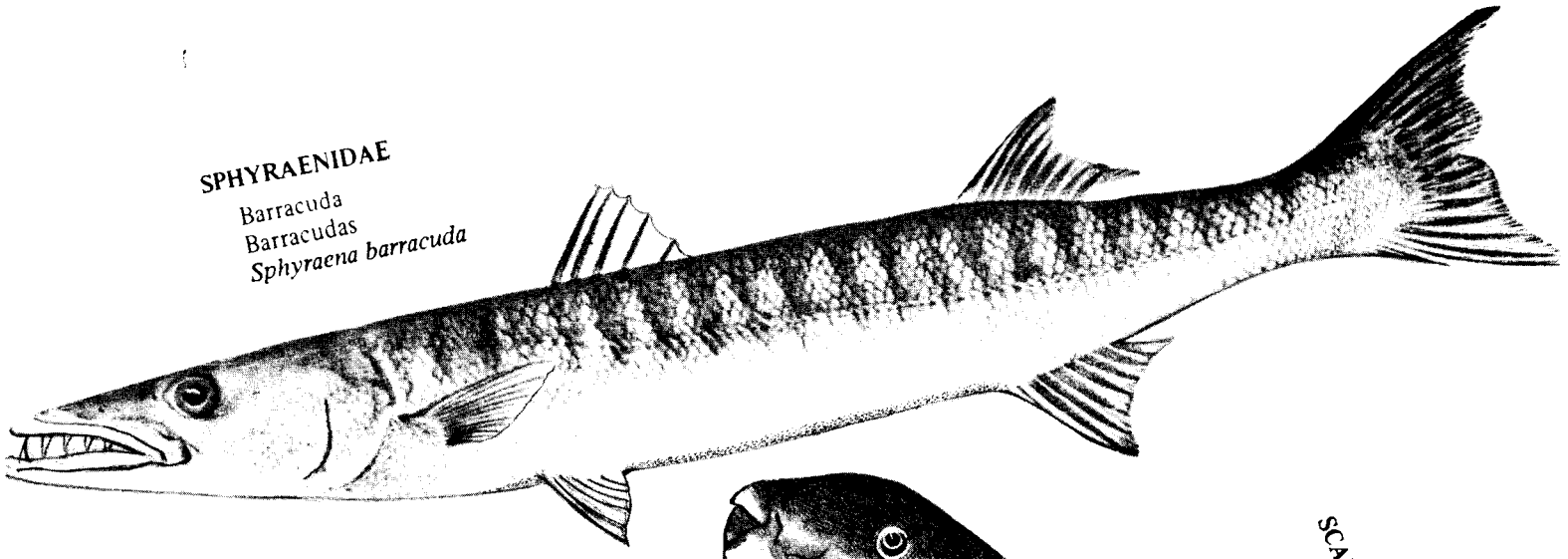
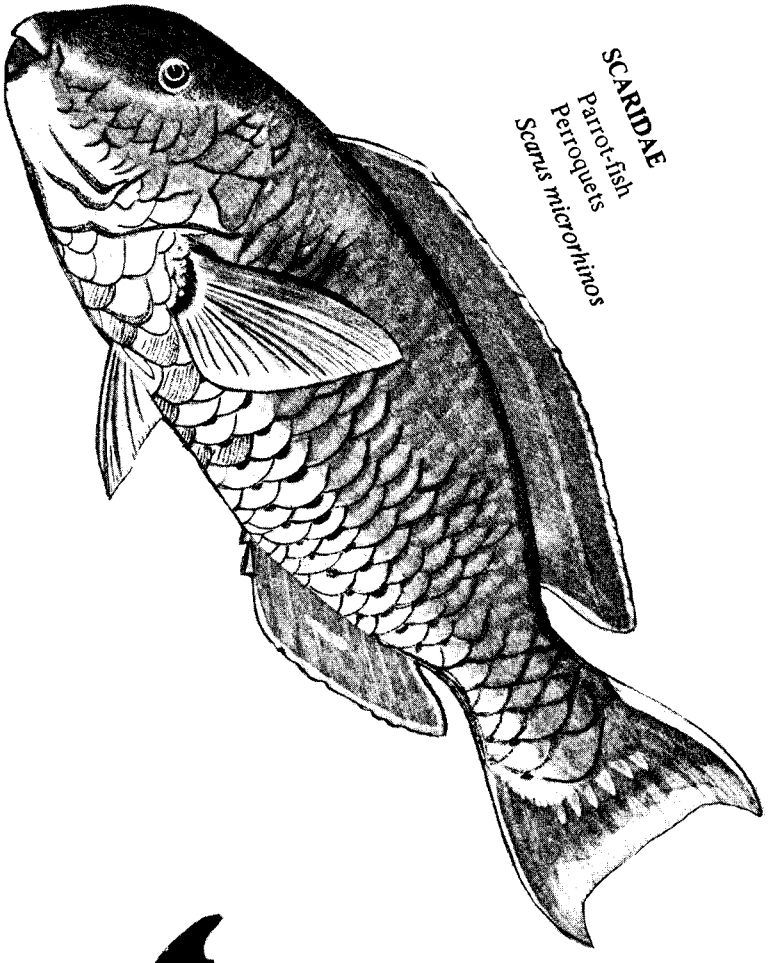


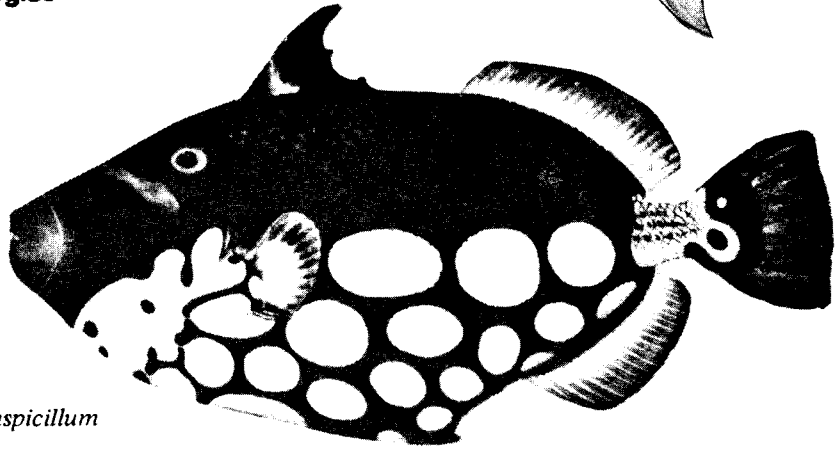
SPHYRAENIDAE
Barracuda
Barracudas
Sphyraena barracuda



SCARIDAE
Parrot-fish
Perroquets
Scarus microrhinos

Recent advances in knowledge of ciguatera fish poisoning

By TIM KUBERSKI, SPC Epidemiologist



BALISTIDAE
Trigger-fish
Balistes
Balistoides conspicillum

Ichthyosarcotoxism is the frighteningly long scientific term for fish poisoning. Literally, it means "poisoning by the flesh of fishes" and is a general term applied to the various different types of poisoning caused by the ingestion of toxic fish. In the South Pacific, where fishing and fish consumption have important nutritional and economic connotations fish poisoning has become a serious problem.

The important implications of fish poisoning to the health and economy of people in the South Pacific was recognized over ten years ago by the South Pacific Commission. In 1968 the Commission organized the First International Seminar on Ichthyosarcotoxism which took place in Tahiti. Since then, it has continued to be vitally concerned with investigations into the various causes of fish poisoning and has published a handbook on this topic.

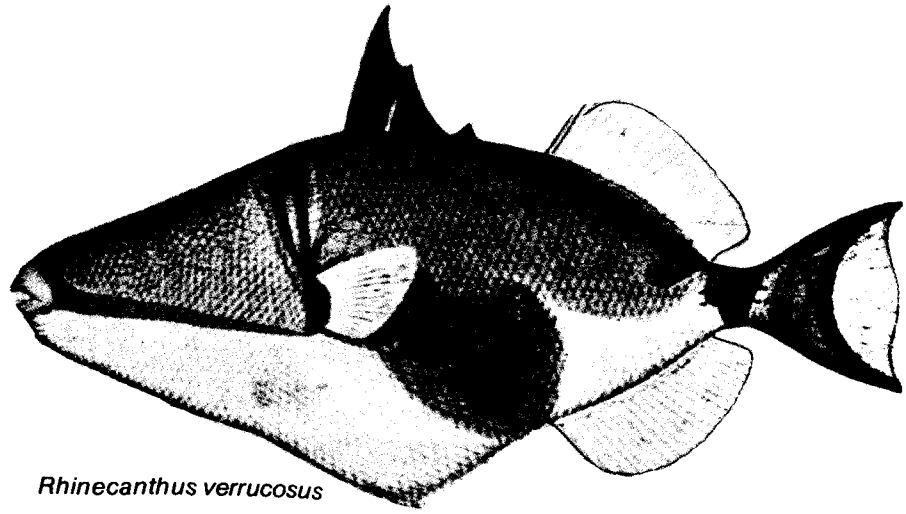
Results from the ongoing research and surveys have been slow in developing, but within the past few years great strides have been made in the knowledge of fish poisoning, particularly a type of poisoning referred to as *ciguatera*. The term ciguatera was coined many years ago by a Cuban fish expert after he recognized the similarity of symptoms between this form of fish poisoning and poisoning due to eating shellfish known in the Spanish Antilles as *cigua* (*Turbo* sp.).

The symptoms observed in a person who has ciguatera fish poisoning can be diverse, with intestinal complaints such as nausea, vomiting and diarrhoea being very common. The most distressing symptoms which occur, however, are the peculiar skin sensations such as itching, pain or numbness which usually involve the arms and legs or occur around the mouth. Weakness and lack of co-ordination can also occur. A few patients complain that touching cold objects results in a sensation of heat and that hot objects feel cold.

These symptoms usually last for only a few days, but they can linger on for several weeks, depending on the sensitivity of the particular individual and the amount of toxin ingested. Some persons appear to be more sensitive to the toxin than others and therefore tend to have a more severe reaction. The symptoms described above are not unique to fish poisoning and similar findings can be observed in other types of intoxications; however their appearance within less than 24 hours of eating types of fish should suggest very highly the possibility of ciguatera fish poisoning. Treatment with anti histamines, which are drugs frequently used for allergic conditions, appears to relieve some of the symptoms.

What causes ciguatera fish poisoning? Scientific evidence gathered in the past few years suggests that a microscopic organism known as a dinoflagellate (*Diplopsalis* sp.) may be the primary source of the ciguatera toxin. This micro-organism, which lives around coral and is frequently found associated with bottom fixed algae, is incorporated in the food of many of the relatively small and intermediate sized fish which feed on the ocean bottom and off coral reefs. Familiar examples of these fish which man consumes would be the parrot fish and the surgeon fish.

The dinoflagellate toxin, known as ciguatoxin, becomes incorporated into the flesh of these fish, making them dangerous for human consumption. However, small fish generally contain comparatively small amounts of toxin and as a general rule poisoning is less likely to occur with small fish than with certain types of larger, more predacious fish. The larger fish, such as groupers, snappers, jacks, barracudas and emperors (also the moray eel), all prey on the small bottom-feeding fish and thus indirectly become contaminated with ciguatoxin.



Rhinecanthus verrucosus

The large fish are amore serious threat since they have been found to contain larger amounts of the toxin, apparently because they tend to concentrate the ciguatoxin acquired from numerous smaller fish. Therefore, a toxin produced by a micro-organism gradually moves along the ocean food chain to reach eventually a concentration in certain fish which makes them toxic to man. The ciguatoxin can be found in both the flesh and entrails of fresh fish and cannot be removed by salting, washing or cooking the fish. It must be emphasised that not every fish of a certain species will be toxic; toxicity is dependent on the distribution in nature of relatively large quantities of the toxin-producing dinoflagellate, as well as the presence of the susceptible fish which feed indirectly on them.

It is difficult to assess accurately how great a problem fish poisoning is in the South Pacific, because many cases are never reported, but several thousand cases of fish poisoning in Pacific Islanders do get reported to the South Pacific Commission every year and the indications are that it is becoming even more commonplace. An explanation for this observation may relate to changes in the environment which are conductive to the growth of the micro-organisms which produce the ciguatoxin. These organisms appear

to increase rapidly in areas of the ocean that experience sudden and drastic natural or man-made changes.

Such things as an unusually heavy rainfall; building of a new channel through a reef or a wharf; wrecks; or dredging in areas where this form of micro-organism exists only in small quantities, frequently will be followed by a great upsurge in their numbers. This eventually results in an increase in the number of toxic fish. It is not impossible that the appearance of toxic fish and recognized human fish poisoning may not be evident for months to years after the increase in the toxin-producing dinoflagellate has occurred. However, further studies of this aspect of fish poisoning are needed before a definite conclusion can be reached. The complicated manner in which the different varieties of fish become toxic has made recognition of the association between human fish poisoning and this small organism very difficult.

Much research has yet to be done before ciguatera fish poisoning as it occurs in the Pacific can be completely understood. The current major efforts of scientists are to determine how to detect toxic fish and how best to deal with patients who become ill with ciguatera intoxication. In many areas of the Pacific, certain fish are not eaten or are completely banned from sale because of their potential toxicity to man. If a simple method could be devised to determine which members of a certain type of fish were toxic, a number of fish identified as safe from ciguatera fish poisoning could then be marketed.

How to deal with individuals who have been poisoned is the other priority research problem of scientists working on ciguatera. This form of fish poisoning is usually not a life-threatening disease; however, a peculiar thing happens to persons repeatedly exposed to the ciguatoxin. They become hypersensitive to fish in general and are unable to tolerate eating any fish, whether toxic or not. Simply eating fish which are apparently toxin-free causes a relapse in their symptoms.

This results in the individuals having to restrict severely the amount of fish in their diet. This has important implications, because some South Pacific Island populations rely heavily on the ocean for food and in some instances very few alternatives are available. Scientists are currently puzzled by this phenomenon, but its importance to human health has made it an area of intensive investigation.

Although there have been major breakthroughs in studies of ciguatera fish poisoning, a number of things need to be done before adequate control and preventive measures can be implemented. A better understanding of the environmental circumstances resulting in the increase of the toxin-producing micro-organism has to be a long-term goal of investigations into ciguatera poisoning. Through a better understanding of the ecological requirements of the toxin-producing dinoflagellate, it might be possible to predict when an increase in these micro-organisms will occur, outline toxic areas and possibly even control outbreaks. But developing a safe method to prevent fish from becoming toxic without upsetting the ecology will be a most difficult task.

Current efforts are now concentrating on effective methods of recognition and control before the problem becomes much larger or insurmountable. This research takes on some element of urgency as the world demand for fish increases and new fishing grounds are continually being sought.

Readers are encouraged to inform the Commission, or their local health authorities, about cases of suspected fish poisoning which undoubtedly occur more frequently than we know about. □

SPC EPIDEMIOLOGIST

The South Pacific Commission has appointed to the post of Epidemiologist Dr Timothy Kuberski, formerly on the staff of the Pacific Research Section, National Institute of Allergy and Infectious Diseases, National Institutes of Health, Honolulu, Hawaii.

Dr Kuberski has been certified by the American Board of Internal Medicine as a specialist in the field of infectious diseases and has undertaken studies involving research and epidemiology of infectious diseases found in the South Pacific. He has held the post of Assistant Clinical Professor of Tropical Medicine and Medical Microbiology at the University of Hawaii. He is particularly interested in dengue, eosinophilic meningitis and venereally transmitted disease, and has extensive laboratory and field experience in work on dengue fever. Dr Kuberski's surveillance and control of dengue fever and other infectious diseases; the organisation of a programme for prevention and detection of diabetes; the formulation of a reporting system for cancer; and responsibility for the South Pacific Epidemiological Health Information Service. He took up his appointment with SPC at the beginning of March.

DR T. KUBERSKI