101* Ostracoda and environment - northern Australia, Indopacific.

ORGANIZATION: Riverina College of Advanced Education
School of Applied Science
P.O. Box 588
Wagga Wagga, N.S.W. 2650

PROJECT LEADER: Dr K.G. McKenzie (069) 232550

CONTACT OFFICER: Mr D.J. Kelso (069) 232224

EXPENDITURE: $11,166 (all years)

MANPOWER: 0.12 (this year), 0.84 (all years)

EXTERNAL SUPPORT: ARGS - $1,960 (Accommodation was provided at Bandung for 10 days during July 1980.)

OBJECTIVE

To identify Cenozoic (Tertiary-Recent) ostracodes of the region, determine their environmental associations, and place type collections in Australian repositories.

METHODOLOGY

Collection of samples, determination of associated ecological factors.
Picking of ostracoda and sorting onto microslides.
Scanning electron microscopy.
Description of species, designation of types.
Publication.

STATUS

Sahul Shelf - all material picked and mounted in microslides (78 samples); ecological factors known; species identified; analysed numerically, types selected. 3 publications.
Arafura Sea - all material picked and mounted; ecological factors known; species identified, analysed numerically. 1 publication.
CSIRO IIOE planktic material - all material prepared; species identified; analysed numerically, species identified. 1 publication.
Torres Strait. 1 publication (joint, with A.J. Keij).
Darwin - paper in preparation.
Indonesia - 1 publication (joint, with Sudijono).
Lizard Island - samples collected; ostracodes picked; stored in alcohol.
SOPAC Cruises - about 60 samples picked. Report forwarded to SOPAC, published as Technical Report.

GEOGRAPHIC REGIONS: E,Y,C,J,R

MAJOR DESCRIPTORS: Ostracoda/Taxonomy/Distribution patterns/Abiotic factors/Biotic factors/

[RCAE--001]

102* Taxonomy and ecology of benthic invertebrates from Heron Island, Queensland.

PERIOD: November 1980 -

ORGANIZATION: University of Queensland
Department of Zoology
St Lucia, Qld 4067

PROJECT LEADER: Dr T.S. Hailstone (07) 3772508

EXPENDITURE: $24,840 (this year)

EXTERNAL SUPPORT: AMSTAC-FAP - $24,840

OBJECTIVES

To publish a series of field guides and handbooks which will enable research workers and others to identify the species in selected groups of marine benthic invertebrates that can be found at Heron Island and adjacent areas at the southern end of the Great Barrier Reef. Study has commenced with selected groups of molluscs anthropods and echinoderms.

To investigate the habitats, habits, resource utilization and breeding activities of species covered by these handbooks.
Overall this project should serve to collate much of the relevant information which is scattered through literature and provide reference bases upon which more extensive ecological studies can be planned for this area.

METHODOLOGY

Individual workers with expertise and interest in specified benthic invertebrate groups are encouraged to participate in collection of relevant groups of animals. Specimens in these collections are identified and their distribution records (geographic and habitat) are compiled for construction of the handbooks. Subsequently, literature records and records from museum collections are to be incorporated. As handbooks are compiled, it is hoped that the information can be assembled in a form whereby it can form part of a more extensive computer data storage system which would be available to a wide range of potential users in Australia.

STATUS

Preliminary manuscripts are near completion for nudibranchs and holothurians. Work is underway on manuscripts for prosobranch gastropods and isopods. Others who have shown interest in the project but who have not yet been recruited (because of shortage of funds) are likely to begin manuscripts on crabs, sponges, shrimps, amphipods and bivalves.

LOCALITY: Heron Island

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Invertebrata/Benthic environment/Taxonomy/Ecology/

[UNIQLD010]

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103 Oysters of the Indo-West Pacific region (Bivalvia : Ostreidae and Gryphaeidae).

PERIOD: December 1975 -

ORGANIZATIONS: Western Australian Museum
Department of Malacology
Francis Street
Perth, W.A. 6000

University of New South Wales
Department of Zoology
Kensington, N.S.W. 2033

PROJECT LEADERS: Mrs S.M. Slack-Smith (09) 3284411
Dr P.I. Dixon

CONTACT OFFICER: Mrs S.M. Slack-Smith

EXPENDITURE: $1,200 (this year), $12,382 (all years)

EXTERNAL SUPPORT: ABRS - $10,282 (Dr Dixon's grant from ABRS not included.)
West Australian Fisheries Department (Ship time - Research vessel Flinders at Shark Bay, W.A.; assistance with collecting, staff, transport.)
Department of Zoology, University of Hong Kong (Assistance with collecting - staff, transport, lab space, use of facilities.)
Lembaga Oseanologi Nacional Jakarta, Indonesia (Assistance with collecting - staff, lab space and use of facilities in Jakarta

104 An illustrated key to the parrotfishes of the Great Barrier Reef.

ORGANIZATION: Australian Museum
Department of Fishes
P.O. Box A285
Sydney South, N.S.W. 2000

PROJECT LEADER: Dr J.H. Choat (02) 3398111

CONTACT OFFICER: Dr J.R. Paxton (02) 3398111

EXTERNAL SUPPORT: MSTGS - $6,645
GBRMPA - $9,900

OBJECTIVE

To produce an appropriately illustrated key to allow for rapid identification of the approximately 25 species of parrotfishes (Scaridae) which occur on the Great Barrier Reef.

METHODOLOGY

The project involved 3 trips to the northern Great Barrier Reef to collect and photograph additional species of parrotfishes. These occurred during March, June and November of 1982. In November I was joined by Dr J. Randall, Bishop Museum, for an examination of Museum collections and further field work. Field collecting and museum work was completed by December 1982.

STATUS

Most outstanding taxonomic problems have been clarified although the identity of two species remains problematical. At present we hold most of the required illustrative material. Field work has been completed.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: Scaridae/Identification keys/Taxonomy/

[AUSMUS002]

105 Taxonomy and ecology of larval and adult fishes.

PERIOD: January 1979 -

ORGANIZATIONS: Australian Museum
Ichthyology Department
P.O. Box A285
Sydney South, N.S.W. 2000
Lizard Island Research Station
PMB 37
Cairns, Qld 4870

PROJECT LEADERS: Dr J.M. Leis (02) 3398111 (Ext 262)
Dr B. Goldman (070) 534500

CONTACT OFFICER: Dr J.M. Leis

EXPENDITURE: $30,000 (this year)

MANPOWER: 1.25 (this year)

EXTERNAL SUPPORT: GBRMPA - $4,000 (Shiptime, equipment)
MSTGS - $176,000
ABRS - $15,000
CSIRO

OBJECTIVE

To study the taxonomy and ecology of larval fishes in the Great Barrier Reef and elsewhere.

METHODOLOGY

Ecological collections are made and studied. Taxonomic collections are made and studied.

108* **Sensory systems of the shrimp *Acetes* in relation to behaviour.**

PERIOD: August 1974 -

ORGANIZATIONS: Australian National University
Department of Neurobiology
Research School of Biological Sciences
P.O. Box 475
Canberra City, A.C.T. 2601

Australian Institute of Marine Science
P.M.B. No. 3
Townsville, M.S.O., Qld 4810

PROJECT LEADERS: Dr E. Ball (062) 494496
Dr L.B. Quetin
Dr R. Ross-Quetin

CONTACT OFFICER: Dr E. Ball

MANPOWER: 0.10 (this year), 4.50 (all years)

OBJECTIVE

To understand the sensory capabilities of the shrimp *Acetes* and the role that these capabilities play in limiting/determining the shrimp's behaviour.

METHODOLOGY

The project involves neuroanatomy, electrophysiology, and laboratory and field observations of behaviour.

STATUS

Six papers in preparation on structure and ultrastructure of eyes, statocyst and antennal setae, research still continuing on these topics.
Data for several other papers on activity patterns and other aspects of natural history including mating, moulting and schooling has been collected - research is continuing.

GEOGRAPHIC REGIONS: R,Q,N

MAJOR DESCRIPTORS: *Acetes* /Malacostraca/Neurophysiology/Behaviour/

[ANU—008]

109* **Bacterial production in sediments.**

PERIOD: June 1979 -

ORGANIZATION: CSIRO
Division of Fisheries Research
CSIRO Marine Laboratories
P.O. Box 120
Cleveland, Qld 4163

PROJECT LEADER: Dr D.J.W. Moriarty (07) 2862022

EXPENDITURE: $20,600 (this year), $77,300 (all years)

MANPOWER: 2.00 (this year), 4.00 (all years)

OBJECTIVE

To measure biomass and productivity of bacteria and other microorganisms in sediments and the water column and to study their interrelationships with primary producers in order to assess their role in food chains.

METHODOLOGY

Biochemical assays for muramic acid, DNA synthesis, chlorophylla; microscopical counting; C, N analysis.
Methods have been developed for measuring biomass and growth rate of bacteria and are being used to measure productivity particularly in seagrass beds and coral reef areas.

CO-ORDINATION WITH OTHER PROJECTS

Future work will involve collaboration with scientists at the Australian Institute of Marine Science. The study will coordinate with research projects on mangroves carried out by Dr T.J. Andrews and B. Clough.

GEOGRAPHIC REGIONS: R,Q,N

MAJOR DESCRIPTORS: Temperature tolerance/Distribution patterns/Angiospermae/*Avicennia marina* /Limiting factors/

[CSIRO-013]

111* Physiology of Penaeid prawns.

PERIOD: July 1976 -

ORGANIZATION: CSIRO
Division of Fisheries Research
CSIRO Marine Laboratories
P.O. Box 120
Cleveland, Qld 4163

PROJECT LEADER: Dr W. Dall (07) 2862022

EXPENDITURE: $30,000 (this year), $593,000 (all years)

MANPOWER: 3.00 (this year), 17.00 (all years)

OBJECTIVES

To study:
1. Osmotic and ionic regulation of selected species.
2. The lipid and protein metabolism of *Penaeus esculentus* (tiger prawn); Uptake and utilization of lipids particularly during the moulting cycle; the role of amino acids and body muscle as an energy source in normal metabolism.

METHODOLOGY

Osmotic concentration by Clifton Technical Physics Cryoscope; chlorides by LKB Chloridometer; other major ions by atomic absorption spectrophotometer. Lipids as total crude lipid gravimetrically following solvent extraction; individual lipids by High Pressure Liquid Chromatography (HPLC) and Gas Liquid Chromatography (GLC) total protein and free amino acids by a ninhydrin method; excreted N by ion-selective electrodes as ammonia and by a ninhydrin method; specific amino acids by High Pressure Liquid Chromatography uptake and turnover of specific lipids and amino acids by tritium or ^{14}C labelled compounds; oxygen consumption by intermittent flow respiratory chamber and oxygen electrode.

STATUS

Osmotic and ionic regulations: Demonstration that early juveniles are osmotically more adaptable than adults for four species and this is related to juvenile habitat preferences; all major ions are regulated with a zone of instability at a salinity of about 40% shown in magnesium regulation.
Lipid and protein metabolism: Stored digestive gland lipids are used mainly in preparation for moulting, but are used during early starvation. Proteins are also metabolised during early starvation and become the principal energy source. Standard and routine metabolic rates have been established; metabolic rate is reduced during starvation by decreased nocturnal activity.

GEOGRAPHIC REGIONS: C,R,Q

MAJOR DESCRIPTORS: Penaeidae/Malacostraca/Osmoregulation/Metabolism/

[CSIRO-056]

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112 **The effects of fuel oil, oil emulsifier and lower salinity upon the common Indo-Pacific reef coral *Acropora formosa* .**

PERIOD: May 1983 -

ORGANIZATIONS: Great Barrier Reef Marine Park Authority
P.O. Box 1379
Townsville, Qld 4810

James Cook University of North Queensland
Sir George Fisher Centre for Tropical Marine Science
Post Office
Townsville, Qld 4811

PROJECT LEADERS: Dr W. Craik (077) 818811
Mr P. Harrison (077) 814111

CONTACT OFFICER: Ms E. Eager (077) 818811

EXPENDITURE: $284 (this year), $2,784 (all years)

MANPOWER: 1.00 (this year), 1.50 (all years)

OBJECTIVE

To determine the effects of oil emulsifier, oil plus emulsifier and lowered salinity on *Acropora formosa* .

METHODOLOGY

Healthy branches of *A. formosa* collected and coral conditions recorded by photography, and notes made on coral colouration, extension, mucus and zooxanthellae extrusion. Tissue samples are collected for histology, single radial polyps are collected and fixed for ultrastructural study on transmission electron-microscope. Branch tips will be collected and examined by scanning electron-microscope study of skeletal growth form.
Use coral *A. formosa* (Widespread and well-studied), Bunker C fuel (widely used in Great Barrier Reef Region), emulsifier BPA-B (currently recommended by Department of Transport), lowered salinity (typical of increased urbanization and industrialisation), in 4 treatments and control.

STATUS

Report to be completed and submitted to GBRMPA.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: *Acropora formosa*
/Anthozoa/Histology/Ultrastructure/Pollution effects/

[GBRMPA066]

113 **Chemical Regulation of Biological Processes. Host Release Factors in Marine Symbioses.**

PERIOD: February 1983 - February 1987

ORGANIZATION: Griffith University
School of Science
Nathan
Brisbane, Qld 4111

PROJECT LEADER: Dr R.J. Quinn (07) 2757567

EXPENDITURE: $25,736 (this year), $34,548 (all years)

MANPOWER: 0.50 (this year), 0.70 (all years)

EXTERNAL SUPPORT: MSTGS - $25,736 (1984)

OBJECTIVE

Symbiosis is an important phenomenon in the marine environment. Zooxanthellae (the algal symbiont) contribute significantly to world ocean productivity and particularly to coral reef benthic primary productivity. The zooanthellae have an important role in the nutrition of the host animals and are essential for the skelton building process in hard corals.

Translocation of fixed carbon from the zooxanthellae to the host is controlled by the host chemically using "host release factors". This project aims to isolate, purify and identify the compound(s) which are utilised by marine invertebrates of marine invertebrate-zooxanthellae symbiotic associations to achieve release of nutrients from the zooxanthellae symbiont.

METHODOLOGY

This project depends on an ability to assay for the release of nutrients from the algal symbionts. This is achieved by isolation of algal cells from the marine invertebrate-zooxanthellae association, incubation of algal cells with $NaH^{14}CO_3$ to obtain incorporation of radioactivity into the products of photosynthesis and examination of release caused by extracts of the host. Various separation techniques will be employed, eg. gel permeation, adsorption, reverse-phase adsorption and ion-exchange chromatography, electrophoresis, isoelectric focussing, in order to isolate the host release factors.

STATUS

Currently two marine invertebrate/zooxanthellae systems are being investigated. The algal symbionts from the sea aneome *Stichodactyla hadonni* and a soft coral have been identified using electron microscopy as *Symbiodinium microadriaticum* . The bioassay for the detection of host release factor is being established.

CO-ORDINATION WITH OTHER PROJECTS

This project is examining the chemical aspects of host release factor and collaboration exists with Dr R. Hine, School of Biological Science, the University of Sydney, and Dr M. Borowitska, School of Environmental and Life Sciences, Murdoch University, who are examining the biological side of control substances in symbioses and nutritional and eco-physiological aspects of symbiosis between algae and invertebrates.

GEOGRAPHIC REGIONS: R,Q

MAJOR DESCRIPTORS: Invertebrata/Algae/Symbiosis/Biochemical analysis/Hosts/

[GRIFFI011]

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114 Eye structure in polychaetes.

ORGANIZATION: James Cook University of North Queensland
Post Office
Townsville, Qld 4811

PROJECT LEADERS: Dr C.G. Alexander (077) 814282
Mr R.S. Smith

CONTACT OFFICER: Dr C.G. Alexander

EXPENDITURE: $1,000 (this year)

MANPOWER: 1.10 (this year)

OBJECTIVE

Investigate the fine structure of the eyes of serpulid (polychaete) worms from a functional, behavioural and possibly evolutionary viewpoint. Developmental biology of polychaete eyes.

STATUS

Fine structure of some adult eyes determined. Larval eyes and their development investigated.

GEOGRAPHIC REGIONS: Q,R

MAJOR DESCRIPTORS: Serpulidae/Annelida/Eyes/Evolution/Behaviour/

[JAMESC058]

METHODOLOGY
Standard ultrastructural techniques.
Standard techniques for investigating photosynthetic characteristics.

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: *Prochloron* /Prochlorophyta/Symbionts/Plant physiology/Ultrastructure/

[JAMESC028]

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117 **Structure and function of sense organs in the banana prawn *Penaeus merguiensis* in relation to the animals behaviour.**

PERIOD: February 1979 -

ORGANIZATION: James Cook University of North Queensland
Department of Marine Biology
Post Office
Townsville, Qld 4811

PROJECT LEADER: Dr C.G. Alexander (077) 814282

EXTERNAL SUPPORT: ARGS - $5,600

OBJECTIVES
To identify and catalogue all external sense organs of *Penaeus merguiensis* .
To describe these in detail using electron microscopical techniques.
To investigate the physiological properties of these organs and relate them to the behaviour of the animal in determining how it responds to the physical environment (e.g. temperature, salinity changes) and the biological environment (e.g. food, animals of the opposite sex, potential predators).

METHODOLOGY
1. Video tape recording of animal's behaviour.
2. Optical and electron microscope examination of sense organs.
3. Electrophysiological recording of neural signals from sense organs.

STATUS
Parts (1) and (2) have produced significant results published in the journal : Marine Biology.

LOCALITY: Cleveland Bay

GEOGRAPHIC REGION: R

MAJOR DESCRIPTORS: *Penaeus merguiensis* /Malacostraca/Sense organs//Behaviour/

[JAMESC042]