a wide aperture. The outer surface is dark and mottled with brown and white. The pearly lustre of the shell is clearly visible when the animal and the outer coating are removed. The large and solid operculum protects the animal from predators (Fig. 4 D).

The species is found in the shallow to deeper waters of Andaman and Nicobar Islands and regularly fished from there along with *Trochus niloticus*. The fishery is controlled by the government as in the case of *Trochus*. The animal provides an important food item. The thick and heavy operculum which closes the aperture firmly, is a hindrance to the extraction of the flesh by using same instrument that is used in the extraction of the flesh of *Trochus*. So the animals are kept exposed on the deck of the motor boat for a considerable time and when the animals creep out of the shells they are removed. The foot and the snout of the animal are cut into small pieces, boiled and dried for consumption (Setna 1933; Rao 1939).

TURBO INTERCOSTALIS Menke

The shell is turban-shaped and thick, and has well-developed spire. The spiral ridges are transpirally grooved. The colour is greenish brown with well-marked yellowish patches (Fig. 4 E).

The species feeds on brown and green argae growing on the rocks or other substratum in the shallow waters. The sexes are separate. From external appearance the sexes cannot be distinguished. This snail is distributed on rocky coastal areas. The island women of Pamban collect these shells during the spring tides from the coral reefs nearby and boil the shellfish to remove the flesh. The flesh extracted in this manner is used in making curry and soup. The flesh of *Turbo* is rich in calcium and iron and compares favourably with that of true fish (Chari and Unny, 1947). The opercula are sold as curios.

DISTRIBUTION IN INDIA

Gulf of Kutch, Gulf of Mannar, Palk Bay, Waltair, Laccadive and Andaman Islands.

Family Strombidae

STROMBUS CANARIUM Linnaeus

The shell is very much calloused with polished columella and wing-shaped outer lip. Irregular pattern of wavy light brownish lines are present on the

whitish shell. The aperture is glossy (Fig. 4 F). The animal has a strong, muscular foot and at the hind end a claw-like operculum is present. The members of the genus *Strombus* are dioecious and the males possess a long, open, grooved and 'prong-like' penis.

This species like the other members of the family inhabits the sandy and muddy areas in shallow waters and browses on algae. They are very common from the low-tide mark to a depth of six to seven metres.

The poorer classes of people of Ramanathapuram district, Tamil Nadu collect these shells along with other molluscs and cook their flesh (Hornell, 1917).

DISTRIBUTION

Southern India to Australia and Melanesia, and in the north to Japan.

LAMBIS LAMBIS (Linnaeus)

COMMON NAMES

English – *Five-fingered chank*

Tamil – *Aiviral sangu*

The shell is large and heavy and the outer lip is prolonged into digitate processes (Fig. 4 G) which are not conspicuous in the younger forms. The siphonal canal is long and slightly turned to the left side. The columella and the interior of the aperture are smooth and shiny. Aperture is of cream or light rose colour with yellowish tinge. The operculum is long, brown and transparent.

The five fingered chank is found on both the coasts of India but they are abundant in the coastal waters of the southeastern region. The *kadayan* and Muhammedan *bech-de-mer* divers collect these shells from the shallows of Palk Bay between Pamban and Tondi. The shell is broken and the flesh extracted and used in curries. The shells are used as sinkers, as traps for capturing *Octopus* and in the manufacture of fancy articles.

DISTRIBUTION

East Africa to Micronesia and eastern Melanesia

Family Muricidae

THAIS RUDOLPHI (Lamarck)

The shell is thick and spindle-shaped, dark blackish brown in colour and devoid of tubercles. The spire is short and the body whorl is wide with large

aperture. Widely spaced spiral ridges and alternating black and yellowish white patches are distinct. The operculum is horny and oval in shape (Fig. 4 H).

THAIS BUFO (Lamarck)

This species can be distinguished from the above one by the nature of short spire and the inflated body-whorl. The body-whorl is characterised by widely set tubercles and non-tuberculated and raised spiral ridges. The aperture of the outer lip is thick. The shell is light brownish yellow.

DISTRIBUTION IN INDIA

Gujarat, Maharashtra, Tamil Nadu.

Thais rudolphi and *T. bufo* are found on rocks or inner surfaces of boulders between tide marks. These rock whelks feed on barnacles and other molluscs, boring through their shells (Hornell, 1951). The breeding period of *Thais bufo* is from January to June. The egg clusters yellow or violet in colour, are found attached on the under-surfaces of boulders or rocks. The egg capsules are like cylindrical tubes with a long stalk and an opening at the top. The sexes in this species are separate; the female is slightly bigger than the male (Chari, 1950). The rock-whelks known as *parattai* in Tamil are eaten by the coastal people of Ramanathapuram and Tirunelveli Districts of Tamil Nadu. On the Bombay and Konkan coasts these species are collected along with other shellfish and the meat is extracted after boiling and cooked (Rai, 1932).

Family Olividae

OLIVA GIBBOSA (Born)

The shell is smooth and shiny with beautiful colour pattern on the outer surface. The spire is very short and the columella is thickened (Fig. 4 I). The mantle lobes meet over the back of the shell and protect the shell from erosive action. The shell is oblong and stout and has a long and narrow aperture. Operculum is absent. The animal is provided with a very large and broad foot with which it ploughs its way through loose muddy sand. The shells can be collected by tracing the long and irregular trail they leave behind while moving and also by the siphon and tentacles which protrude out of the sand.

The handsome olive is represented in the sandy areas in the intertidal and sub-tidal zone on the east coast of India. They can be collected in good numbers between February and April. On the Coromandal coast the olives called *kovanji* in Tamil are collected by *pattanawar* (fishermen caste) women and children during February and April. The flesh is extracted after boiling the animal in fresh water. The meat is consumed by making curry or frying in oil (Hornell, 1951).

Family Vasidae

XANCUS PYRUM (Linnaeus)

COMMON NAMES

English – *Sacred chank*
Tamil – *Sangu; Palsangu*
Telugu – *Sankham*
Hindi – *Sankh*

The shell is large, thick, pear-shaped and covered with a brownish horny periostracum. The spire is high and apex pointed. The whorls have slightly angulated shoulders; the one on the body whorl is distinct. The shoulder ridges bear a series of small, compressed tubercles. The columella is thickened with callus and bears four transverse folds. The anterior canal is wide open. When the periostracum is removed the shell is ivory white (Pl. III A).

DISTRIBUTION IN INDIAN REGION

Gulf of Kutch, Kerala, Gulf of Mannar, Palk Bay, and up to mouth of Godavari, Andamans, Ceylon.

Male chanks attain sexual maturity when they are 57 mm to 60 mm in diameter. The female is usually larger than the males. Fertilization is internal and the fertilized ova are deposited in a spirally twisted chitinous capsule known as 'ram's horn' (Hornell, 1914). Each egg capsule contains 28 to 36 eggs within it. The young ones are characterized by a spirally coiled shell and well-developed velum and foot (Natarajan, 1957). A free-swimming larval stage is absent. The young, about one cm in length, eat out portions of the chambers of the soft and pliable capsule and force their way out.

The sacred chank usually inhabits fine or soft sandy areas or *poochi manal* (Tamil) richly infested with polychaete worms which constitute their main food item. They are fished from the Gulf of Mannar and Palk Bay and the industry is controlled by the government.

The *parawa* chank divers of Tuticorin have started using the flesh of this gastropod as a food item in large quantities since the famine of 1877. Now it has become a common food item of the people living in Tirunelveli and Ramanathapuram districts of Tamil Nadu where there are important chank fisheries. On Tuticorin coast the chank grounds are 8–12 miles from shore, where the depth is 7–12 fathoms. Fishing is done by skin diving between November and May when the water is clear (Nagappan Nayar and Mahadevan, 1967). The chank divers remove the foot and the head region from the shell with the help of an iron skewer. The muscular tissue commonly called *sangu sathai* in Tamil thus

extracted is boiled in water with a small amount of salt, cooled, cut into slices and sun-dried for two or three days. The chank flesh chips are stored in air-tight containers for use later. The chips are consumed by frying in oil and are considered a delicacy by the fishermen. The *pattanawars* of Pulicat fishing village fish the chank with *thuri valai* and eat the flesh after boiling. Chank flesh chips are rich in protein and minerals (Venkataraman and Chari, 1953) and can be used as a substitute for fish.

While in India the value of the edible gastropods as food is not realized by most people, in other countries the edible gastropods are very much relished. Snails and olives have been special items of dinner even at the time of Pliny the the younger (Cook, 1895). The periwinkles (*Littorina*) that are abundant between tide marks are gathered in large quantities in United Kingdom, United States of America and Ireland and eaten after boiling (Russel and Yonge, 1963). The abalones which are said to have delicate flavour are caught in large quantities annually in Mexico (6,900 tonnes in 1969), United States of America (1,600 tonnes) and Japan (6,500 tonnes) and in lesser quantities in Canada, South Africa, Taiwan, Korea and Australia (F. A. O., 1970a). The edible whelks (*Buccinum* spp., *Busycon*), trochids and strombids are captured in large quantities in Japan (8,500 tonnes), Chile (3,600 tonnes), U. K. (2,100 tonnes), Korea (2,600 tonnes) and Malaysia (500 tonnes). Whelk steaks are prepared by slicing the foot and body into pieces 1 cm thick and pounded between two pieces of cheese cloth with a hammer. The steaks are seasoned with black pepper and salt, rolled in flour, fried and served hot in the Bahamas and other islands of the West Indies (Zinn, 1970). The flesh of some species of univalves such as *Lambis* is said to have narcotic effect (Abbott, 1961).

The extent of edible gastopod resources belonging to different genera in the various parts of the country's coasts should be determined and steps taken to protect the resources from indiscriminate removal. There is need for information on the optium level of fishing that could be allowed. Investigations should be conducted to study the biology of the chank *Xancus pyrum* and to find out the possibility of increasing its production by the discovery of new grounds of occurrence.