

Status of Shellfish Toxicity and Related Problems in Malaysia

Alexander A. Jothy

*Fisheries Research Institute,
Fisheries Division of the Ministry of Agriculture,
Penang, Malaysia*

Introduction

The major species of molluscan shellfish exploited in the coastal waters of Malaysia include bivalves such as the cockle (*Anadara granosa*), mussel (*Perna¹ viridis*), and oysters (*Saccostrea² belcheri*, *S. cucullata*, *Ostrea folium*), and gastropods as such as *Cerithedia obtusa*. There are, of course, a host of other species of bivalves exploited at subsistence levels.

In 1982, the entire coastal zone of Malaysia yielded about 57000 metric tons of shellfish (Anonymous, in press). Cockles formed the bulk (86%) of this yield. They are reared in culture beds in the Straits of Malacca mainly in the mud flats off the states of Perak, Penang, and Selangor. Currently, much importance has been accorded to the expansion of the cockle industry, in view of the great potential shown by this bivalve for large-scale production in the inshore coastal waters.

Shellfish form less than 10% of the gross marine fishery production in Malaysia; nevertheless, they are consumed widely in the country, particularly by the coastal population.

Shellfish Toxicity

The frequency of occurrence of shellfish toxicity in Malaysia has not been established. However, there are records of isolated cases of what is known as paralytic shellfish poisoning (PSP) and some cases of viral gastroenteritis, i.e., if the latter can be considered in the context of shellfish toxicity. This

does not exclude the probable occurrence of numerous other cases of shellfish poisoning in the past, cases that were either not related to shellfish toxicity in terms of a medical diagnosis, or those that did not seek appropriate medical care and hence were unknown.

The first reported case of PSP in Malaysia was that which occurred in the state of Sabah between January and April 1976, following an outbreak of "red tide" in the coastal waters of the state (Roy 1977). Of a total of 202 cases of food poisoning, seven (all children ranging in age from 4-11) died. The species of shellfish consumed was not established; however, the red-tide organism was identified by the Marine Research Laboratory in St. Petersburg, Florida, as *Pyrodinium bahamense* var. *compressa* Böhm, a dinoflagellate that is known to carry biotoxins that can accumulate in shellfish (Jothy 1982).

A second outbreak of "red tide" was recorded in Sabah from April to June 1980, causing two deaths from PSP (Maclean, this volume).

Paralytic shellfish poisoning struck the state of Sabah again from November 1983 to March 1984. Of the 25 persons known to have consumed shellfish, locally called "kalasiu" (*Oliva* spp.),⁵ (all children ranging in age from 3-9) succumbed to the poisoning. Normally, the shellfish concerned is reported to be found buried in 1.0-1.5 cm of sand in the intertidal zone of the beach. There were no indications of a red-tide phenomenon during this period.

Red Tide

The phenomenon of red tide has, for a long time, been known to occur in subtropical waters,

¹*Perna* = *Mytilus*.

²*Saccostrea* = *Crassostrea*.

particularly in Florida and Japan, during the summer months. This phenomenon has, in recent years, shown up in the warmer tropical seas of Papua New Guinea in 1972 (Maclean 1973), in Brunei (Beales 1976) and Malaysia since 1976, and in the Philippines in 1983 (Hermes and Viloso, in press).

Red tides in Malaysia have been observed in the coastal waters of Sabah and Penang and in the Straits of Johor. The causative organism in all cases was a dinoflagellate. In the case of Sabah, it was identified as *Pyrodinium bahamense* var. *compressa* Böhm, a toxin-bearing dinoflagellate, whereas that recorded in Penang and the Johor Straits was *Noctiluca miliaris* Suriray, which has not been known to carry any toxins.

The Penang and Johor phenomena were observed to be triggered by a period of heavy rainfall, which may have caused nutrient enrichment in the surrounding coastal waters, possibly emanating from terrestrial runoff. Fishermen have reported reduced catches during such phenomena and this may be due to oxygen deficiency in the water, which may have driven the fish to safer grounds. Unlike the Sabah phenomena, there have, thus far, been no cases of shellfish toxicity in the Penang and Johor phenomena.

Research

There has been very little research in Malaysia in the field of shellfish toxicity. Research has been confined to mouse bioassays, carried out by the Sabah Fisheries Department on a routine basis, and by the Sabah Medical and Health Services on an ad hoc basis, i.e., as and when cases of paralytic shellfish poisoning are reported in the state.

Following the second attack of shellfish poisoning in Sabah, in early 1984, the Fisheries Division of the Ministry of Agriculture, having become aware of the seriousness of the matter, set up a national working group in May 1984 to plan a program to carry out in-depth studies into the problem of shellfish toxicity in Sabah in an attempt

to avoid future incidents of human fatalities arising from the consumption of shellfish. The working group comprises staff from Universiti Sains Malaysia, Penang; Universiti Pertanian Malaysia, Serdang; Fisheries Research Institute, Penang; Institute of Medical Research, Kuala Lumpur; Sabah Fisheries Department; and Sabah Medical and Health Services.

Efforts are currently under way to formulate a multidisciplinary study of Sabah's coastal waters covering research in the following areas: oceanography (coastal current patterns, nutrients); plankton regime (dinoflagellates); benthos (dinoflagellate cysts); shellfish biology and distribution; biotoxins in plankton and shellfish; pharmacology of the biotoxins (bioassays); and immunology.

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