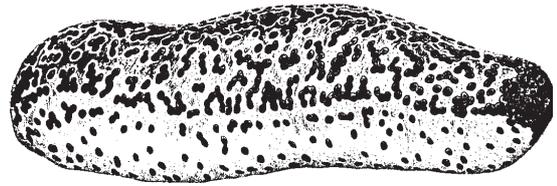


B E C H E - D E - M E R

CORRESPONDENCE



New species of holothurian found in Guam?

Alexander M. Kerr (Marine Laboratory, University of Guam, U.O.G. Station, Mangilao, Guam 96923) wrote the following letter to Garry Preston (South Pacific Commission) and Chantal Conand.

'...Myself and several others have been doing nocturnal reefal surveys for new echinoderm records to Guam. We have made several expected and a few interesting finds (one asteroid, two echinoids and six holothuroids) which are scheduled to appear in the December 1992 volume of *Micronesica*.

We have not, however, been able to identify a species of holothuroid. During an otherwise uneventful fishing trip (we caught one fish), Paul Gates mentioned that you work with holothuroids. I am hoping that you may be able to help identify this puzzling specimen or know someone who can.

The holothuroid is 15-22 cm relaxed length and is a dark purplish-brown. The tentacles of the specimen shown in the enclosed picture are purple and number 20 (Note from editor: the photo was not of good enough quality to be published – the original will be kept by the SPC Fisheries Information Officer and will be available on request to members). The spicules appear to belong to a *Holothuria* (*Thymiocysia*) sp. Notice the small knobs scattered along the longitudinal axis of the otherwise smooth buttons. We photographed the animal during the day on an algal substrate, however, it is

strictly nocturnal and has been found active only on live colonies of the massive coral *Porites rus*. The tegument is thick, much like *H. (T.) impatiens*, but is smooth. It emits an amazing quantity of long, very thin cuvierian tubules when disturbed. Like *H. (Microthele) nobilis*, abrading the tegument reveals a lighter colour beneath. If it is indeed a species of *Thymiocysia*, could it be *H. (T.) remollescens*? I do not have access to Lampert's original description (in Semper 1885) nor to H.L. Clark's (1946) description.

For your convenience, I have enclosed a self-addressed postcard. If you recognise the holothuroid and have any information concerning it, know someone who might, and/or would like to receive a specimen (relaxed in MgSO₄, then preserved in 70% ethanol), I would be very pleased to acknowledge your reply. I would also be glad to send you specimens of other Guam echinoderms should you so desire. I am quite interested in holothuroid ecology and plan as a master's thesis to do several field experiments assessing their community structure and community-level effects on other reefal organisms. I would be interested in receiving materials on holothuroids that you have published and have available at S.P.C.'

Reply from Chantal Conand

'...Thank you for your letter and questions about a species of *Holothuria*. Although it is only from a photograph and a few observations, it corresponds exactly to the species I have not identified and referred to as *Holothuria* sp. 1 in my thesis. I have also given a photograph, a few details on morphology (p.29) and ecology (p.92). I have found it at 8 sites all around New Caledonia. The cuvierian tubules and the "smooth" tegument are really characteristic.'

Royal Hawaiian Sea Farms involved in research on sea cucumbers

Dale Sarver, from Hawaii (Royal Hawaiian Sea Farms Inc., PO Box 3167, Kailua-Kona, Hawaii 96745) sent letters to Garry Preston, SPC and to Chantal Conand to explain what kind of activities are carried out by Royal Hawaiian Sea Farms in Kailua-Kona, Hawaii. Extracts from these letters are reproduced below.

1. Letter to Gary Preston

'...Royal Hawaiian Sea Farms is a small company producing a variety of edible seaweed, seawater raised tilapia, and on occasion shrimp. We produce over one tonne of Gracilaria every week which is our main crop. It is sold locally and on the US mainland.

In addition to aquaculture production RHSF trades in a variety of prepared and dried seaweeds and live lobsters and will soon start selling prepared seaweed products.

RHSF carries out research on other potential marine products in an effort to diversify and provide a wider range of products. One such potential product is sea cucumbers. Stichopus horrens has a very strong ethnic market in the islands. It is usually pickled and served in a variety of Japanese styles. The animals are found intertidally at night, and the fishing pressure has reduced the population significantly.

*We have obtained a Small Business Innovation Research grant through the Department of Agriculture which has also attracted matching State funds. The project is to develop maturation and larval culture techniques which might lead to commercial production. Although little is known of this species it appears to be seasonal like most other cucumbers. Attempts are being made to initiate out of season maturation and spawning through manipulation of various environmental factors. We are modelling our approach on methods proved to be successful with *S. japonicus* in Asia. RHSF is arranging to obtain broodstock of this species in order to attempt commercial production, and to use as a model for our work on the local species.*

Work has just started but there are indications that there are some mature individuals even in the off season. We will keep you informed on our progress. Comments and advice are welcome.

2. Letter to Chantal Conand

'...Thank you for your letter and enclosed reprints on sea cucumber biology.

Our luck with the Stichopus horrens has been very good. I have been able to stimulate out of season spawning by manipulating several physical and chemical parameters. In addition we have succeeded in rearing the larvae of juveniles, although the numbers have been very low. I am currently trying to improve on the techniques and hopefully we can get enough through to work with.

*The program we are working under specifies we try culture techniques for *S. japonicus* also. I have been having a very hard time locating a source of these animals. Do you have any suggestions as to where I could obtain some live specimens? Broodstock size would be best but even small juveniles would be helpful. There has been no response from my approach to some of the Prefectures involved in the early research. Possibly a biological supply company would be a good way if you know of any. Any advice would be appreciated.'*

Sea cucumber culture in Japan

Hideyuki Tanaka, Project Manager with the South Pacific Aquaculture Development Programme, sent the following correspondence, regarding sea cucumber culture, to Being Yeeting, Senior Fisheries Officer, Fisheries Division Kiribati.

'...In response to your fax inquiry on sea-cucumber culture, unfortunately there is not too much development in tropical sea-cucumber culture at present even in resource management, though University of Guam has started research on its ecology and seed production since 1988.

However, sea-cucumber resource management and culture have been commonly practiced in Japan and China. Seed production technique is already established in Japan for developing sea-cucumber ranching and culture. There are, I think, six or seven, or more large scaled hatcheries in Japan. In recent, we sent a staff of Fiji

Fisheries Division to one-month training course on sea-cucumber and tropical scallop cultures in China. A copy of training report prepared by the participant will be sent to you together with some other papers. There are currently strong interests in sea-cucumber culture in the South-east Asian countries, and I have heard some country has started experiment of sea-cucumber stocking-culture in fishpen.

In Japan sea-cucumber culture is practiced by intensive methods, such as by cages or baskets, which are at present not technically applicable and very costly in the region. Given to slow growth of sea-cucumber, China and Japan

are at present making more efforts in restocking of juveniles with setting up nursery or grow-out grounds rather than culturing. I also would like to propose to look into resource enhancement by management method in the tropical situation rather than culture method. What we need as the best in the tropic, I think, is to develop the method of juvenile aggregation and protect those juveniles until market size.

I have several examples of successful practices in resource enhancement, but sorry those information available with me are limited only from Japan. There have been many trials in Japan since the 18 Century, the following are some major successful records:

1. In two localities in Aichi Province in 1894, stones were dropped into sea bottom for increasing stock. Both trials resulted in very successfully.
2. In 1932, Nagasaki Fisheries Experimental Station confirmed effect of bundles of twigs placed to shallow bottom as good seed (juvenile) collectors. Saga Fish. Exp. St. also obtained a good result of juvenile aggregation by placing bundles of lumbers with weight. It was also found that this trial created a place of estivation for adult sea-cucumber.
3. In Hyogo Province during 1932-34, one sea-cucumber fishing ground was divided into three zones, and one zone was dropped with stones and restocked with wild juveniles in the first year, another zone in the second year and the last zone in the third year. Each zone was harvested after two years alternatively (e.g. each zone was harvested at every two years) and at the same time catch of sea-cucumber less than 50 g was restricted. In three years later, production became 27 times of initial stocking.
4. In Ohura Bay of Saga Province in 1934, 915 m³ of stones were dropped at one location and restocked with 1,700 kg of mature sea-cucumbers, and in the next year 359 m³ stones were also dropped at another location. Some 1,600 kg of sea-cucumber were harvested only for 4 days period after two years fishing moratorium. Production was increased 9 times bigger in weight and 13 times much in value compared to before. Given this successful result, fishermen built a monument for advising this success in history.
5. Since around 1935 in Nanao Bay, Ishikawa Province, fishermen started construction of sea-cucumber shelters by sinking lumbers and old boats together with stones. Since 1953 shelters were constructed at considerable scale in the bay by stones dropping. In 1977-78 a large scaled nursery ground was constructed at two locations, which aimed at 25-26 t of additional annual catch at each location.
6. In Miyagi Province in 1938, a shelter was constructed by sinking old boats and dropping stones, and restocked with 1,200 liters of young sea-cucumbers. After one year moratorium, production increased to 2.5-3.7 times bigger in catch and 5-6 times higher in value compared to the previous catches.
7. In Ohura Bay, Nagasaki, in 1978-79, long-lined seed collectors attached with oyster shells collected seed successfully. Some 69,000 and 341,000 juveniles were collected each year by this method.
8. Similarly, in Senzaki Bay, Yamaguchi Province in 1980-81, suspended seed collectors made of pearl culture baskets inside which hold oyster shells and cedar leaves, collected 1,064 and 53,200 juveniles yearly. Those seed were used for restocking.
9. In Okayama Province in 1988, a young-fishermen group experimentally collected about 10,000 juveniles of which size was 1.4 g in body weight, by pearl culture baskets with oyster shells. All seed were aimed at restocking rather than culturing.

As conclusion, the following practices might be suggested as feasible conservation measures for sea-cucumber resources.

- moratorium for long terms;
- rotation of fishing grounds;
- restriction of catching season;
- size regulation;
- construction of juvenile aggregation areas;
- construction of sea-cucumber shelters and restocking of adults or juveniles;
- collection of wild seed and restocking.

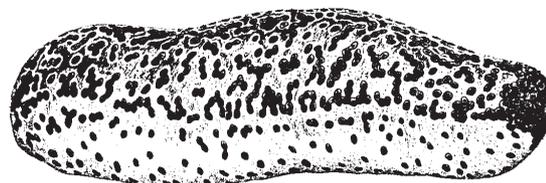
Regarding restriction of catching season in Japan, each province has a different closed fishing season, but these are all between March to November. March to July is a spawning season, August to September is an estivation period due to high temperature, and October is a recovering period from the estivation. In the period August to October, sea-cucumber is less commercial value due to poor quality. On the other hand, there is a difficulty for tropical sea-cucumber to establish such closed fishing season because of lacking of basic information on life cycle, growth, maturity, etc.; on tropical species. What is the maturing size for each commercially important species? When is the spawning season for each species? How do they grow? Is there an estivation period for tropical species like the temperate species?

Our project has encouraged to develop these basic research in the region during the project period, and tried to do it even by ourselves. However, this was not realised due to lack of manpower in both country and project office. Research institutes or universities in the region didn't pick up these regionally important research, except the

University of Guam. I hope the USP or Atoll Research Unit might be in a position to carry out such research. I really feel the necessity of setting up a sub-regional research station/group on sea-cucumber study in the region.

B E C H E - D E - M E R

Abstracts, Publications Workshops and Meetings



The new references listed below will be held in the SPC library and will be available on request.

If there are documents that you feel should be added to the database, please send us a copy, or, if this not possible, a photocopy of the cover page. Documents do not need to be formal publications—

many of those held in the database are not — and we are keen to archive as much 'grey literature' (internal reports, correspondence, unpublished data, etc...) as possible.

Thanks in advance for your help.

Conand, C. and C. De Ridder (1990). Reproduction asexuée par scission chez *Holothuria atra* (Holothuroidea) dans des populations de platiers récifaux. *Echinoderm Research*, De Ridder, Dubois, Lahaye & Jangoux (eds), 1990 Balkema, Rotterdam (an abstract in English is shown below).

Holothuria atra is the most common aspidochirotid holothurian on tropical Indo-Pacific reef-flats. Transverse fission followed by regeneration has been studied in populations from New Caledonia and Papua New Guinea. Fission has been observed in the field in all sizes of individuals at a mean rate of 1% of the population sampled in New Caledonia. From direct observations and from the sizes of recently divided individuals regenerating the oral or anal end, the position of the split has been located in the anterior 45%. From the observed fission and regeneration rates in the population, it is inferred that external regeneration (disappearance of fission signs) takes about two months. Asexual and sexual reproduction appears to be seasonal. But whereas fission mainly occurs during the cool season, sexual reproduction (from gonad studies) takes place during the warm season. Fission is probably triggered by emersion, during low tides, through dessication and thermal stress. It is hypothesised that the low water time of the spring tides can explain the seasonality of the fission as this phase of the tide occurs in these localities near the middle of the day in the cool season (and during the night in the warm season).

Conand, C. (1991). Long-term movements and mortality of some tropical sea-cucumbers monitored by tagging and recapture. *Biology of Echinodermata*, Yanagisawa, Yasumasu, Oguro, Suzuki & Motokawa (eds), 1991 Balkema, Rotterdam (an abstract is shown below).

In addition to assisting studies of growth and mortality of a population, tagging experiments followed by a series of recaptures are useful in following animal movements. Tagging experiments have been conducted on seven aspidochirotid holothurians from different lagoon and reef habitats of the lagoon of New Caledonia. On reef-flats, where high-density populations are observed, the position of tagged individuals was located inside quadrats marked out by pegs and orientated. In deeper stations, where population densities are usually lower, the quadrats were larger and were not delimited with precision. Recaptures were generally made each three months. Recapture rates are highly variable, depending on the species, and their progressive decline is mostly due to the loss of tags. For the reef-flat species *Actinopyga echinites* and *A. mauritiana*, the movements of some tagged individuals were followed over one year. Their mobility was rather limited as many individuals were found within the inner quadrat after six months. The average direction of movement has been determined for these two species. It is apparently random for *A. echinites* and oriented towards the reef crest for *A. mauritiana*.