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IDEA

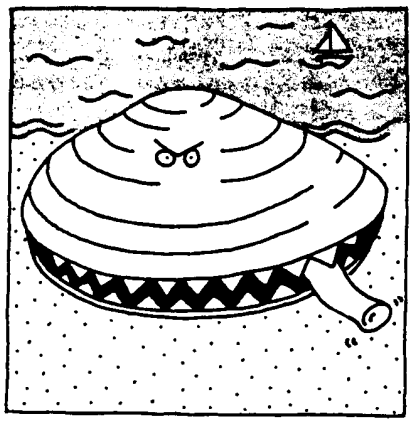
Current research by Wesleyan faculty.

CHEMISTS SYNTHESIZE SPY POISON

Wesleyan University chemists have announced a laboratory synthesis for a natural substance once gathered clandestinely by the Central Intelligence Agency as a potential suicide pill or a weapon because of its extraordinary toxicity.

Less than a milligram of this poison, called saxitoxin, can kill a person in under an hour. It is produced by red tide algae and is responsible for shellfish poisoning when red tide invades beaches.

But for Peter Jacobi, associate professor of chemistry, and graduate student Michael Martinelli, saxitoxin's vice is its virtue: The powerful paralytic effect it has on nerve impulses makes it ideal for the study of nervous disorders such as multiple sclerosis. Until now, however, the scarce supply of saxitoxin has limited its laboratory use. Saxitoxin is imposingly difficult to isolate from clams—one ton of clams yields one gram—and has proved to be equally troublesome to make in the laboratory.



Jacobi and Martinelli say their synthesis, although not the first, is a practical one that with further development promises to make saxitoxin available to the medical community. The project, supported by the National Institutes of Health, took seven years to complete; Martinelli took over the problem 3½ years ago.

The CIA was not pursuing medical research when it began experimenting with saxitoxin in the 1950s at Fort Detrick, Md. The CIA reportedly used the poison in suicide pills provided to its own agents (including U-2 pilot Francis Gary Powers); the Agency also reportedly developed dart guns and other clever means to deliver the poison to troublesome guard dogs when entering embassies or other buildings.

President Nixon ordered the CIA to destroy its supply of saxitoxin to conform with the draft convention of the U.N. Disarmament Conference, but in 1975, CIA Director William Colby revealed to Congress that 10.9 grams of saxitoxin remained in agency labs in downtown Washington.

Since the CIA held nearly the entire world's known supply of saxitoxin, the scientific community breathed a sign of relief when the agency decided to distribute the substance to researchers. Much of the supply went to scientists at Yale University.

Jacobi and Martinelli are, of course, taking no chances with their dangerous product. The minute quantity of saxitoxin they have on hand is kept secure. Not until the latter stages in the synthetic process does the substance become poisonous, so they plan to keep the bulk of their supply in a non-toxic form, ready for conversion to saxitoxin only when needed.

The achievement has brought Martinelli a coveted fellowship sponsored by Proctor & Gamble Corp. and awarded annually by the American Chemical Society to four students nationwide.

A curious footnote to the saxitoxin story is provided by the puffer fish, which inhabits waters near Japan and contains a closely related and equally deadly neurotoxin. Far from being feared, however, the puffer fish is considered a delicacy when prepared by specially licensed chefs. They know how to reduce the toxin level so that it produces merely a tingling of the nerves.

Almost all of Jacobi's projects are concerned with naturally active products. Another of his students, Hal Selnick, recently completed the first laboratory synthesis of a substance known as gnididione, derived from a plant native to Kenya that produces a number of biologically active substances. Gnididione is toxic to living cells and is therefore of interest to medical researchers as well as chemists. An advantage of laboratory synthesis is that controlled modifications can be made easily to alter activity. Selnick's synthesis of this compound was the first and was supported by the National Science Foundation.