



Lizard Island Research Station

Newsletter 2003

Published March 2004

Sponsored by the
Lizard Island Reef
Research Foundation

Lizard Island Research Station

2003: 30th anniversary

and the busiest year ever for research and education



Photo: Andy Lewis



Photo: Andy Lewis

Cover photographs by Alex Vail (fish face) and Andy Lewis (all others).
Other photographs by Lyle Vail or Anne Hoggett unless otherwise indicated.



Lizard Island Research Station Newsletter 2003

This newsletter covers events during 2003.
Published March 2004.

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Charlie Shuetrim

30th Anniversary Development launched!

Lizard Island Research Station has provided 30 years of continuous service to the scientific community. To celebrate, the 30th Anniversary Development is being planned to ensure that the Station continues to support the best coral reef science into the 21st century. It will include new laboratories, a new education centre with a seminar room and library, new offices and other facilities. Construction is planned for 2006 providing fundraising targets are achieved. At an estimated cost of \$1.2 million, the 30th Anniversary Development is the most ambitious capital development program in the Station's history.

Fundraising for the 30th Anniversary Development was launched by the Lizard Island Reef Research Foundation (LIRRF) and the Coral Reef and Marine Science Foundation (CRMSF) on 20 February 2003 at the Australian Museum. By the end of 2003, more than 70% of the target had been promised by generous donors including: Kevin Kalkhoven; The Raymond E. Purves Foundation; Macquarie Bank Foundation; The James N. Kirby Foundation; Charlie & Sandy Shuetrim; P&O Australian Resorts; the Duplessie family; Dick & Patti Eidswick; Captain Cook Cruises; Ken Coles and Rowena Danziger; Trevor Pearson; Dick & Pip Smith; Sarah & Robert Whyte. The fundraising committee consists of LIRRF trustees Charlie Shuetrim (Chairman), Ken Coles and Andrew Green.

The 30th Anniversary Development will include:

- More lab space to cope with a nearly 50% increase in usage by researchers and students since 1990.
- New lab equipment to allow for more sophisticated kinds of research.
- Additional aquarium space to ease the annual crush in spring and summer.
- A computer room with three computers connected to a broadband satellite internet system.
- An education centre with the Station's first dedicated seminar room and a significantly larger library to house more books, journals, reprints and non-print media.
- Storage facilities for the Station's snorkelling and scuba gear.
- Offices for staff.
- A more efficient service area to cope with freight and laundry for this remote community.



Artist's impression of the proposed
30th Anniversary Development

The refurbished and extended Raymond E. Purves Laboratory



Developments during 2003

A substantial refurbishment and construction program costing \$210,000 was carried out during the year. This comprised:

- A substantial upgrade of **Kirby House**, including installation of a commercial kitchen. The James N. Kirby Foundation and Raymond Kirby provided the funds for this project. The new kitchen greatly improves efficiency and cleanliness.
- The **Raymond E. Purves Laboratory** was extended and refurbished. A new air-conditioned room was added to the western end of the building and the lab's wet area was fitted with new floor-coverings and stainless steel benches. These substantial improvements were funded by The Raymond E. Purves Foundation. Since construction of Stage I in 1992, this laboratory has developed into the focal point for laboratory-based research activities at the Station.
- Kirby House, Suntory House, Loomis House and the Raymond E. Purves Laboratory were **painted** inside and out with funding provided by the Australian Museum and the Lizard Island Reef Research Foundation (LIRRF).
- The **roofs were replaced** at Kirby House, Suntory House, Loomis House and the generator shed with funding provided by the Australian Museum.
- A new **kitchen** was installed in Talbot House with funding provided by the LIRRF.

- The Station's power generating capability was upgraded by replacing the smallest **generator** (27 kVA) with a 40 kVA. The Station now has two 40 kVAs and one 60 kVA generator. Funding for the new generator was provided by the LIRRF.
- A reliable flow-through salt-water aquarium system is vital to maintaining research capacity. The Station's system provides a high volume (~10,000 litres/hr) of seawater that is delivered from the nearby reef waters using three pumps. A fourth **pump**, capable of delivering ~4,000 litres/hour, was acquired as a back-up and to increase output during periods of high demand. The new pump was funded by the LIRRF.

The LIRRF also provided funds this year to continue the ongoing replacement schedule for **outboard motors**, to purchase a new **computer** and **printer**, and eight **scuba tanks**.

As well, great improvements to the Station's **database** of contacts, projects, visits and site usage were made during the year with the help of expert volunteers. This database is essential for efficient operations and for informing scientists where they can and cannot collect specimens.

An **EFTPOS facility** was obtained during 2003 to improve efficiency and service.



The new kitchen at Kirby House

Doctoral Fellowships

The Lizard Island Doctoral Fellowship Program is funded by the Lizard Island Reef Research Foundation. Twenty-five Fellowships have been awarded since the program's inception in 1984, with at least one Fellowship being given annually. The program provides financial support for up to three years of field-intensive coral reef research at the Lizard Island Research Station by outstanding PhD students. Each Fellowship is worth up to A\$6,000 per year for up to three years. An additional A\$1,000 per annum may be granted to assist with additional travel costs if the successful applicant is enrolled at a foreign university. Information about the 2005 Lizard Island Doctoral Fellowship will be available at www.lizardisland.net.au by July 2004.

The Fellowship is highly competitive with applications coming from Australia and overseas. Seventeen applications were received for the 2004 Fellowship with eleven from Australia, four from North America and two from other overseas countries.



Justine Becker conducts behavioural experiments with cleaner shrimp and host fishes

Fellowship research during 2003

Justine Becker (2002 Fellow, University of Queensland) spent more than ten weeks over two trips at Lizard Island during 2003 continuing her studies into the ecological role of cleaner shrimps on coral reef fishes. Justine has demonstrated for the first time that cleaner shrimp in the wild remove ectoparasites from fish. Justine found that cleaner shrimp can reduce ectoparasite loads from a species of surgeon fish by 75% over two days. She is planning a final field trip to LIRS of about six weeks duration in 2004.

Line Bay (2003 Fellow, James Cook University) conducted field studies for more than three months during four trips to LIRS in 2003. Her work on thermal adaptation of reef fishes aims to understand how evolution shapes the geographic boundaries of species' distributions, and to increase our understanding of how climate change may affect coral reef fish communities. Line's studies on mitochondrial genes has found that the relationship between pelagic larval duration and gene flow may be more complex than previously thought. Fish species with short larval durations have randomly interbreeding populations along the Great Barrier Reef, whereas species with extended larval durations display genetically structured populations. Line's investigations in 2004 will further clarify population structure of reef fish by examining nuclear genetic markers as well as investigating how thermal tolerance varies among populations and species.

Line Bay and colleagues at work





Chris Fulton and colleagues measure swimming abilities of fishes using a flow chamber.

Chris Fulton (2003 Fellow, James Cook University) is assessing the extent to which wave energy and swimming performance shape the distribution and abundance patterns of fishes on reefs. His study has involved quantifying the wave-induced water motion produced in coral reef habitats, and making direct comparisons with the distribution patterns of reef fishes according to their swimming abilities. Such information is valuable when selecting marine reserve areas for the management and conservation of coral reef ecosystems. Chris made three trips to Lizard Island in 2003 covering 11 weeks. He will make two trips in 2004, totaling about 3.5 months in duration.

2004 Doctoral Fellowship

We are pleased to announce that **Cathie Page** of James Cook University was awarded the 2004 Lizard Island Fellowship for her project "Prevalence and Ecological Impact of Coral Disease on the Great Barrier Reef".

Coral disease is one of the gravest problems facing coral reefs in the 21st century and it is a significant source of coral mortality worldwide. Coral disease is present on the Great Barrier Reef (GBR) and one disease has shown dramatic increases in abundance in the past 5 years. However rates of disease prevalence and incidence, particularly in relation to spatial, temporal and seasonal variability, are largely unknown on the GBR.

Cathie's project will document (1) the incidence of coral diseases, (2) the effects of diseases on coral mortality, (3) the effects of diseases on coral fitness, and (4) the spatial distribution and epidemiology of diseases in the area around Lizard Island. Her research is significant because it will be the first attempt to understand the spatial distribution and the current biological and ecological impact of coral disease on the GBR. In addition, her study allows the impact of coral disease to be evaluated in the context of other disturbance types (e.g. cyclones,

COTS outbreaks, bleaching events). Given the increasing rate of identification of coral diseases worldwide, it is timely to initiate coral disease research on the GBR.

Cathie will undertake three field trips to Lizard Island in each of 2004 and 2005 and two trips in 2006. Her research will investigate disease in corals on outer barrier, mid-shelf and in-shore reefs. In addition, similar, comparative cross-shelf studies will be done off Townsville.



Cathie Page spends a lot of time underwater recording the prevalence of coral disease.



Lizard Island Reef Research Foundation

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Mr Raymond Kirby AO

Mr Henry Loomis and Mrs Jacqueline Loomis
Lady Proud

Mr Robert Purves

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Mr Bill Page-Hanify AM

Mr Robert Purves

Associate Prof Margaret Rose#

Prof Stephan Schnierer*

Mr Charles Shuetrim

Ms Julianna Walton#

Mr Charles Warman AM

[^] deceased

* new trustee in 2003

resigned during 2003

The Lizard Island Reef Research Foundation is an independent trust established to raise funds for the Lizard Island Research Station and to support research on the Great Barrier Reef. Its major commitments are to the Doctoral Fellowships program and to capital developments at Lizard Island. Donations to the Foundation are tax deductible within Australia. More than \$2.4 million has been raised by the Foundation since its inception in 1978. See the inside back cover for Members and Friends of the Foundation in 2003.

In the 2002/03 financial year, the LIRRF contributed \$169,000 to the Station and it has committed additional funds for 2003/04. Developments in 2003 that were made possible by the LIRRF are outlined elsewhere in this newsletter.

Foundation Members' Events

The annual Members' dinner was held on 6 August 2003 at the Wharf Restaurant on Sydney Harbour, thanks to Anders Ousback. About 105 people attended the dinner. Guest speaker Dr Andrew Baker gave an exciting and informative presentation on the impacts of global warming on coral reefs. Andrew is a research scientist at the Wildlife Conservation Society in New York, a former Lizard Island Doctoral Fellow (1997) and a Director of the Coral Reef and Marine Science Foundation. Wine for the dinner was generously donated by Fesq & Company, Shaw & Smith, and Port Phillip Estate.

James Duplessie from New York also attended the dinner. He has had a relatively short, but extremely active, association with the Lizard Island Research Station. James first visited the Station in 1999 with sons, William and Andrew, and again in 2003 with William and his youngest son Stephen. The Duplessie family became Members of the Lizard Island Reef Research Foundation in 1999 and the following year James hosted a fundraising event in Greenwich, Connecticut. In October 2003 Jim Bildner, Chairman and Founder of the Coral Reef and Marine Science Foundation, announced

Geraldine and Trevor Haworth, Pip and Dick Smith



Deirdre and Raymond Kirby





Dr Andrew Baker speaks to LIRRF members at the 2003 dinner

that James Duplessie had agreed to become President of the CRMSF. In February 2004, James will sponsor a fundraising event in New York City. James is thanked for his active participation in raising funds for coral reef research.

Luncheon at the Athenaeum Club in Melbourne is also an annual Foundation Members' event hosted by LIRRF chairman Ken Coles. In 2003, the function was held on 12 August and attended by eighteen people. Dr Andrew Baker gave another interesting talk on his main research topic, the effect of elevated sea temperatures on coral reefs. Trustee Charlie Shuetrim and Member Sandy Shuetrim from Sydney also attended.

The annual dinner in Sydney and luncheon in Melbourne are not intended as fundraisers but as a thank you to existing donors and as a means of interesting others in the Foundation's work. Ken Coles (Chairman of the Lizard Island Reef Research Foundation) initiated both events,

in 1994 and 1998 respectively and continues to organise them personally. Ken is thanked for his long-term success in drawing together people who are interested in supporting the Lizard Island Research Station.

Members' prizes

Each year, Members of the Foundation are automatically entered into a draw for two fantastic prizes. One is a four-night stay for two at the Lizard Island Resort with return air fares to Lizard Island from within Australia, and the other is a four-night cruise for two to Lizard Island aboard the Captain Cook Cruises ship *Reef Endeavour* with return air fares to Cairns from within Australia. These two prizes are generously sponsored by P&O Australian Resorts and Captain Cook Cruises, respectively.

In 2003, John and Margie Goodall were drawn as winners of the Resort prize, and Ros Packer won the *Reef Endeavour* cruise.

Foundation visitors

It is always a pleasure to show supporters the research being done at the Station and how we spend their donations. Many people associated with the Lizard Island Reef Research Foundation visited during 2003 while staying at the Resort or during a Reef Endeavour cruise:

Ken Coles AM and Rowena Danziger

Richard Hein AM (P&O Australia), Lord Sterling (P&O) and party

Michael and Aletha Hoy

Margaret and Rod McDonald

James, William and Stephen Duplessie

Kevin Kalkhoven with Kim Case, Kirsty Kalkhoven, Lorna and Hal Llewellyn and others

Gretel Packer and Shane Murray

John and Margaret Goodall

Phillip and Moira Weate

Pam and Allen Rogers

Frank & Sue Talbot stayed at the Station during September

Kirsty Kalkhoven with the boat that bears her name



James Duplessie with sons Stephen and William





For the record...

Rezoning of the GBR

A new zoning plan for the whole of the Great Barrier Reef was tabled in Federal Parliament by the Minister for Environment and Heritage on 3 December 2003. User groups were widely consulted during the planning phase: the Great Barrier Reef Marine Park Authority (GBRMPA) received about 31,500 submissions during two community consultation phases during 2002/03.

A major provision of the plan is to increase the proportion of highly protected 'no-take' areas (green zones) from the present level of less than 5% to at least 30%. The new plan will also have more scientific research zones and their provisions will be different to existing ones. In general, the public will not be excluded from the new scientific research zones but extractive activities other than research will not be allowed.

The Research Station's main concern is that sustainable extractive research continues to be allowed within the area accessible to researchers at Lizard Island. To ensure a satisfactory outcome, the Australian Museum (represented by Penny Berents and Jeff Leis) and LIRS had numerous consultations with the GBRMPA regarding zoning in the Research Station's areas of operation. In addition, many researchers submitted responses in support of the Station's proposal during the public consultation phases.

In the plan tabled in parliament, the Lizard Island Group is mostly Scientific Research Zone except the northeastern side which is a less-protected Conservation Park Zone and a very small area of more highly-protected National Park Zone at Granite Bluff. The Station will be asking for revision of the boundaries at the northern tip of the island to protect a coral trout spawning aggregation and to bring the zoning plan into line with the existing Cairns Area Plan of Management. The following areas near Lizard Island will also be Scientific Research Zones under the new plan: Macgillivray Reef, North Direction Island, part of Yonge Reef, and Day Reef. Although not ideal, this is a good outcome for the Research Station and its users. Thanks to everyone who supported our proposals and especially to P&O Australian Resorts for their crucial support in helping include the Anchor and Watson's Bay areas in the Scientific Research Zone.

Fire management

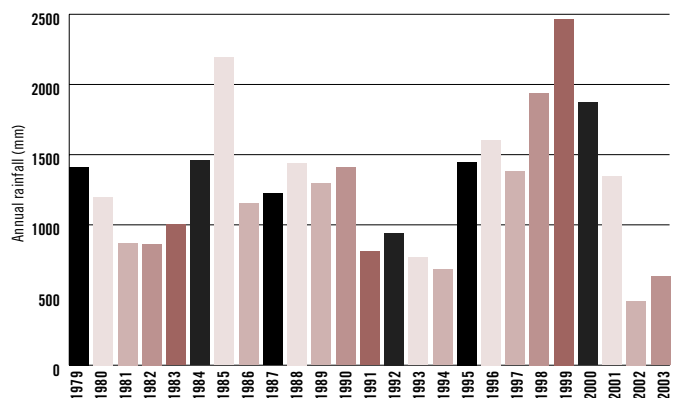
The Queensland Parks and Wildlife Service has a fire management strategy for Lizard Island that includes periodic burning of certain areas. The purpose of the controlled burns is to lessen the likelihood and impact of wildfires and to protect and maintain a balanced biodiversity of natural habitat. For the first time in recorded history, QPWS undertook burns this year on the western side of the Island including areas adjacent to the Resort and the Research Station.

Kirsty K is a big hit

In September 2002, LIRS took possession of a high-speed 6 m catamaran (*Kirsty K*) that was fully funded by a grant from the Coral Reef and Marine Science Foundation. Kevin Kalkhoven was the major donor to this CRMSF initiative. During the next 14 months (to November 2003), *Kirsty K* travelled about 2,000 nautical miles while transporting researchers to eight outer barrier reefs and nine mid-shelf reefs. We thank Kevin and the CRMSF for providing this extremely useful vessel.

Dryest period on record

Like the rest of Australia, Lizard Island experienced severe drought conditions during 2002 and 2003 with only 457 mm and 632 mm of rain in those years, respectively. These are by far the driest years since rainfall records began in 1979. Long-term average rainfall at Lizard Island is 1,301 mm per year.



Work experience student Jessie Ainsworth from Ascham School

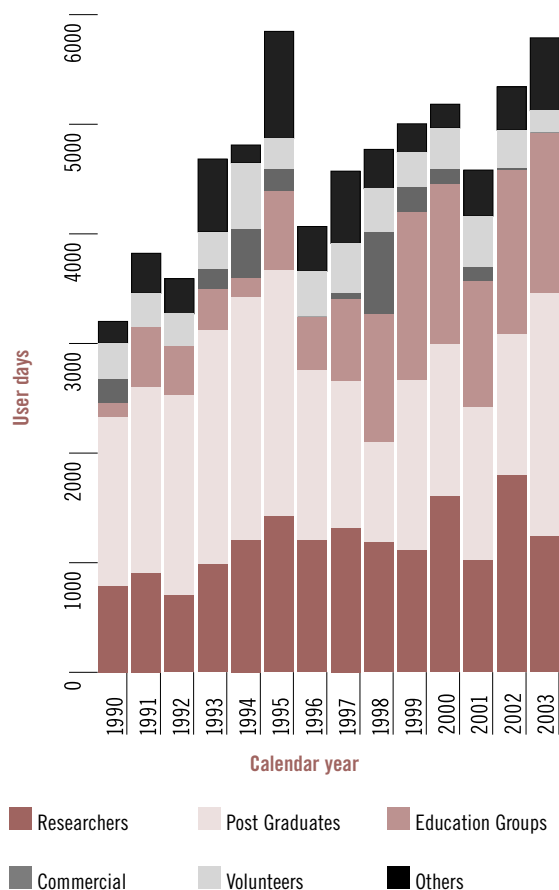


Staff

There are four full-time staff positions at the Research Station and there were no changes in incumbents yet again this year. Lyle Vail and Anne Hoggett have been Directors since 1990. The other two positions are shared by two couples, each working for six months of the year. Lance and Marianne Pearce are on duty during summer (September to March) and they have been employed at LIRS since 1988. Bob and Tania Lamb work during the winter period and they started their first term in April 1998. Long-term volunteers Renie Hood and Snow Amos assisted Lance and Marianne when Anne and Lyle were both off the island in January.

Usage

The Station again achieved record usage by its core user groups during 2003. Researchers, postgraduate students and student groups together accounted for 4,931 user days from a total of 5,800. Volunteers, contractors and official guests make up the difference. The highest monthly usage on record (774 user days) occurred in December 2003.



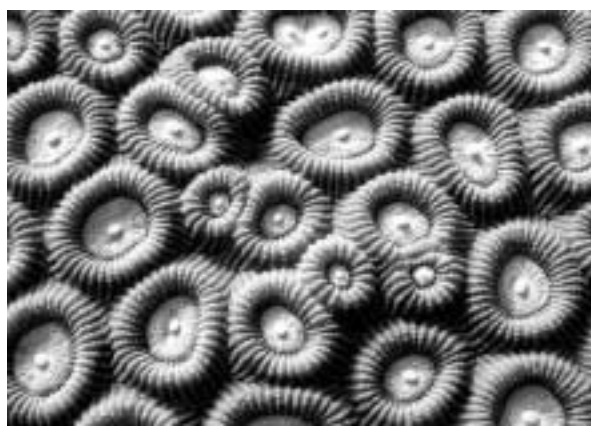
Bench fees

Researchers, educational groups and commercial users are charged a bench fee that is subsidised by the Australian Museum Trust and the Lizard Island Reef Research Foundation. The fee covers shared, self-catering accommodation, use of a small boat, laboratory and aquarium facilities, and scuba tanks and air fills to qualified divers. The fee changes each year on 1 January to cover costs. Researchers and student groups who are applying for grant funding should include a margin for these annual increases. The fee schedule for 2003 and 2004 is (A\$ including GST, per person per night):

	2003	2004
Researcher	\$95.00	\$97.00
Researcher's assistant	\$83.00	\$85.00
Postgrad student (own project)	\$36.00	\$37.00
Postgrad's assistant	\$32.00	\$33.00
School or university group	\$59.00	\$60.00
Commercial	\$176.00	\$180.00

For individuals staying for 28 consecutive days or longer, a 10% discount applies to the whole of their bench fee. Other costs involved in conducting research or bringing an educational group to the Station, such as airfares, barge freight, food, diving gear hire, are detailed on the Station's web site.

Photo: Andy Lewis





For the record...

Volunteer program

The Station's popular volunteer program is essential to its operations. The program provides valuable experiences for the 20 to 30 volunteers accepted each year from the hundreds of applications received. Volunteers give four hours manual work each day and stay for approximately two weeks. The work is maintenance, not research, but many volunteers are recently qualified biologists who are eager to live on a field station, experience the coral reef environment and mix with researchers. Volunteers must pay their own travel expenses and arrange for their own food supplies. To enable volunteers to donate their services, shared accommodation is provided free of charge at the Station. In general, only two volunteers are accepted at any time on a space available basis. Opportunities are greatest from mid-February to mid-June and during August and September. More details about the program and an application form are available on the Station's web site.

Research volunteers

The research volunteer program was established in 2002. The Station's web site invites interested people to register as volunteers to assist with research. Many volunteers have science backgrounds and are highly qualified divers.

The Station can provide Lizard Island researchers with succinct details of volunteers who are available at the appropriate time. It is then up to the researcher to contact the volunteers and make arrangements independently. The Station does not provide prospective volunteers with any researcher's details. Volunteers must be treated under the relevant guidelines at the researcher's home institution and insurance issues should be considered. Bench fees for volunteer assistants are payable by the researcher to the Station as for any other assistant.

A few research volunteers were placed in each of 2002 and 2003. Those that were placed became valuable and effective members of their teams. We encourage other researchers to take advantage of this valuable and cost-effective service during 2004.

Monitoring

The following monitoring activities continued during 2003.

- Daily rainfall and daily maximum and minimum air temperatures have been recorded since 1979. Wind speed and direction records are available from 1996.
- Water temperature data from loggers at 2 metres depth are available from 1993 and at 0 metres and 6 metres depth from 1995.
- The number of crown-of thorns starfish observed by divers from the Research Station has been recorded since 1993.
- Records of human usage and numbers of potato cod at the Cod Hole are available since 1992. The videographer on board the Lizard Island Resort dive boat makes these observations.
- Photographs of individual coral colonies have been taken monthly since February 2002 to record coral bleaching.

In addition, in October this year we began recording the number and species of sharks seen by divers from the Research Station.

Tours

Tours of the Station for Resort guests are conducted on Mondays and Fridays from 9.30 to 11 am. A tour for other island visitors, mainly campers and yachties, is conducted from April to November from 11 am to 12.30 pm on Mondays only. The tours are popular and an effective means of communicating the research being done at the Station.



Research Projects & Participants

Project leaders who are postgraduate students are indicated with an asterisk (*).

Characterization of adaptations to large cell size in *Epulopiscium* sp (October)

Dr Esther Angert (Cornell University), Prof Howard Choat (James Cook University) and Dr Kendall Clements (University of Auckland), assisted by Will Robbins

Genome sequence analysis of an uncultured bacterium (October)

Dr Esther Angert (Cornell University), Dr Karen Nelson (The Institute for Genomic Research), Emmanuel Mongodin (The Institute for Genomic Research), Prof Howard Choat (James Cook University) and Dr Kendall Clements (University of Auckland) assisted by Will Robbins

Evolution and diversity of *Prochloron*-ascidian symbiosis (December)

Dr Brett Neilan (University of New South Wales), Dr Yuichi Hirose (University of the Ryukyus), Dr Tadashi Maruyama (Japan Marine Science and Technology Center) assisted by Brendan Burns, Frank Pomati and accompanied by Eddy Neilan

Ecology of crustose coralline algae: interactions with scleractinian corals (January)

*Lindsay Harrington (James Cook University)

Seagrass photosynthesis and productivity and the effect of depth (November)

Dr Len McKenzie, Dr Stuart Campbell and Simon Kerville (Northern Fisheries Centre)

Vanadium haloperoxidase enzymes in marine algae (July)

Dr Alison Butler (University of California Santa Barbara) assisted by Eric Matthys and accompanied by Oriane Matthys and Madeleine Matthys

Reproductive strategies in the needle coral *Seriatopora hystrix* (Dec 2002/ January)

Dr Ralph Tollrian and *Elke Maier (University of Munich, Germany) assisted by Jens Bohn and Christoph Haacke and accompanied by Susi, Lea and Lenny Tollrian

The distribution and morphology of corals across hydrodynamic gradients (January/ February)

*Joshua Madin (James Cook University) assisted by Dr Andrew Baird and Elizabeth Madin

Large-scale patterns of coral demography on the Great Barrier Reef (January)

Dr Andrew Baird (James Cook University) assisted by Joshua Madin and Elizabeth Madin

Coral disease surveys (January)

Dr Bette Willis, Cathie Page, Elizabeth Dinsdale (James Cook University), Dr Kimberly Ritchie (University of California San Diego, USA) and Dr Garriet Smith (University of South Carolina, USA)

Constructing the first coral chip: a link between bacterial pathogens, coral disease and coral bleaching (July)

*Meir Sussman (James Cook University)

Prevalence and impact of coral disease (July, November)

*Cathie Page (James Cook University) assisted by David Bourne and Dr Bette Willis

Spread and transmission of coral disease on the Great Barrier Reef (July)

*Holly Boyett (James Cook University)

Changes in algal symbiont communities in reef corals at Lizard Island following the 2002 bleaching event (August)

Dr Andrew Baker (Columbia University, USA) accompanied by Tiffen Baker and Teia Baker

Coral diseases (November)

*Meir Sussman (James Cook University)

Community structure of parasites in wrasses (January; March; September)

*Gabriela Munoz (University of Queensland) assisted by Conor Jones

Taxonomy, phylogeny and coevolution of the Sanguinicolidae in Australian waters (January)

*Matthew Nolan (University of Queensland)

The Bucephalidae (Trematoda) system on the Great Barrier Reef (January)

*Nathan Bott (University of Queensland)

Mating behaviour and sexual conflict in simultaneously hermaphroditic sea slugs (January/ February; October/ February 2004)

*Nils Anthes (University of Muenster, Germany) assisted by Prof Nicolaas Michiels, Shireen Fahey and Iris Michiels

Comparative kidney ultrastructure of cerithioidean snails (May)

Dr Ellen Strong (University of Minnesota, USA) assisted by Dr Heather Bennett

Solar powered animals, especially sacoglossans (June)

Dr Geir Johnsen and *Jussi Evertsen (Norwegian University of Science & Technology)

Phylogeographic structuring of marine molluscs in insular settings (July)

*Lisa Kirkendale (Florida Museum of Natural History)

Cloning and expression of the clam homologue of the swelling-dependent chlorine channel (August/ September)

Prof Markus Paulmichl (University of Innsbruck) accompanied by Martina, Katharina and Sebastian Paulmichl

Mating conflicts in hermaphroditic sea slugs (October/ February 2004)

*Annika Putz (University of Muenster) assisted by Prof Nicolaas Michiels and Iris Michiels



Photo: Andy Lewis

Mating behaviour and reproduction within a closely related group of simultaneously hermaphroditic sea slugs (Opisthobranchia: Aglajidae) (November/ December)

*Genevieve Arredondo (School for International Training, USA)

Does the cleaner shrimp/ fish mutualism fit a biological market? (January/ March; October/ November)

*Justine Becker (University of Queensland) assisted by Maely Gauthier and Rob Jacob

Long-term effect of cleaners on gnathiid isopods (January; March; April; May/June; August)

Dr Alexandra Grutter (University of Queensland) assisted by Mark Johnson and Conor Jones

Phylogenetic systematics and biogeography of sphaeromatid isopods (Crustacea: Pericarida) (April)

Dr Regina Wetzer (Natural History Museum LA County, USA) assisted by N. Dean Pentcheff

Role of marine cleaning symbioses in the diversification of gnathiid parasites (April; November/ December)

*Laura Nagel (Queen's University, Canada) assisted by Troy Day and Martial Depczynski and accompanied by Willem Day

Behavioural and ecological relevance of colour vision in mantis shrimp (June)

*Alex Cheroske (University of Maryland Baltimore County, USA)

Polarized light signaling in stomatopod crustaceans (August/ September)

Prof Tom Cronin and *Tsyrr-Huei Chiou (University of Maryland Baltimore County)

Mysid crustaceans of the Lizard Island area (September)

Suzette Talbot (Macquarie University) assisted by Prof Frank Talbot

Role of *Anilocra apogonae* in the parasitic castration and filial cannibalistic behaviour of a cardinalfish species (October/ November)

*Rachel Fogelman (University of Queensland)

Stomatopod signals (November)

Prof Roy Caldwell (University of California, Berkeley) assisted by Gloria Caldwell

Population genetic structure of fish blood parasites (November/ December)

Dr Troy Day (Queen's University, Canada) assisted by Martial Depczynski

Growth and demography of the shallow water crinoid *Himerometra robustipinna* (January)

*Paul Detwiler (San Diego State University, USA) assisted by Ralph Alquezar

Extraction of sperm attractant chemicals from brittlestar eggs (January/ February)

Dr Richard Miller (Temple University, USA) assisted by Bryony Hazell

Phenotypic plasticity in larvae of *Macrophiothrix* (Echinodermata: Ophiuroidea) (January/ February)

*Justin McAlister (University of North Carolina at Chapel Hill, USA) assisted by Kirsty Kemp

Biology and ecology of brittlestars in the genus *Macrophiothrix* (January/ March)

*Tara Fitzhenry (University of North Carolina at Chapel Hill, USA)

Egg size, evolution and larval development in the brittlestar genus *Macrophiothrix* (January/ March)

*Jonathon Allen (University of North Carolina at Chapel Hill, USA) assisted by Dr Johanna Mader

Evolution of early life history stages in *Macrophiothrix* brittlestars (November/ December)

Dr Bob Podolsky (University of North Carolina) assisted by Dr Johanna Mader and Dr Allison Welch

Predator selectivity on juvenile fishes (October/ December)

*Tom Holmes (James Cook University) assisted by Dr Mark McCormick, Shawn Smith, Graham Hill and Nathan Roswell

Orientation of settling reef fish larvae to sources of underwater sound (November)

Dr Andrew Jeffs (National Institute of Water & Atmospheric Research) and Prof John Montgomery (University of Auckland)

The effect of auditory cues on the early stages of coral reef fishes (November/ December)

*Steve Simpson (University of York) and Dr Mark Meekan (Australian Institute of Marine Science) assisted by Marten Wolter and Caroline Stewart

Acoustic conditioning of settlement-stage coral reef fishes (*Pomacentrus*) (November/ December)

*Nick Larsen (School for International Training)

Ontogeny of sensory abilities in larvae of marine fishes (December)

Dr Dennis Higgs (University of Windsor, Canada) and *Kelly Wright (University of New South Wales) assisted by Richard Piola and Andrea Belanger

Ontogeny of behaviour in larval fishes (December/ January 2004)

Dr Jeff Leis (Australian Museum) assisted by Domine Clark, Matthew Lockett, Sue Bullock, Sam Leis and Mark Brown

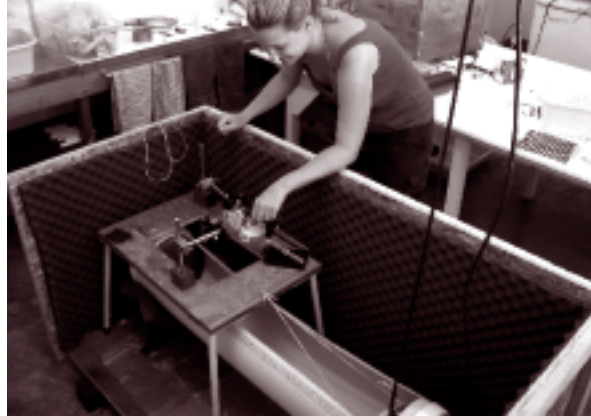
Effect of parasites on larval and juvenile reef fishes (December/ February 2004)

*Jennifer Pickering (University of Queensland)

The effect of stress on damselfish offspring (October 2002/ February)

Dr Mark McCormick (James Cook University) assisted by Shawn Smith, Charlotte Berkstrom, Tom Holmes and accompanied by Donna Larcom

Kelly Wright investigates hearing
in larval reef fishes



Functional morphospace and ecomorphology of chaetodontid fishes (January)

*Nicolai Konow (James Cook University)

Wave energy and the structure of reef fish assemblages: the role of swimming performance (January/ February, July, October/ November)

*Chris Fulton (James Cook University) assisted by Lachlan Barnes, Vincenzo Montalbano, Neal Cantin, David Wakelin and Amara Thomas

Thermal adaptation and the evolution of species' borders in coral reef fishes (January, July, December/ January 2004)

*Line Bay (James Cook University) assisted by Nicolai Konow, Dr Julian Caley, Martial Depczynski, Monica Gagliano, Rhona McPhee, Ewan McPhee and accompanied by Tasman and Kalle McPhee

Demography of chaetodontids (February)

*Michael Berumen (James Cook University) assisted by Danielle De Vere and Josiah Pit

Ecological character displacement in coral-dwelling fishes of the genus *Dascyllus* (February)

*Andrew Limbourn (James Cook University) assisted by Vincenzo Montalbano

Genetic and morphological analysis of colour variation in two coral reef fishes (February/ March)

*Vanessa Messmer (James Cook University) assisted by Stefan Walker

The functional role of cryptobenthic reef fish in coral reef ecosystems (February/ March, November)

*Martial Depczynski (James Cook University) assisted by Adam Barnett

The neuroecology of labrids (March)

*Viviana Gamboa (University of Queensland) assisted by Dr Shaun Collin

Predator-prey interactions in coral reef fish communities (March)

*Ameer Abdulla (James Cook University) assisted by Monica Gagliano

Effect of sociobiological processes on life history traits in reef fish (March/ April)

*Stefan Walker (James Cook University) assisted by Chadd Chustz

Cooperative and cognitive aspects of cleaning symbiosis (March/ April)

Dr Redouan Bshary (University of Cambridge, UK) accompanied by Heidrun Bshary and Heike Hornsmann

Dynamics of reef fish recruitment across their range (April)

Dr David Booth (University of Technology, Sydney) assisted by Giglia Beretta

Survey of coral reef fishes for blood parasites and their possible vectors (April)

Dr Alexandra Grutter (University of Queensland)

Cleaning behaviour as a model system for testing theories of mutualism (April)

Dr Alexandra Grutter (University of Queensland)

Hormones mediating bi-directional sex change in coral reef fishes (April/ May)

Dr Phil Munday (James Cook University), Dr Frederieke Kroon and Dr David Westcott (CSIRO, Australia) and Dr Robin Liley (University of British Columbia, Canada)

Sexual plasticity in a coral dwelling goby, *Gobiodon histrio* (June)

*Jean-Paul Hobbs (James Cook University)

The evolution of monogamy in reef fish (June)

*Marian Wong (James Cook University)

Polarisation signals in fish and stomatopods (June)

Dr Justin Marshall (University of Queensland) assisted by Kylie Jennings

Effects of soft coral extract on butterflyfish detoxification enzyme expression (July/ August)

Dr Daniel Schlenk (University of California Riverside) assisted by Rebecca Polcyn and accompanied by Ronly, Marina and Noah Schlenk

Species recognition in pomacentrids and uv facial patterns of two *Pomacentrus* species (September)

Dr Ulricke Siebeck (University of Queensland) assisted by Dennis Sprenger

The role of ontogenetic colour change in social interaction in damselfish (September, November/ December)

*Samantha Waller (University of Queensland) assisted by Conor Jones and Christine Huffard

Effects of line fishing – visual surveys of coral trout (September/ October)

Dr Tony Ayling (Consultant to CRC Reef) assisted by Gabriel Codina and Chris Ryan, and accompanied by Avril Ayling, Bliss Ayling, Zenica Ayling, Zoe Codina, Melba Quinn, Emma Ryan and Lucas Bluegum Ryan

Growth, demography and stock structure of north Queensland reef sharks (October)

*Will Robbins (James Cook University)

Long-term monitoring of scarids and acanthurids (October)

Prof Howard Choat (James Cook University) and Dr Kendall Clements (University of Auckland) assisted by Will Robbins

The role of selective mortality in the early life history of coral reef fishes (October/ January 2004)

*Monica Gagliano (James Cook University) assisted by Dr Mark McCormick, Vanessa Messmer and Johanna Mader

Trophic implications of diet and mouth-brooding in apogonids (October, November)

*Adam Barnett (James Cook University) assisted by Fiona Merida and Martial Depczynski

Cleaner fish food preferences (November/ December)

Dr Alexandra Grutter (University of Queensland) assisted by Mark Johnson



Research continued

Ultraviolet communication in reef fish (November)

Dr Uli Siebeck (University of Queensland)

Intertidal biotas of Lizard Island: windward versus leeward relationships (September)

Dr Markes Johnson and Dr Gudveig Baali (Williams College, USA)

Sperm evolution in relation to sperm competition in coral reef fishes and invertebrates (November/ December)

Dr Robert Montgomerie (Queen's University, Canada)
assisted by Denise Michaud

Changes in polarization due to environmental conditions (August/ September)

*Shai Sabbah (Hebrew University of Jerusalem)

Polarization decay in seawater (August/ September)

Dr Nadav Shashar (Hebrew University of Jerusalem)

Polarization imaging of underwater environments (August/ September)

Prof Tom Cronin (University of Maryland Baltimore County)

3D determination of the growth and evolution of the Holocene carbonate platforms around Lizard Island (January/ February)

*Siwan Rees and Dr Bradley Opdyke (Australian National University)

Dissolution of carbonate sediments with increased carbon dioxide (January/ February)

*Sarah Tynan and Dr Bradley Opdyke (Australian National University)

Biominalisation (July/ August)

Prof Paul Price (University of California San Diego)
accompanied by Pam, Susie, and Andrew Price

Coral Reefs of the Indo-Pacific and changes in climate (August/ September)

Dr Bradley Opdyke (Australian National University) and
*Siwan Rees (University of Southampton) assisted by Matt
Crabbe and Nigel Stevens

School group (March)

Students of Lakeridge Academy (USA) led by Jane
Maczuzak, Dr Andy Lewis, Mike Emslie and Dave
Williamson

University group (March)

Students of the School for International Training (USA) led by
Dr Tony Cummings, Dr Andrew Lewis and Russell Butler

TAFE group (April)

Students of the Tropical North Institute of TAFE (Australia)
led by Tom Collis and Sue Taylor

University group (May)

Students of Grand Valley State University (USA) led by
Dr Joe Jacquot, Dr Andrew Lewis, Mike Emslie and Dave
Williamson

University group (June)

Students of University of New Mexico (USA) led by Dr Ursula
Shepherd, Dr Joshua Leffler and Anna Tyler

University group (July)

Students of RMIT University (Melbourne) led by Dr Brian
Leonard and Gale Spring

University group (July)

Students of Arcadia University (USA) led by Dr Andy Lewis
and Mike Emslie

School group (July)

Students of Mecosta-Osceola Intermediate School (USA) led
by Peter Brennan, Laurie Tomczyk, Matt Williams and
Dave Williamson

University group (August)

Students of the University of Guelph (Canada) led by Prof
Paul Hebert and Prof Jim Ballantyne

School group (September/ October)

Students of Barker College (Sydney) led by Tim Binet,
Miriam Broadhurst and David Giltrap

School group (October)

Students of Queenwood School (Sydney) led by Liz Kemmis
and Dr Penny Berents

University group (October)

Students of the School for International Training (USA) led by
Dr Andrew Lewis and John Brown

Special interest visits

Jessie Ainsworth (Ascham School, Sydney; work experience,
June/ July)

Allan Ross (Microscope service, August/ September)

Dr Andy Lewis (Teven'i Marine) and Michelle Dyer
(Reconnaissance for group visits, September)

Molly Olsen (May)

Prof Bob Horvitz (Massachusetts Institute of Technology)
accompanied by Martha Paton, Alexandra Horvitz and
Christina Jacobsen (July)

Graham Hill (The Deep, UK) (November)

Dr Pat Vickers-Rich and Prof Tom Rich (Monash University)
and Dr Mikhail Fedonkin and Dr Tanya Tumanova (Russian
Academy of Science) (December/ January 2004)

Volunteer program

Snow Amos

Nikki Bass

Louise Chapman

John Davis

Garrett Donnelly

Wolfgang Freitag

Felicity Hayward

Renie Hood

Johanna Mader

Anna Migdal

Tim Ogden

Thomas Oliver

Phillipe Pichon

Nathalie Pichon

Dennis Sprenger

Sophie Stojic

Linda Tucker

Max Tucker

Peter Wood



Publications

The following publications based on work carried out at the Research Station were received into the Station's collection this year. The collection now totals over 800 publications. All visiting researchers are urged to send two copies of papers resulting from work at Lizard Island to the Station.

Bellwood, D.R. and P.C. Wainwright (2001). Locomotion in labrid fishes: implications for habitat use and cross-shelf biogeography on the Great Barrier Reef. *Coral Reefs*, 20: 139-150.

Bellwood, D.R., P.C. Wainwright, C.J. Fulton and A. Hoey (2002). Assembly rules and functional groups at global geographical scales. *Functional Ecology*, 16: 557-562.

Bellwood, D.R., A.S. Hoey and J.H. Choat (2003). Limited functional redundancy in high diversity systems: resilience and ecosystem function on coral reefs. *Ecology Letters*, 6: 281-285.

Caley, M.J. and P.L. Munday (2003). Growth trades off with habitat specialization. *Proceedings of the Royal Society, London, B (Supplement), Biology Letters*. DOI 10.1098/rsb1.2003.0040.

Caley, M.J. and D. Schluter (2003). Predators favour mimicry in a tropical reef fish. *Proceedings of the Royal Society, London, B*, 270: 667-672.

Chisholm, J.R.M. (2003). Primary productivity of reef-building crustose coralline algae. *Limnology and Oceanography*, 48: 1376-1387.

Glover, E.A. and J.D. Taylor (2001). Systematic revision of Australian and Indo-Pacific Lucinidae (Mollusca: Bivalvia): *Pillucina*, *Wallucina* and descriptions of two new genera and four new species. *Records of the Australian Museum*, 53: 263-292.

Ferry-Graham, L.A., P.C. Wainwright, and D.R. Bellwood (2001). Prey capture in long-jawed butterflyfishes (Chaetodontidae): the functional basis of novel feeding habits. *Journal of Experimental Marine Biology and Ecology*. 256:167-184.

Ferry-Graham, L.A., P.C. Wainwright, M.W. Westneat and D.R. Bellwood (2002). Mechanisms of benthic prey capture in wrasses (Labridae). *Marine Biology*, 141: 819-830.

Fisher, R. (2002). The functional capabilities of reef fish larvae: implications for dispersal during the pelagic phase. PhD thesis, James Cook University.

Grim, J.N. (1993). Description of somatic kineties and vestibular organization of *Balantidium jocularum* sp. n., and possible taxonomic implications for the class Litosomatea and the genus *Balantidium*. *Acta Protozoologica*, 32: 37-45.

Grutter, A.S. (2002). Cleaning symbioses from the parasites' perspective. *Parasitology*, 124: S65-S81.

Grutter, A. (2003). Feeding ecology of the fish ectoparasite *Gnathia* sp. (Crustacea: Isopoda) from the Great Barrier Reef and its implications for fish cleaning behaviour. *Marine Ecology Progress Series*, 259: 295-302.

Grutter, A.S. and R. Bshary (2003). Cleaner wrasse prefer client mucus: support for partner control mechanisms in cleaning interactions. *Proceedings of the Royal Society, London, B. Supplement*, 270: S242-S244.

Grutter, A.S., J.M. Murphy and J.H. Choat (2003). Cleaner fish drives local fish diversity on coral reefs. *Current Biology*, 13: 64-67.

Gust, N. (2002). Scard biomass on the northern Great Barrier Reef: the influence of exposure, depth and substrata. *Environmental Biology of Fishes*, 64: 353-366.

Hall, V.R. (2001). The response of *Acropora hyacinthus* and *Montipora tuberculosa* to three different types of colony damage: scraping injury, tissue mortality and breakage. *Journal of Experimental Marine Biology and Ecology*, 264: 209-223.

Heyward, A.J., L.D. Smith, M. Rees and S.N. Field (2002). Enhancement of coral recruitment by *in situ* mass culture of coral larvae. *Marine Ecology Progress Series*, 230: 113-118.

Hobbs, J.-P. (2002). An experimental evaluation of sexual plasticity in a coral-dwelling goby. Honours thesis, James Cook University.

Hooper, J.N.A., J.A. Kennedy and R.J. Quinn (2002). Biodiversity 'hotspots', patterns of richness and endemism, and taxonomic affinities of tropical Australian sponges (Porifera). *Biodiversity and Conservation*, 11: 851-885.

Hulsey, C.D. and P.C. Wainwright (2002). Mapping mechanics into morphospace: disparity in the jaws of labrid fishes. *Proceedings of the Royal Society, London, B*. 269: 317-326.

Jones, C., A.S. Grutter and T.H. Cribb (2003). *Rhipidocotyle labroidei* n. sp. (Digenea: Bucephalidae) from *Labroides dimidiatus* (Valenciennes) (Labridae). *Zootaxa*, 327: 1-5.

Kroon, F.J., P.L. Munday and N.W. Pankhurst (2003). Steroid hormone levels and bi-directional sex change in *Gobiodon histrio*. *Journal of Fish Biology*, 62: January 2003: 153-167.

Kuiter, R.H. (2001). Revision of the Australian seahorses of the genus *Hippocampus* (Syngnathiformes: Syngnathidae) with descriptions of nine new species. *Records of the Australian Museum*, 53: 293-340.



Publications continued

- Lachlan, R.B. (2003).** An annotated list of the hawk moths and butterflies (Lepidoptera) of Lizard Island, Queensland. *Australian Entomologist*, 30: 1-3.
- Leis, J.M. (2002).** Pacific coral-reef fishes: the implications of behaviour and ecology of larvae for biodiversity and conservation, and a reassessment of the open population paradigm. *Environmental Biology of Fishes*, 65: 199-208.
- Leis, J.M. (2003).** What does larval fish biology tell us about the design and efficacy of marine protected areas? Pp. 170-180 in J.P. Beumer, A. Grant and D.C. Smith (eds.). *Aquatic Protected Areas: What works best and how do we know?* Proceedings of the World Congress on Aquatic Protected Areas, Cairns. ASFB, North Beach, WA
- Leis, J.M. and B.M. Carson-Ewart (2003).** Orientation of pelagic larvae of coral-reef fishes in the ocean. *Marine Ecology Progress Series*, 252: 239-253.
- Leis, J.M., B.M. Carson-Ewart, A.C. Hay and D.H. Cato (2003).** Coral-reef sounds enable nocturnal navigation by some reef-fish larvae in some places and at some times. *Journal of Fish Biology*, 63: 724-737.
- Losey, G.S. (2003).** Cypsis and communication functions of UV-visible coloration in two coral reef damselfish, *Dascyllus aruanus* and *D. reticulatus*. *Animal Behaviour*, 66: 299-307.
- McCormick, M.I., L. Makey and V. Dufour (2002).** Comparative study of metamorphosis in tropical reef fishes. *Marine Biology*, 141: 841-853.
- McCormick, M.I. (2003).** Consumption of coral propagules after mass spawning enhances larval quality of damselfish through maternal effects. *Oecologia*, 136: 37-45.
- Messmer, V. (2003).** Genetic and experimental analysis of colour variation in coral reef fish (family Pseudochromidae). Honours thesis, James Cook University.
- Munday, P.L. (2002).** Bi-directional sex change: testing the growth-rate advantage model. *Behavioural Ecology and Sociobiology*, 52: 247-254.
- Munday, P.L., P.J. Eyre and G.P. Jones (2003).** Ecological mechanisms for coexistence of colour polymorphism in a coral-reef fish: an experimental evaluation. *Oecologia*, 144: 519-526.
- Munday, P.L., M. Schubert, J.A. Baggio, G.P. Jones, M.J. Caley and A.S. Grutter (2003).** Skin toxins and external parasitism of coral-dwelling gobies. *Journal of Fish Biology*, 62: 976-981.
- Nilsson, G.E. and S Ostlund-Nilsson (2003).** Hypoxia in paradise: widespread hypoxia tolerance in coral reef fishes. *Proceedings of the Royal Society London, B. Supplement*. Published online 10.09.03.
- Nuetzel, A. (1997).** Ueber die Stammesgeschichte der Ptenoglossa (Gastropoda). *Berliner Geowissenschaftliche Abhandlungen Reihe E Palaeobiologie*, 26: 1-229.
- O'Dor, R.K., S. Adamo, J.P. Aitken, Y. Andrade, J. Finn, R.T. Hanlon and G.D. Jackson (2002).** Currents as environmental constraints on the behavior, energetics and distribution of squid and cuttlefish. *Bulletin of Marine Science*, 71: 601-617.
- Olson, R.R. (1984).** The life history and larval ecology of the ascidian-algal symbiosis *Didemnum molle*. PhD thesis, Harvard University.
- Patterson, H.M. (2003).** Otolith chemistry, early life history, and potential self-recruitment of coral reef fishes. PhD thesis, James Cook University.
- Riegl, B. and A. Antonius (2003).** *Halofolliculina* skeleton eroding band (SEB): a coral disease with fossilization potential? *Coral Reefs*, 22: 48.
- Schubert, M., P.L. Munday, M.J. Caley, G.P. Jones and L.E. Llewellyn (2003).** The toxicity of skin secretions from coral-dwelling gobies and their potential role as a predator deterrent. *Environmental Biology of Fishes*, 67: 359-367.
- Tebbich, S., R. Bshary and A.S. Grutter (2002).** Cleaner fish *Labroides dimidiatus* recognise familiar clients. *Animal Cognition*, 5: 139-145.
- Tribollet, A., G. Decherf, P.A. Hutchings and M. Peyrot-Clausade (2002).** Large-scale spatial variability in bioerosion of experimental coral substrates on the Great Barrier Reef (Australia): importance of microborers. *Coral Reefs*, 21: 424-432.
- Wainwright, P.C., D.R. Bellwood and M.W. Westneat (2002).** Ecomorphology of locomotion in labrid fishes. *Environmental Biology of Fishes*, 65: 47-62.
- Wilson, S. (2002).** Nutritional value of detritus and algae in blenny territories on the Great Barrier Reef. *Journal of Experimental Marine Biology and Ecology*, 271: 155-169.
- Wilson, S.K., D.R. Bellwood, J.H. Choat and M.J. Furnas (2003).** Detritus in the epilithic algal matrix and its use by coral reef fishes. *Oceanography and Marine Biology: an Annual Review*, 41: 279-309.
- Zeller, D., S.L. Stoute and G.R. Russ (2003).** Movements of reef fishes across marine reserve boundaries: effects of manipulating a density gradient. *Marine Ecology Progress Series*, 254: 269-280.
- Zemke-White, W.L., J.H. Choat and K.D. Clements (2002).** A re-evaluation of the diel feeding hypothesis for marine herbivorous fishes. *Marine Biology*, 141: 571-579.

