

Results of the larval rearing experiments have been good. Adults of all three species collected from the wild have been successfully induced to spawn. Spawning is greatly enhanced by thermal shock (usually delivered by leaving the animals in a tankful of slowly heating water on the back of a flat-bed truck as they are driven from the collection site to the lab). Fertilisation and development through the first (auricularia) to the second (doliolaria) stage has been achieved in *A. mauritiana* and *H. nobilis*. The developing larvae are raised in aerated water in glass containers and are dosed with penicillin to prevent bacterial and ciliate infection. The larvae are fed on dinoflagellates and this material can be seen in the gut canal, which is transparent, until metamorphosis to the doliolaria stage, at which time it becomes replaced by unpigmented detrital matter. Development of the larvae to juvenile sea cucumbers has not yet been achieved, and this is an area on which studies are focussing at present. Lab staff have recently built a larval stirring system which has proven useful. Using the system, all the larvae from a January 1990 spawning of *H. nobilis* have been induced to settle, and the research team are now experimenting with different substrates and diatoms on which to raise the larvae.

The UOG team has also been looking at aspects of adult culture, and in particular artificial induction of fission, by keeping wild-collected adults of a range of sea cucumber species in artificial enclosures. The adults are fed daily using homogenised *Sargassum* seaweed. Fission can be induced in *H. nobilis* and *A. mauritiana* (but not *T. ananas*) by placing a tight rubber band around the animal for several days. The sea cucumber will eventually divide into two at the point

where the rubber band constricts it. Although this may ultimately prove to be a useful way of avoiding juvenile mortality and improving recruitment in sea cucumber farming, the experiments carried out so far have been of limited success. Additionally, the classic problems of negative growth rates (shrinkage) and necrosis in captive animals continue to plague the UOG experiments and there is still a lot to learn about keeping these animals in captivity.

As part of an overall effort to encourage sustainable exploitation of the sea cucumber resource in Micronesia, Bob Richmond believes it would be wise for Micronesian states to consider forming a marketing consortium so that harvesting and export could take place in a controlled, managed way. At present, beche-de-mer harvesting in Micronesia - as well as in many other localities - takes place in a sporadic, ad hoc way, with individual islands or communities producing small, irregular consignments and then trying to sell them. Small quantities and irregular production usually mean low prices, so foreign buyers are able to take advantage of this situation. A marketing consortium would enable production from the various island groups to be pooled and marketed as bigger lots on a more regular basis. As well as maximising economic returns from the resource, such a system would also enable harvests in particular locations to take place at regular, sustained levels, rather than the 'boom-and-bust' style of exploitation that has typically characterised beche-de-mer fisheries in small islands.

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Aspidochirote holothurians of the New Caledonian lagoon: biology, ecology and exploitation

Abstract of the recent thesis by Chantal Conand, published in 1989 by ORSTOM (see Conand, 1989, reference list this issue)

Some Aspidochirotid Holothurians (Ecinodermata) are fished and processed into bêche-de-mer (or trepang) for human consumption. At first the 48 species collected from the New Caledonian lagoon are presented and classified into commercial categories.

The main characteristics of the distribution and abundance of these species, in the different reefal and lagoonal biotops are defined by an autoecological study. Groups are also distinguished according to reefal and depth gradients, as well as by substrate preferences. Several holothurians assemblages (or taxocenoses) are described. Their richness (by number and by mass) decreases from the inner reef-flats to the inner lagoon, then the outer reef-flats up to the outer lagoon and the reef slopes. Populations appear to be stable. The study of the population biology of the nine main commercial species enables the determination of the main parameters of their biometry, reproduction, growth and mortality. Sexual reproduction exhibits

rather homogeneous characteristics: these species are gonochoric and iteroparous, have an annual sexual cycle, late sexual maturity and high fecundity. Growth and mortality, whose study is particularly difficult, are both quite low. On the whole, the means mass of the species can be related to the biological and ecological parameters as a gradient in the adaptive strategies is shown.

Exploitations in New Caledonia and other countries of the South Tropical Pacific are described. The causes of their wide fluctuations are analysed and connected with Hong Kong and Singapore markets. Maximum sustainable yields are estimated at about ten to thirty kilograms per hectare per year in the rich assemblages. Their thematic mapping, an example of which is given using high resolution images from SPOT silulation, remains necessary for the lagoon as a whole. Lastly several options for fishery management are discussed.