

### 3. TOXIC MARINE INVERTEBRATES — VENOMOUS AND NOXIOUS FISHES OF FRESH WATER

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TOXIC MARINE ANIMALS — Research on toxic marine animals has been done in Brazil by Faria (1914, p. 29) on PROTOZOA. *Pteridinium tochoideum*, which is associated with mass mortality of marine organisms, and *Prorocentrum* sp. were described. As it is well known, the first one is very common on the Brazilian coasts, but their appearance in mass is, fortunately, not very frequent. In the sound of São Sebastião, where the laboratory of the Marine Institute of Biology is located, the red tide has been observed in 10 years only once.

MARINE INVERTEBRATES — PORIFERA — De Laubenfels (1932, p. 85) says that *Tedania toxicalis* is toxic and its toxicity is one of its striking characters. The spicules are long and provoke a very strong irritation on the hands. Even other animals are sensitive to those spicules. According to De Laubenfels (l.c.) if a specimen of this sponge be placed in a bucket with other living sea animals, as for example, fish, molluscs, crabs, and worms, in an hour or less they are observed to die, while in controls lacking the sponge they survive.

It seems that not all species are sensitive to the toxin because the sponges live in very dense community with other animals, chiefly, Echinoderms (Ophiuroids), small crustaceans (Amphipods, Polychaetes), etc.

The zonation of these animals is very interesting. Their habitat is restricted to the middle and inferior littoral.

In the same place, on the beach of the São Sebastião sound, there are a number of Coelenterates. For example, *Palythoa* sp. are very common. The abundant mucus secreted by these animals, injected into the vascular system of some mammals, such as the Rat, seems to be toxic. The mechanism of secretion of this mucus, and the toxicity is unknown. Some experiments have been run at the laboratory of the Institute of Marine Biology at São Sebastião, 230 km to the north of São Paulo, and we expect to confirm or not its toxicity.

ECHINODERMS — It is known that several Echinoids are venomous. In the Institute of Marine Biology, Mendes, Abbud and Umiji (1963, p. 408) have studied a substance produced by the pedicellariae of the Sea Urchin *Lytechinus variegatus*. It has an acetylcholine-like behavior, according to the results obtained on the responses of the guinea pig ileum, rat uterus, blood pressure in the dog, heart-beating of toad, longitudinal muscle of holothurian, and the protractor muscle of the sea urchin lantern.



The famous venomous sea-urchin gen. *Diadema* does not occur on the Brazilian coast. The Sea Urchins common here are *Lytechinus variegatus*, *Echinometra lucunter* and *Arbacia lixula*. *Echinometra lucunter* is the most common sea-urchin on the Brazilian seashores. The spines are straight and pointed. It is not known if the spines of *Echinometra* have the so-called poison glands. They are borne in a tubercle of the thecal plate. When the spines of *Echinometra* perforate the skin the wound is painful, and sometimes an inflammation occurs.

*Diadema* has been captured in the bay of Acapulco, Mexico. Some spines can exceed 50 cm in length, and injure the skin when touched. I know this by my own experience when I visited the Acapulco bay. Russell (1965, p. 285) says: "There does not appear to be any biochemical or toxicological evidence, at the present time, to indicate that these structures do indeed contain a poison". All I know is that when the spines are touched the skin shows an irritation and is painful.

*Holothurians* — On the Brazilian sea-shore *Holothuria grisea* is very common. They have some toxin in the Cuvierian tubules. Some investigators think that the toxin secreted by the Cuvierian tubules is related to the fact of evisceration, shown by this animal, when out of water, or when exposed to excessive changes of temperature, pH and oxygen tension. Nigrelli (1952, p. 89) named the substance of the Bahamian sea cucumber, *Actinopyra agassizi*, as holothurin. It is composed of 60% glycosides and 30% pigment salts, polypeptides and free aminoacids, 5 to 10% insoluble protein and 1% cholesterol. Holothurin has deleterious effects on *Hydra*, *Planorbis*, and *Tubifex*.

**WORMS** — Among the Polychaetes several species are toxic. On the Brazilian coasts the AMPHINOMIDAE are very frequent. Hartmann (1951, p. 21) indicates that the common name, "fire-worm" alludes to the stinging sensation caused from handling specimens. The injury is mechanical, resulting from the penetration into the skin of numerous, fine, glass-like, harpoon-shaped setae that are difficult to remove. Inflammation and considerable discomfort result, but there is no permanent injury.

I have observed these worms under the stones in the intertidal zone, and the collectors must be careful, because they can irritate the hands. Several cases, that I observed indicate that the sensitiveness of people is different in degree, probably related to some allergic reaction.

The same Polychaetes (AMPHINOMIDAE) were considered long time ago as venomous, according to Baird (1864, p. 450) who says: "The specimens of this worm *Amphinome didymobranchiata* came from the Island of Ascención where they are collected by the boatmen and sold as curiosities. They pretend that they are of venomous nature, and are able to inflict serious wound upon those who incautiously handle them. This idea no doubt takes its origin from numerous setae with which their feet are clothed, but which (to judge from their appearance...) in reality powerful weapons for offense and defense against these animals which prey upon or are fitted for food for them are in fact powerless for harm to human beings". Arndt (1930, p. 292) refers to noxious Polychaetes such as *Hermodice corunculata*, which is very toxic.

According to Russell (1964, p. 480) the composition of the venoms of marine animals varies considerable. Among the Coelenterates there are the following composition: several quaternary ammonium compounds, the most toxic of which



being the tetramethylammonium hydroxide our "tetramine", 5-hydroxytryptamine, histamine and histamine releasers, several proteins whose composition has not yet been determined.

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VENOMOUS AND NOXIOUS FRESHWATER FISHES — South American freshwaters are populated by several species of venomous fishes.

The so-called black rays or *Arraia arara* and *Arraia pintada* (*Trygon strongylopterus*, *Potamotrygon brachyurus* or *Parotrygon motoro*), are small rays, found in the rivers Amazon and Paraguai. One or two stings are located in the tail. They are known also by the common name of stingray. The sting is bilaterally serrated. The venom and also the venom apparatus of Brazilian stingray have not been studied. Russell (l.c., p. 339) describe the marine stingray, *Urolophus halleri*, and says that the venom is known to exert a deleterious effect on the mammalian cardiovascular system. It causes bradycardia and increase the PR interval of the ECG.

Observations of some cases of attacks by the *Parotrygon* from the Araguaia river, in the north of Brazil, indicates that the sting delivers a large quantity of mucus, and the venomous substances probably exist in it.

Another venomous fish is *Potamotrygon brachyurus* from Guyana, Venezuela and the Amazon region. Some information on the biology of this ray has been quoted by Dr. Hermann von Ihering. The fishermen say that this fish when attacked keep the fry in the vagina.

SILURIDAE — In Brazilian rivers several fishes of this family are very common. Most of them have the first ray of the pectoral and dorsal fins serrated. When caught they attack the men with this serrated ray. In the beginning the wound provokes only a strong pain, but afterwards as a result of the mucus left inside the skin, inflammation occurs, followed by headache and in some cases vomiting. It has not been demonstrated up to now if this serrated fin ray is venomous or not in spite of the information from Lagler, Bardach and Miller (1962, p. 132) who indicate that catfishes (*Clarias* and others) possess spines of dorsal and pectoral fins with glands beneath the skin, opening through pores at bases of spines.

The same authors (l.c., p. 184) inform that in the North American freshwater catfishes (ICTALURIDAE), the sharp, hardened ray of the leading edge of the pectoral fin has a locking structure, which enables the catfish to erect and hold it erect, presumably as an instrument of combat. In the madtson (*Noturus*) this spinous ray has a special gland at its base. The secretion of the gland, injected by the spine, has a stinging, paralyzing effect on man.

In this family several fishes are edible and the fishermen cut out the first ray of the pectoral and dorsal fins to maintain the fishes in the hand. In the creeks and rivers of the outskirts of São Paulo, fishes of the family PIMELODIDAE (*Pimelodus* sp., and *Clarias* sp.) and others can be easily found. When caught the fish spread out the rays of the dorsal and pectoral fins for defense. If the fisherman is wounded by the serrated first ray and inflammation usually follows.

Russell (1965, p. 480) informs that fish venoms are composed of 3 to 10 proteins and have little or no enzymatic activity.

Other fishes — The famous piranha (sub fam. SERRASALMONINAE) from tropical waters can be here included. These fishes usually damage cattle, other



fishes and men. The fishermen say that the piranhas smell blood, and by this attack the victim. Cannibalism also occurs.

Another curious fish noxious to man is the so-called Candiru (*Vandellia cirrhosa* or *Hemicetopsis candiru*). People say that this small fish of 3-5 cm in length penetrates the urethra of man and the vagina of woman when they are taking a bath. When the fish penetrates the urethra there is an copious bleeding. Eingenmann and Allen (1942, p. 142) give a long report on the "candiru" and say (p. 146-147) that "there is little clear-cut evidence by which we can definitely sort out cases of urinotropism from parasitism".

Santos (1962, p. 114) also describes this curious fish, but by the figure and the size of the animal it does not seem probable that it can enter into a man's urethra.

Within the TETRAODONTIDAE there is a species, *Colomesus psittacus*, named "baiacu" or "mamaiacu", which similar to its relative from the sea water, is believed to be venomous (Couto Magalhães 1931, p. 95). It lives in the rivers of the North of Brazil. The flesh is edible but the liver is very toxic. The fish is small (18 cm in length) and usually can be kept in aquarium as an ornamental fish.

The South American electrical — *Electrophorus electricus* — could be listed here. This fish is neither toxic nor venomous, but is noxious to the human being and other animals.

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