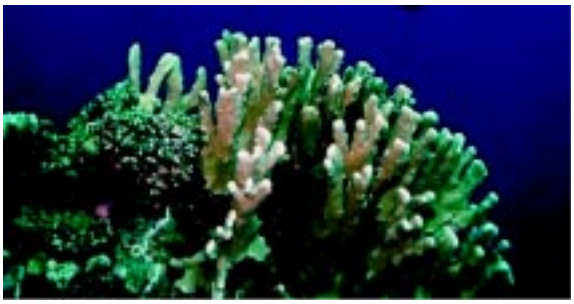
DRUGS FROM THE SEA



According to a report on the BBC at the end of 2001, scientists working for the United Nations' World Conservation Monitoring Centre, based in Cambridge, UK, say reefs cover a far smaller area of the globe than they had previously thought and they estimate that more than half the world's reefs are under threat from human activities.

Divers are drawn to the reefs to photograph their diverse lifeforms, but the reefs are being damaged faster than researchers can collect data about them and their ecosystems. Coral reefs are highly sensitive to changes in water temperature - an increase of one to two degrees in the El Nino event of 1998 apparently destroyed 90% of coral in the central Indian Ocean.

The Coral Reef Alliance has underlined the importance of maintaining healthy reefs. It said several important drugs had already been developed from chemicals found in coral reef organisms. The most famous of these is AZT, a treatment for people with HIV infections, which is based on chemicals extracted from a Caribbean reef sponge.

Scuba divers and snorklers have long marveled at the intricate patterns of coral reefs in the Pacific, Caribbean, and other exotic locations. These patterns are now a marvel for people with certain kinds of bone injuries. A product made from the rigid exoskeletons of marine coral can fill voids caused by fractures or other trauma in the upper, flared-out portions of long bones. Called hydroxyapatite (HA), the material is similar in structure to human bone. When HA is implanted into a bone void, its web-like structure allows surrounding bone and fibrous tissue to infiltrate the implant and make it biologically part of the body. The implants, which are either blocks in pre-cut sizes or granules used to fill in the spaces not covered by the blocks, must be used with reinforcement devices such as steel rods to ensure that the fracture remains stable until it heals. Otherwise the implant may crack when you walk or put any weight on it. It wouldn't have sufficient strength to support the weight until bone grows into it or the fracture heals.

Although it is possible for patients to donate bone from other sites on their body to repair a fracture, this causes extra trauma, one of the real advantages of using coral-based implants is that they avoid a second surgery that would be necessary if a donor site is used. The US Food and Drug Agency has already approved coral-derived implants for applications such as bone loss around the root of a tooth and in certain areas of the skull.

Until recently, virtually all medical products had terrestrial sources. For example, organisms found in soil have yielded products such as penicillin, amoxicillin, and other antibiotic compounds responsible for saving millions of people from suffering and death.

Sea-based products are rare, but some experts say the world's oceans and waterways may harbor the next generation of drugs, biologics, and even a few medical devices. Dozens of promising products, including a cancer therapy made from algae are in development at research laboratories right now. Other products, such as an anti-inflammatory drug extracted from an organism called the Caribbean sea whip, are under review. Three approved products already have brought the healing power of the sea successfully into the world of public health.

Other important sea-based medical product work is also progressing. For instance, the National Cancer Institute is sponsoring clinical trials of five substances derived from marine invertebrates such as sea hares and bryozoans that may have use in the future as cancer treatments. Elsewhere, one drug company is testing a neurotoxin obtained from a seagoing snail common in the Pacific as a potent painkiller. Early clinical trials have shown that the substance relieves some of the worst kind of chronic pain and could someday be an alternative to morphine.

For the time being, the sea's potential as a medicine cabinet remains largely in the realm of experimentation. But science is moving quickly, and many experts say the world's waterways may soon yield some effective medical treatments, if not some miracle cures.