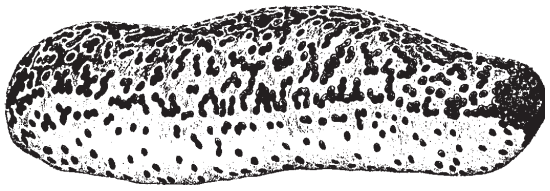
B E C H E - D E - M E R

Abstracts, Publications Workshops and Meetings



The biology and behavioural ecology of small juveniles of the holothurian species *Actinopyga echinites* (Jäger 1833)

An abstract of a thesis submitted by W.L. Wiedemeyer to the University of the Ryukyus, Okinawa, Japan in September 1992 is given below.

Several morphological, physiological and ecological experiments on the general biology of small juveniles (drained body weight = 0.09–17.34 g) of *Actinopyga echinites* (Echinodermata, Holothuroidea) were conducted between August 1991 and July 1992 on the reef flat near Bise Village, Okinawa, southern Japan (Figure 1).

Supplementary experiments were carried out at the laboratory. All experiments were methodically linked to each other and designed in order to evaluate the biological applicability of *A. echinites* to future stock enhancement projects intended for the species and for other commercially exploited tropical sea cucumbers of the coral reef zone if occasions arose.

The juveniles of *A. echinites* showed an average percentage of drained body weight within their fresh body weight of 48.25 per cent. Their internal and skeletal morphology differed considerably from the morphology of adult specimens. Two new types of skeletal spicules were discovered.

Individual growth of all spicule types monitored during a period of twelve months differed notably and shrinkage was observed for the two newly discovered types. The quantitative frequencies of the spicule types within the skeletons changed with increasing weights of the animals.

The juveniles of *A. echinites* displayed a strong habitat preference for plate-like substrate types

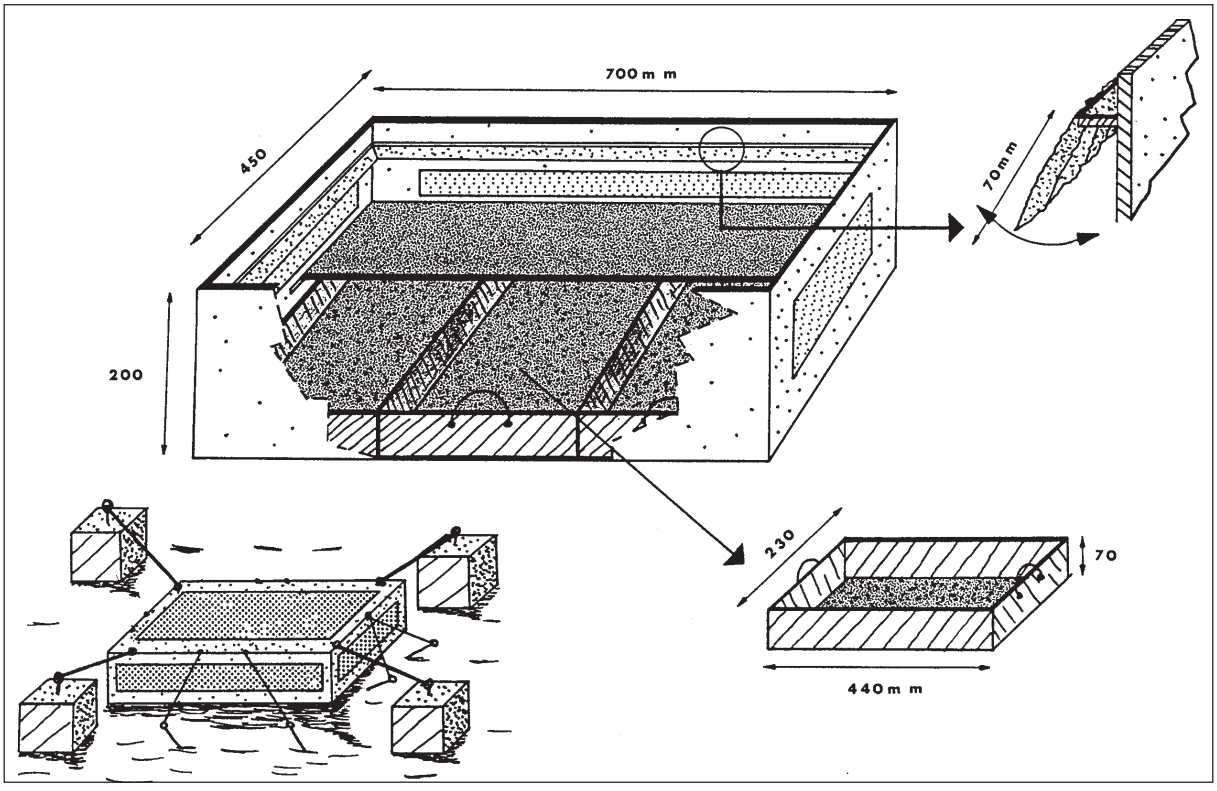


Figure 1: Design of the modified polypropylene boxes used during the field experiments

such as limestone or dead skeletons of *Acropora* spp. and exhibited continuous cryptic behaviour during 24 hours. The natural mortality of the animals (excluding predation effects) was low: 0.6 per cent per month during the first three months of the field experiments.

Although mortality reached a rate of 3.3 per cent during the rest of the experiments when predation effects were included, this was still considered to be a minor increase. The average percentage of predation effects within the total natural mortality was estimated as 76.8 per cent. In the field, *A. echinites* disclosed exponential growth with a 1,500 per cent weight increase during eleven months (Figure2).

At the same time, individuals kept at the laboratory under conditions which were very close to the natural environment in the field showed shrinkage of 54 per cent of their body weight. Juvenile *A.echinites* exhibited a maximum short-distance migration speed of 9 cm/h, which was 20 times slower than the speed observed in the adult animals (900 cm/h), when differences in total body length were taken into consideration.

The daily amount of sediment ingested by the juvenile *A. echinites* was estimated as 58.25 per cent of their individual drained body weight. The daily assimilated amount of organic material removed from the surrounding sediment was estimated as 0.54 per cent of the individual drained weights.

The author concludes that outdoor rearing of *A.echinites* juveniles and the releasing of the specimens to the field might be feasible. The results presented in this study provide basic information in order to enable the selection of adequate releasing areas and assessments of densities of juveniles to be installed during possible future stock enhancement projects.

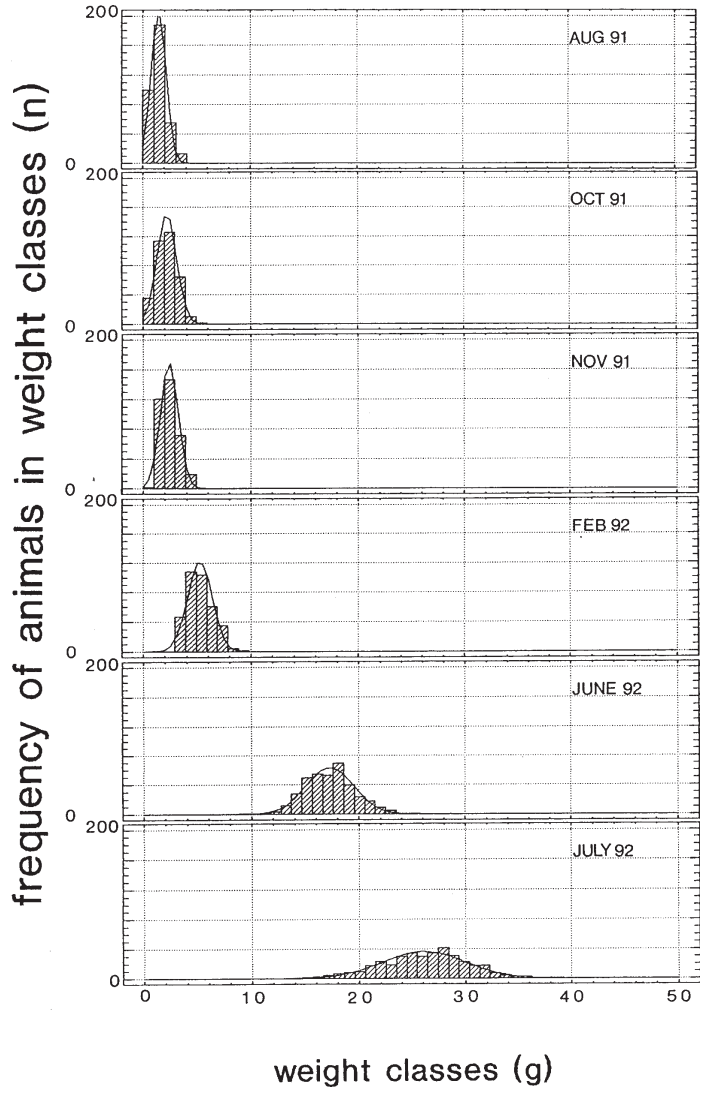


Figure 2: Frequency distribution of juvenile *A. echinites* within weight classes (g) during field experiments from August 1991 to August 1992. Fitted lines are ideal normal distributions. n = 360 animals for each plotted distribution.

Below are abstracts of papers presented at the 7th International Coral Reef Symposium in 1992 in Guam.

Wiedemeyer, W.L. (1992). Feeding behaviour of two tropical holothurians, *Holothuria (Metriatyla) scabra* (Jäger 1833) and *H. (Halodeima) atra* (Jäger 1833) from Okinawa, Japan

Digestive contents of *Holothuria scabra* and *H. atra* (n = 476 ind. each) were analysed on Okinawa, southern Japan from field surveys covering 24hour-periods. Specimens were collected at separate locations during the spawning and post-spawning seasons of 1991.

H. scabra fed during the night when burrowed. Small, medium and large individuals of both species had distinct feeding modes based on digestive speed, daily and seasonal feeding cycles, particle-size and chemical selectivity. *H. scabra* and *H. atra* showed different feeding strategies and behaviour which were specific for seasons and habitats. *H.scabra* reworked more sediment than *H. atra*. But with respect to thickness of the sediment layers at the survey areas, the effect of reworking of *H. atra* at areas of underlying hard substrates is considered more significant.

The amount (dry weight) of daily reworked sediment, as a percentage of the drained body weight of the individuals, was 31.0 per cent and 23.4 per cent in *H. scabra* and 46.5 per cent and 45.2 per cent in *H.atra* for spawning and post-spawning seasons, respectively. Daily assimilated organic matter (carbon / dry weight), as a percentage of the drained body weight of the individuals, was 0.29 per cent and 0.23 per cent in *H. scabra* and 0.18 per cent and 0.13 per cent in *H. atra* for spawning and post-spawning seasons, respectively. Assimilated organic matter per unit weight decreased with increasing body weight in both species, with the exception of reproducing individuals during the spawning seasons. Assimilation efficiency for organic matter was 75 per cent higher in *H. scabra* than in *H. atra*.

Buckley, R.M. & M.C. Gomez-Buckley (1992). Internal micro-tag identification systems for teleosts, holothurians and decapods

Successful extrinsic identification of organisms in ecological studies enables validation of biocenosis assumptions, estimation of population parameters and assessment of migrations, at relevant spatial and temporal scales.

The magnetic, binary-coded wire tag (CWT), alpha / numeric-coded Visible Implant (VI) tag, and fluorescent polymer (FP) tag, are bio-compatible internal micro-tags that (1) allow individual or batch recognition, (2) have low rates of loss, (3) do not invalidate biological normality, and (4) enable practical long-term recovery of information.

Retention of CWT in juveniles of five temperate reef, and three subtropical nearshore, fishes was 95–100 per cent up to 365 d; retention of VI tags in seven species was 0–85 per cent up to 365 d. Retention of FP tags in juveniles of two temperate reef fishes was 94 per cent at 70 d. Pilot study retention of FP tags in one sea cucumber and two shrimp species was 100 per cent up to 50 d. FP tags in juvenile *Sebastes* sp. have been recovered *in situ* during visual transects using ultra-violet dive lights.

Kerr, A.M. (1992). Effects of typhoon-generated waves on windward and leeward assemblages of holothuroids

In the Western Pacific, where typhoons are frequent, storm-associated waves were suspected of influencing the distributions of shallow-water holothuroids. I sampled holothuroids on a windward and leeward reef on Guam before and after Typhoon Russ.

Holothuria atra and *Actinopyga echinites*, which live on open, unsheltered substrata, and diurnally cryptic species were greatly reduced (66.1 per cent, 59.6 per cent and 55.6 per cent respectively) on the outer reef flat of the windward site. On the windward inner reef, *Actinopyga echinites* and cryptic species also decreased (47.2 per cent and 14.3 per cent). No species decreased on the leeward outer and inner reefs.

Rheophilic taxa along the reef margins at both sites were also unaffected by the typhoons. These data, the frequency of typhoons in the region (1 every 3.5 year on average) and the hypothesised longevity of many species (5–15 years), suggest that cyclonic storms may be important in structuring populations of holothuroids, particularly exposed, epibenthic forms, on windward reefs in the Western Pacific.

The new references abstracted 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.

Kerr, A.M., E.M. Stoffel & Rosanna L. Yoon (1993). Abundance distribution of holothuroids (Echinodermata: Holothuroidea) on a windward and leeward fringing coral reef, Guam, Mariana Islands. *Bulletin of Marine Science*, 52(2): 780–791.

We used line transects to determine the abundance distribution of holothuroids on a windward (Pago) and leeward (Tumon) reef on Guam. In a total sample space of 11,134 m^2 between depths of 0 and 23 m, we recorded 20,283 holothuroids comprising 19 species.

Another five species were recorded as single individuals off the transects. *Holothuria atra* was the most abundant species recorded and comprised 92 per cent of the holothuroids counted at both sites.

The two next most abundant species were considerably less common: *Actinopyga echinites* and *H.leucospilota* were 3 per cent and 2 per cent of the enumerated fauna, respectively. Each of the remaining 20 species were 1 per cent or less of the total fauna. Species richness and a species' relative abundance between sites appeared related to overall reef exposure.

Species richness was slightly less for Pago (20) than for Tumon (22). Pago had much lower densities of the largest, epibenthic holothuroids common at Tumon: *Bohadschia argus*, *Stichopus chloronotus*, *Thelenota ananas* and *H. nobilis*. Conversely, abundances of cryptic holothuroids were similar between sites.

These observations suggested that storm-generated waves, which often devastate the windward reef at Pago, may strongly influence the holothuroid community there. Within-site species richness was associated with physiographic zones. The middle reef flats had the greatest number of species (20) of any reef zone, while reef slopes supported ten species.

The fewest number of species, four, occurred along the reef margin, and only two species, *Actinopyga mauritiana* and *H. cinerascens*, were found there in abundance.

Species abundances at smaller scales were less predictable. Pairwise product–moment correlation analyses of species abundances at Tumon showed that most distributions were independent of one another when enumerated within 10 m^2 and 2 m^2 quadrates.

Less often, there were weak but significant positive correlations. Weak but significant inverse correlations existed between *Holothuria atra* and three holothuroids found mainly on the reef front or reef slope: *A. mauritiana, H. nobilis* and *S. chloronotus.*

Each microhabitat supported more than one species, and species were often found in more than one microhabitat : rubble and sand bottoms and areas under rocks each supported 11 species, seven taxa were seen on sand, while three species were found in sand.

Macroalgae, turfaceous-algae-covered pavement, the surface of live coral and bare pavement had five, three, two and two species, respectively.

VandenSpiegel, D. & M. Jangoux (1993). Fine structure and behaviour of the so-called Cuvierian organs in the holothuroid genus *Actinopyga* (Echinodermata). *Acta Zoologica* (Stockholm) 74: 43–50.

Actinopygid Cuvierian tubules are few in number. They are made of a basal trunk from which arise 2-3branches. The trunk is smooth and hollow (proximally) or slightly swollen and solid (distally) and the branches consist of a central rachis to which attach many peripheral spherules.

The fine structure of the tubules is similar in the three investigated species of *Actinopyga* but differs considerably from that of non-actinopygid tubules. Basic behavioural differences occur also as actinopygid. Cuvierian tubules cannot elongate nor become sticky, and are not expelled by the individuals. It is concluded that actinopygid Cuvierian tubules do not fulfill a defensive function.

Vail, L. & Barry Russel (1990). Indonesian fishermen of Australia's Noth-West. *Australian Natural History*, 24: 211–220.

This article presents information about traditional Indonesian fishing activities, mostly sea-cucumber collection and trepang preparation on Ashmore Reef. The authors conclude 'the pressure of the marine resources have increased over the 10–15 years... and it is clear that some conservation measures are called for'.

List of beche-de-mer buyers

A list of beche-de-mer buyers was published in 1979 in the well-known SPC Handbook No 18 *Beche-de-mer of the Tropical Pacific*. This list is now out-of-date and the new version of the handbook is currently in preparation. However we have decided to publish an amended version of the list in the Bulletin to give people the chance to comment and suggest corrections and changes.

We look forward to receive any information on the contents of the address list.

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