Southern California Association of
Marine Invertebrate Taxonomists

3720 Stephen White Drive
San Pedro, California 90731

July, 2002

SCAMIT Newsletter

Vol. 21, No. 3

SUBJECT:	**Epitoniidae**
GUEST SPEAKER:	**none; Ron Velarde Discussion Leader**
DATE:	**9 September 2002**
TIME:	**9:30 a.m. to 3:30 p. m.**
LOCATION:	**City of San Diego - Marine Biology Lab** **4918 N. Harbor Dr., suite 201**

DIDN'T SEE IT COMING

Gorgonocephalus sp - (juv) found on *Thesea* sp B
CSD Station SD 11, 9 July 02, 90m
disk diameter approx. 2-3mm

Dave Montagne recently circulated the following item among folks at CSDLAC. It's worth passing on.
"I note in the 24 May issue of Science a little sidebar that reports the following:

Happy to Be ... a Biologist

The best job in the United States is that of biologist, according to this year's ranking by the Jobs Rated Almanac.

Biologists have moved up from 23rd place a few years ago to displace financial planners at the top of the heap. The almanac rates jobs according to stress levels, pay, degree of autonomy, physical demands, job security, and market demand. The rankings are based on government labor and census data, combined with surveys conducted by trade and industry groups.

Two other scientific disciplines are also in the top 10: meteorology and astronomy.

Congratulations to all of us on our perspicacious choice of career!"

BUT THEN AGAIN...

The other side of this issue was recently circulated by John Ljubenkov, who provided a link to Dr. Milt Love's webpage and an entry entitled "So You Want To Be A Marine Biologist". You too can examine it (and in light of the Science report above, you should) at

http://www.id.ucsb.edu/lovelab/biologist.html

NEW LITERATURE

Well, it's almost that time again. Bight '03 is almost here, and the planning stage is almost upon us. One of the things that all those who participated in the trawling effort of B'98 recall was the stupendous waste of blindly applying random station location methodology in areas of mixed bottoms. This was particularly evident off San Diego, and in the Channel Islands. Many nets were needlessly sacrificed to inviolable randomness, and many man-days of labor lost in attempts to trawl at sites where the bottom was unsuited to use of trawl gear. One of the recommendations coming from that experience is that it not be repeated; that the locations of untrawlable bottom be treated as if they were land, and excluded from the random draw station location pool. To do so we will need to accurately characterize the bottom in question. Cochrane & Lafferty (2002) report on initial attempts to distinguish between hard and soft bottoms in the Channel Islands using sidescan sonar data.

This is of some importance. High relief reef structure can be observed with a fathometer by a boat pre-cruising the proposed trawl path, but flat or low-relief hard bottom cannot. Low reefs, especially when intermittently covered by thin sediments, pose little risk to trawling efforts as they offer little to snag the net. Trawling across such bottoms will often will bring up interesting and unusual organisms which will allow the nature of the bottom to be reconstructed by shipboard observers.

If the bottom is, however, subject to little or no intermittent sediment cover, it will probably bear sessile organisms with the potential to snag and/or tear the net. Such bottoms can only be avoided by careful preparation, and investigative tools such as those used by the present authors. It remains to be seen if Bight '03 will again take us to the Channel Islands, and if so, whether we will trawl there. If we do, we must be prepared.

Another often mentioned possibility for inclusion in the scope of B'03 is sampling on the upper and middle slope, and perhaps the nearshore basins. Such a move, if taken, would allow examination of areas which either pass through or accumulate anthropogenically modified sediments. It will also expose taxonomists and ecologists familiar with benthic communities nearer shore to different animals forming unfamiliar communities. We might encounter seep/vent associated communities. There is limited development of this type of chemautotrophy-based community even in nearshore waters on Palos Verdes, where hydrothermal vents exist in several locations.

In deep water these communities are scattered widely in the North Pacific. Kojima (2002) provides an overview of the distribution and constituents of such communities in the northwestern Pacific. One subset, the mussel bed community around thermal vents, is described in more detail by Van Dover (2002). While she describes the community at three sites on the southern East Pacific Rise, she found the same species there known from much further north. Focusing even further, Martell et al (2002) discuss the biology of a new species of buccinid whelk found on the Juan de Fuca Ridge in the Northeast Pacific. The species is from worm beds rather than

musselbeds, and the authors provide information on diet, reproduction and predation on the snail by large majid crabs. It is described in Harasewych and Kantor (2002).

The worm beds are formed of vestimentiferans, worms typically found around vents. These have in the past usually been treated as members of a separate phylum, although the first attempt at placing them within a classificatory context was as a subfamily of the polychaete family Sabellidae. A recent cladistic analysis of their relationships (Rouse 2001) found nothing to indicate a position differing from that proposed by Rouse & Fauchald 1997; placement as a separate family, the Siboglinidae, within the sabelloids. Rouse utilized a set of 30 characters in the analysis of siboglinid genera. He viewed all other vestimentiferan families as synonyms of this one family. Perhaps if we go deep enough we'll see some of these guys...I've been hoping to for years.

There is also a possibility that B'03 sampling will take us again into the shallow, particle-rich waters of bays and harbors. If we do sample there we will undoubtedly see the often large filter-feeding slipper snail *Crepidula onyx*. This species forms "stacks" under the right conditions (plenty of food and not too many predators). A path of protandrous hermaphoditism is followed, starting out as males and undergoing a sex change to female as they get larger. A male larva will settle from the plankton onto the back of a female, or of a prexisting male atop a female. As he grows he probably will accumulate another male on his own shell, eventually forming the stack. The question is, "why do they settle there, rather than just alongside the female [still allowing reproductive access]"? Zhao and Qian (2002) address this question, trying to parse apart the effects of chemical cues to settlement provided by other snails already there, and the cues provided by the biofilm which covers them, and nearly all hard surfaces subtidally.

From my point of view, what is even more interesting is how, when the one at the bottom of the stack dies, do the rest avoid falling to their burial and death in the surrounding soft sediments? They are only held in place by the adhesion of the foot of the bottom female; once she is gone, so is their attachment to the substrate. Suggestions?

A similar problem faces ectoparasites of animals that molt; how to stay on the host when it sheds its exterior? Behaviour of a clam symbiont and an isopod parasite of a mudshrimp are reported by Itani, Kato and Shirayama (2002). They used time-lapse video of the process of ecdysis (skin-shedding) in the host, and carefully monitored the timing and nature of movement of the symbionts.

They distinguish two strategies for symbionts to deal with ecdysis; 1) complete your life-cycle between molts and don't attempt to remain on the host, or 2) be mobile and leave the shed molt for the newly exposed surface of the host. There actually is a third method, hormonal control of host physiology and complete suppression or drastic extension of the host molt cycle. This is the method used by those physio-terrorists the ascothoracid barnacles, who are internal parasites with external reproductive structures and must also cope with molting. Of course if you are a parasite using so much of the host energy that it doesn't have any left for somatic growth, the need for molting largely disappears. The authors give a nice summary of the existing literature on the problem, and combined with their video, this is a nice concise treatment of the issue.

Remember the "Wanted" posters that Andy Cohen put out several years ago for the introduced crabs *Eriochir sinensis* (the Chinese wooly-handed Crab) and *Carcinus meanas* (the European green crab)? While having a major impact in San Francisco Bay and associated estuarine areas (including the Sacramento Delta), neither of these two miscreants has

shown up in the SCB. Don't get me wrong, I'm glad they aren't here; I just wonder if they're coming at all. I heard that *C. maenas* has been taken as far south as Morro Bay, but I hope the report is erroneous.

Perhaps the answer is in the animals themselves. *Eriochir*, for instance, needs freshwater to complete it's life cycle, and we have precious little of that here in Southern California. But what about *Carcinus*? The answer may be buried in the detail provided by Moksnes (2002). His studies indicate that early instars have very specific habitat preferences, they like to settle in mussel beds and filamentous red algal patches on rocky shores (or in eelgrass beds in bays). This should guarantee a virtually complete connection between San Francisco Bay and the shores of the Bight. Although there are some sandy stretches inbetween, rocky habitat should be within the dispersive reach of the planktonic larvae to either side. Such interspersed sandy beachs may deter young crabs, but not larvae. Given this information, we should brace ourselves for the eventual arrival of the green crab as the margins of the population push into open coastal areas outside of bays, followed by current driven lateral spread along the coastline. It may be that young crabs are also carried down the coast with boat fouling. The result will be the same – emergence of the green crab as an introduced pest in the SCB, unless, of course, they don't like it here...We'll see. Information on the species is available from many internet sources. I recommend the concise treatment at

http://www.mdsg.umd.edu/MarineNotes/Mar-Apr96

Keep your eyes open.

Morphometric analysis is only infrequently performed on non-hard body parts subject to shrinkage, contraction, and distortion in preservation. Voight (2002) applies it to a series of characters of reproductive structures in male octopus. Characters of the hectocotylized arm, being primary sexual characters, should be strongly modified during growth. In consequence she analysed several hectocotylus characters with regard to mantle length in 43 different species.

MINUTES

The July 15th SCAMIT meeting was extremely well attended. The business meeting began with Kelvin reminding us of upcoming meetings: Aug 19, Nereids at LACMNH, Sept 9, Epitoniidae at CSD, and Oct 21, a review of the Glyceridae at LACMNH.

Kelvin also reminded everybody that 20th anniversary t-shirts were still available and he just happened to have some at the meeting on display and ready for purchase.

There has been an email change for the people employed by Hyperion (CLAEMD). Their new email addresses will now consist of the person's three initials followed by "@san.lacity.org".

After the business portion of the meeting was concluded Kelvin introduced a guest speaker, N. Scott Rugh from the Paleontology Department of the San Diego Natural History Museum. Scott gave a talk based on his presentation at the WSM meetings earlier this year. Following is the abstract from his paper:

"A Highly Diverse Holocene Invertebrate Fauna Collected After Beach Replenishment Operations at Cardiff State Beach, San Diego County

During the month of August, 2001 a phase of beach replenishment conducted by SANDAG (San Diego Association of Governments) transported ocean bottom sand from under 70 feet of water one kilometer offshore to the shore at Cardiff State Beach. Shells contained in the sand were sifted out by the tides, and for approximately two weeks beginning August 19, repeated collections were made from this deposited material. Specimens were brought to

the San Diego Natural History Museum, cleaned, sorted, and identified and placed in the Paleontology Department. Two hundred fifty invertebrate specimen lots were entered, mostly bivalves and gastropods, and three vertebrates, including individual teeth of a bat ray, shark, and Sheepshead Fish were also identified. The most common large gastropod, spread by the hundreds along the high tide line of the rocky berm, was *Bursa californica*. This species lives in shallow to deep water and shells usually are only occasionally brought on shore by winter storms. Other subtidal species common in the dredge material included *Turritella cooperi*, *Megasurcula carpenteriana, Terebra pedroana*, *Dentalium pretiosum*, *Pecten diegensis*, and *Glycymeris subobsoleta*. The specimens were empty and most were dull and slightly discolored. Although most specimens were probably derived from an offshore, buried Holocene deposit, a few of the deep water shells brought up by the dredging were clearly modern. Among these were *Halistylus pupoides*, a few of which still had operculi in the apertures, and specimens of *Sinum scopulosum*, *Lucinoma annulata*, *Tellina idae*, and other bivalves that still had periostracum attached."

In addition to the information included in the above abstract, Scott discussed two species he discovered which were unusual. He found specimens of *Acmaea mitra* and *Cryptochiton stelleri* which are known from central and northern California but not from this far south. Perhaps this discovery indicates their presence, historically, in the Southern California region. Scott also brought a special gift for those present; he had a large bag full of frog shells (*Bursa californica*) which were passed around the room and people were encouraged to help themselves. You will find attached at the end of the newsletter a complete listing of the species collected during the project.

With Scott's talk concluded it was time for the main portion of the meeting to commence. The presentation on digital imaging, given by Rick Rowe (CSD) and Kelvin Barwick (CSD) was so extensive and thorough that your secretary gave up the idea of trying to take down all the information after just a few minutes. Included below is a general overview of the topics discussed and some links that were used during the creation of the presentation. Kelvin started by covering the various file format options and modes when saving a digital file: Bitmap = TIFF, JPEG, GIFF, and Object oriented = PICT, EPS and Tilepic. As for the modes aspect he covered grayscale and and CMYK vs. RGB. He then discussed how to modify images in terms of if images are too dark or too light, out of focus, or need color corrections. Next was document production: Image processing (Adobe Photoshop, and Photoelements), Page layout (Adobe Pagemaker, InDesign, Quark Xpress, Word processor), Electronic publication (Adobe Acrobat), HTML/web publishing, and presentations (Microsoft Powerpoint). Finally he discussed the practical applications of using digital images. Digital imaging saves time and effort in terms of getting visual data processed and available. It's invaluable in large labs for assisting with in-house communication and QA/QC as well as interlab calibration and communicating information quickly and efficiently with experts around the world.

Rick Rowe did a very thorough and detailed presentation with regards to the actual art and science of photography. Below is a list of links from sites where he garnered much of his information. Please take the opportunity to browse these sites and educate yourself as to the wonderful world of digital photography (these links are not hyperlinked in this newsletter, as there are too many of them; we will work on making this list available on the web in the near future).

IMAGING HARDWARE POWERPOINT PRESENTATION SCAMIT 15JULY2002 BY RICK ROWE — LINKS INCLUDED WITHIN THE SLIDESHOW

COLOR PERCEPTION
http://www.cybercollege.com/tvp028.htm

DEFINITION AND EXPLANATION OF COLOR TEMPERATURE
http://micro.magnet.fsu.edu/primer/photomicrography/colortemperature.html

CHROMIC ABERRATION
http://www.chm.colostate.edu/erf/teaching/c532/opaberfib.htm

BASIC OPTICS
http://www.overtonphoto.com/tech/optics.htm

ADVANCED MICROSCOPY OPTICS
http://www.microscopy.fsu.edu/primer/anatomy/components.html

CONCEPTS OF MAGNIFICATION
http://micro.magnet.fsu.edu/primer/anatomy/magnification.html

COMPOUND MICROSCOPE LIGHTING VOLTAGE CONTROL
http://micro.magnet.fsu.edu/primer/photomicrography/colortemperature.html
(scroll down below the color spectrum graph for a short statement about the photovoltage control)

MICROSCOPE LIGHTING HARDWARE
http://www.olympusmicro.com/primer/anatomy/sources.html

GENERAL INFORMATION ABOUT FILTERS AND FILTER TERMINOLOGY
http://www.edmundoptics.com/techsupport/DisplayArticle.cfm?articleid=273

CONTRAST IN OPTICAL MICROSCOPY
http://micro.magnet.fsu.edu/primer/techniques/contrast.html

SPECIALIZED MICROSCOPY TECHNIQUES
http://www.microscopy.fsu.edu/primer/techniques/

SUMMARY OF SOURCES OF MICROSCOPE RESOLUTION ABERRATION
http://www.olympusmicro.com/primer/anatomy/aberrationhome.html

NUMERICAL APERTURE (N.A.)
http://www.microscopy.fsu.edu/primer/anatomy/numaperture.html

OBJECTIVE LENS
http://micro.magnet.fsu.edu/primer/anatomy/objectives.html

KOHLER ILLUMINATION
http://micro.magnet.fsu.edu/primer/anatomy/kohler.html

ABBE CONDENSER
http://micro.magnet.fsu.edu/primer/anatomy/condensers.html

CONDENSER NUMERICAL APERTURE (C.A.N.)
http://www.olympusmicro.com/primer/java/mtf/modulation/

USEFUL TOTAL MAGNIFICATION
http://www.microscopyu.com/articles/formulas/formulasmagrange.html

MICROSCOPE OPTICAL COMPONENTS
http://www.microscopy.fsu.edu/primer/anatomy/components.html

MARTIN MICROSCOPE ADAPTER
http://www.martinmicroscope.com/MM99707%20&%20MMC00L5K.htm

ISOLATING PROBLEMS WITH IMAGES – PROCESS OR HARDWARE?
http://micro.magnet.fsu.edu/primer/photomicrography/errors.html

http://micro.magnet.fsu.edu/primer/photomicrography/chromereflectfaults.html
(works for digital also)

NIKON MICROSCOPY UNIVERSITY
http://www.microscopyu.com/index.html

MOLECULAR EXPRESSIONS
http://micro.magnet.fsu.edu/primer/index.html
Special thanks to Michael W. Davidson and Florida State University for the volumes of information.

CHARGE-COUPLED DEVICE (CCD)
http://micro.magnet.fsu.edu/primer/digitalimaging/concepts/ccdanatomy.html

WHY 72 DPI?
http://www.scantips.com/basics1a.html

RESAMPLING
http://www.designer-info.com/master.htm?http://www.designer-info.com/Photo/image_resample.htm

UNDERSTANDING DEPTH OF FIELD
http://www.luminous-landscape.com/tutorials/understanding-series/dof.shtml

DEPTH OF FIELD CALCULATOR SOFTWARE (FREE)
http://tangentsoft.net/fcalc/

CIRCLE OF CONFUSION
http://www.nikonlinks.com/unklbil/dof.htm

SMALLER DIGITAL SENSORS AND DEPTH OF FIELD
http://www.wrotniak.net/photo/dof/

HIGH END SCANNER
http://www.cameras-scanners-flaar.org/Fujifilm_Electronic_Imaging/Fujifilm_C550_Lanovia_scan.html

SCANNER REVIEWS AND ANOTHER LINK TO PROFESSIONAL PRINTING AND SCANNING AT THE FLAAR COMMUNITY OF WEBSITES
http://www.flatbed-scanner-review.org/

GENERAL AND STRAIGHT FORWARD SCANNING TIPS
http://www.scantips.com/

DEMO OF HOW A CCD WORKS
http://micro.magnÖt.fsu.edu/primer/java/photomicrography/avalanche/

CMOS OR CCD?
http://www.kodak.com/US/en/corp/researchDevelopment/technologyFeatures/cmos.shtml

CANON EOS-D60 - ONE OF THE BEST dSLR's
http://www.dpreview.com/reviews/canoneosd60/page24.asp

CANON EOS-D60 – REVIEWED AT MY SECOND FAVORITE PHOTO SITE (MAYBE THE THIRD ACTUALLY BEHIND LUMINOUS LANDSCAPE)
http://www.steves-digicams.com/2002_reviews/d60_pg5.html

NIKON D-100 REVIEWS
http://www.dpreview.com/reviews/nikond100/

http://www.steves-digicams.com/2002_reviews/nikon_d100.html

http://www.naturfotograf.com/index2_PC.html
A very serious photographer's opinion

SONY DSC-F707 REVIEW – THE 5Mp CAMERA USED BY THE CITY OF SAN DIEGO AND BY THE AUTHOR OF THIS LIST (WITH THE MARTIN MICROSCOPE ADAPTER FOR PHOTOMICROSCOPY)
http://www.dpreview.com/reviews/sonydscf707/

LUMINOUS LANDSCAPE – A WEALTH OF TUTORIALS AND EXCELLENT IMAGES
http://www.luminous-landscape.com/tutorials/dq.shtml

ONE OF SEVERAL LCD PROJECTOR SITES
http://www.projectorcentral.com/

Several sites on the Web deserve special recognition for content. Specific pages from these sites may have been included in the Imaging Hardware SCAMIT presentation, but I recommend browsing through the sites for more information.

For the photographer – everything from color theory to camera reviews with excellent guest authored articles and accompanying images – Select the "Understanding Series" and "Tutorial" dropdowns on the home page. http://www.luminous-landscape.com

Reviews and user forums are a good way to add to your evaluation of equipment before purchase. My favorites are: http://www.dpreview.com - Phil Askey's camera reviews

http://www.steves-digicams.com/

http://www.imaging-resource.com/

http://www.dcresource.com/

NEW BOOKS

Two new books may be of interest to readers. The first is available, the second is in the future, and is calling for participation by interested parties.

First – Australian Crustaceans

Just published, 2002: "A Field Guide to Crustaceans of Australian Waters" (new edition) by Diana Jones and Gary Morgan, 224 pp, Reed New Holland Publishers, Sydney. Price A$39.95. Order by email from: bookshop@museum.wa.gov.au. Enquiries to: diana.jones@museum.wa.gov.au

The Book

"A Field Guide to Crustaceans of Australian Waters" is the most current, complete summary of all Australia's known crustaceans. It is the only book of its kind, giving an overview of Australia's tropical and temperate, marine and fresh-water, as well as terrestrial, crustacean species. A great deal of research has been undertaken since the first edition of this book was published. This second edition incorporates up-to-date information, with each section checked by world experts, and even features rare, recently discovered subterranean crustaceans.

This beautifully laid out, easy to follow book, with its comprehensive bibliography, glossary and reference list, is aimed at naturalists, scientists, marine science students, commercial and recreational fishermen, marine ecologists and zoologists, fisheries departments and environmental agencies, who will find it useful for identification and other purposes. For the general reader, it will open a door to the biology of these often beautifully coloured and outrageously shaped animals. Lavishly illustrated with line drawings and stunning photographs, this is an essential guide for anyone with a crustacean interest.

The Authors

Diana Jones and Gary Morgan are experts in their field. Marine life teems around the vast coast of Western Australia and so it is no coincidence that both scientists work at the Western Australian Museum. Diana specializes in crabs in the mangrove areas and in barnacles, and also has an interest in introduced marine pests as well as the fauna of hydrothermal vents. She has published extensively on crustacean taxonomy and biology and she is the Curator of Crustacea at the Museum. Gary also specializes incrabs including hermit crabs; freshwater crayfish are another area of his research. He also has a particular interest in coral reef animals. Curator of Crustacea at the Museum for seven years, he is now the Executive Director."

Your editor has not yet seen this volume, but it sounds very interesting.

Second – Eastern Pacific Crustaceans

"CALL FOR PAPERS: FIRST ANNOUNCEMENT, AUGUST 2002
SECOND VOLUME OF BOOK ON EAST PACIFIC CRUSTACEAN (sic)

The second issue of a series of volumes on marine crustaceans from the east Pacific is being prepared for publication in 2003 (December). The book will follow the format of individual contributions (one or several authors) related to any aspect (biology, taxonomy, fishery ...) of benthic and pelagic crustaceans, including synthesis or review papers. Contributions in Spanish or English will be accepted.

Each contribution will be reviewed by 1-2 referees to check for quality. However, the main objective of this series of books is to make available regional contributions as well as to rescue original and valuable information which has never been published in "tough" journals, like data in reports or thesis. Hence, criteria for accepting contributions will be softer than in major journals although care will be taken to provide a top quality to format and edition; in particular, style and correct use of language will be strictly examined.

Format will be aprox. 17 cm x 22 cm, two columns. Instructions to authors will be mailed to potential authors upon request or can be obtained at the following web site (September 2002): http://ola.icmyl.unam.mx

This site also displays Volume 1 contents and cover (volume 1 due August 2002). A volume will be published every year.

There will be a page charge of 15 US$ (fifteen) per page in order to pay for part of the printing. Each issue will have 500 copies. Authors will be allowed to buy issues at cost and will receive 25 free reprints (extra reprints will be at cost). The editor will be Michel E. Hendrickx (Unidad Academica Mazatlan, UNAM, Mazatlan, Mexico) but an English co-editor will assist if necessary.

Please let me know of your interest to contribute to this second issue before the 15 of December 2002 at one of the following e-mails (preferably the first): mehendrickx@us.es or michel@ola.icmyl.unam.mx

Please include the following data:

1. Author(s), afiliation and institution address (mail and e-mail)
2. Tentative title for the contribution.
3. Number of pages (aprox.) of contribution (MS, double space, including figures and tables)
4. Maximum date for submitting the MS
5. Availability of PC equipment to send and receive electronic files.

Manuscripts can be submitted any time but the dead line for Volume 2 is May 2003. Contact editor first for details regarding the sending of manuscripts through regular mail, express mail and internet."

General thanks to Dr. Hendrickx for undertaking these volumes, we should be getting a glimpse of the first one any day now. Hopefully some SCAMIT members will choose to be involved in this project.

JOBS!!!

"I am writing to solicit applications for 4 new postdoctoral positions at the Centre for Coral Reef Biodiversity in Townsville, Australia. One is available immediately, and all 4 should ideally start by the end of this year. We can offer 1, 2 or 3-year positions (preferably 3-year), with a beginning salary of approximately A$50K plus benefits. Funding is available for moving costs from overseas. We will shortly advertise these positions in Science/Nature.

The successful applicants will join Centre staff engaged in the study of coral reef biodiversity at a global scale. There is considerable scope for the successful candidates to shape a role that suits their particular strengths and interests. The successful applicants will be expected to publish her or his work in high-quality journals, and to collaborate with Centre staff to apply their skills to research problems in coral reef biodiversity. We are particularly interested in people with advanced training in macroecology, evolutionary biology,

biogeography, functional biology and paleontology. We also seek a biostatistician who will develop new statistical models for use in the study of the distribution, abundance, and ecological function of organisms at large scales. To be competitive, younger applicants will need to have already published some of the PhD results in better journals.

In our first year of operation, the CCRB has secured $10 million in competitive research funding. (Applicants can find out more about the members and activities of the Centre at the URL below. A list of 50 publication by the Centre for 2001/2 is available on request).

Please ask potential candidates to contact me (or another CCRB Member if they prefer) by email for further details. Thanks for your time.

Prof. Terry Hughes, FAA
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VISIT THE NEW CENTRE FOR CORAL REEF BIODIVERSITY

http://www.jcu.edu.au/school/mbiolaq/ccrbio/

CORRECTION

In the June issue of the SCAMIT newsletter, reference was made to *Microcosmus exasperatus*. This name is no longer in use and the animal is now *Microcosmus squamiger*. Thanks to Ron Velarde (CSD) for catching my mistake – M. Lilly.

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Please visit the SCAMIT Website at: http://www.scamit.org

SCAMIT OFFICERS:

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SAN DIEGO NATURAL HISTORY MUSEUM
DEPARTMENT OF PALEONTOLOGY
FROG SHELL HEAVEN: CARDIFF STATE BEACH DREDGE

LOCALITY NUMBERS 4508	SPECIES
1	Spirorbis sp.
4	Balanus sp. cf. B. aquila Pilsbry, 1907
6	Balanus sp. cf. B. pacificus Pilsbry, 1916
37	Megabalanus californicus (Pilsbry, 1916)
1	Tetraclita rubescens Darwin, 1854
9	Decapoda
2	Cancer sp. cf. C. antennarius Stimpson, 1856
3	Cancer sp. cf. C. gracilis Dana, 1852
9	Randallia ornata (Randall)
1	Loxorhynchus grandis Stimpson, 1857
2	cf. Pugettia sp.
1	cf. Isocheles sp.
5	Heterocrypta occidentalis (Dana)
12	Cryptolepas sp.
1	Platylepas sp.
1	Terebratalia transversa Sowerby, 1846
23	Bryozoa
45	Cellaria sp.
1	cf. Coenocyathus bowersi Vaughan, 1906
1	cf. Astrangia lajollensis Durham, 1947
24	Dendraster excentricus (Eschscholtz, 1831)
23	Strongylocentrotus sp.
6	Spatangoida
2	Acmaea digitalis Rathke in Eschscholtz, 1833
30	Acmaea insessa (Hinds, 1842)
3	Acmaea mitra Rathke, 1833
3	Acmaea paleacea (Gould, 1853)
4	Acmaea sp. cf. A. pelta Rathke in Eschscholtz, 1833
2	Acmaea scabra (Gould, 1846)
9	Diodora aspera (Rathke in Eschscholtz, 1833)
5	Fissurella volcano Reeve, 1849
1	Lucapinella callomarginata (Dall, 1871)
4	Megathura crenulata (Sowerby, 1825)
1	Haliotis assimilis Dall, 1878
10	Haliotis rufescens Swainson, 1822
39	Tricolia compta (Gould, 1855)
4	Calliostoma canaliculatum (Lightfoot, 1786)
2	Calliostoma gemmulatum Carpenter, 1864
1	Calliostoma gloriosum Dall, 1871
2	Calliostoma supragranosum Carpenter, 1864
7	Calliostoma tricolor Gabb, 1865
517	Halistylus pupoides (Carpenter, 1864)
4	Lirularia sp. cf. L. parcipicta (Carpenter, 1864)
11	Norrisia norrisi (Sowerby, 1838)
5	Tegula aureotincta (Forbes, 1850)
9	Tegula eiseni Jordan, 1936
1	Tegula funebralis (A. Adams, 1855)
5	Tegula gallina (Forbes, 1850)
1	Tegula pulligo (Gmelin, 1791)
2	Turcica caffea Gabb, 1865
5	Astraea gibberosa (Dillwyn, 1817)
7	Astraea undosa (Wood, 1828)
1	Melampus olivaceus Carpenter, 1857
1	Trimusculus reticulatus (Sowerby, 1835)
1	Acteocina culcitella (Gould, 1853)
26	Acteocina sp.
4	Acteon punctocaelatus (Carpenter, 1864)
2	Acteon traski Stearns, 1897
4	Bulla gouldiana Pilsbry, 1893
3	Cylichna sp.
2	cf. Cylichna sp.
1	Volvulella panamica Dall, 1919
91	Bursa californica (Hinds, 1843)
1	Caecum californicum Dall, 1885
88	Caecum crebricinctum (Carpenter, 1864)
4	Caecum sp.
1	cf. Capulus sp.
1	Cerithiopsis sp. cf. C. cosmia Bartsch, 1907
1	Seila montereyensis Bartsch, 1907
1	Calyptraea fastigiata Gould, 1856
4	Crepidula coei Berry, 1950
3	Crepidula norrisiarum Williamson, 1905
9	Crepidula onyx Sowerby, 1824
1	Crepidula perforans (Valenciennes, 1846)
15	Crepipatella lingulata (Gould, 1846)
2	Crucibulum spinosum (Sowerby, 1824)
1	Cymatium sp.
8	Cypraea spadicea Swainson, 1823
9	Epitonium bellastriatum (Carpenter, 1864)
34	Epitonium indianorum (Carpenter, 1864)
2	Opalia funiculata Carpenter, 1857
4	Opalia wroblewskii (Morch, 1876)
1	Erato vitellina Hinds, 1844
3	Trivia californiana (Gray, 1827)
4	Trivia solandri (Sowerby, 1832)
2	Iselica fenestrata (Carpenter, 1864)
4	Hipponix antiquatus (Linnaeus, 1767)
5	Hipponix tumens Carpenter, 1864
21	Lacuna unifasciata Carpenter, 1857
4	Littorina keenae Rosewater, 1978
2	Littorina plena Gould, 1849
14	Littorina scutulata Gould, 1849
15	Melanella sp.
18	Polinices altus (Pilsbry, 1929)
11	Polinices draconis (Dall, 1903)
8	Polinices lewisii (Gould, 1847)
2	Polinices reclusianus (Deshayes, 1839)
10	Polinices sp.
2	Sinum scopulosum (Conrad, 1849)
2	Cerithidea californica (Haldeman, 1840)
2	Rissoina californica Bartsch, 1915
13	Rissoina sp. cf. R. lapazana Bartsch, 1915

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41	Turritella cooperi Carpenter, 1864
1	Petaloconchus montereyensis Dall, 1919
9	Serpulorbis squamigerus (Carpenter, 1857)
2	Vitrinella oldroydi Bartsch, 1907
2	Kelletia kelletii (Forbes, 1850)
1	Neptunea tabulata (Baird, 1863)
9	Cancellaria cooperi Gabb, 1865
1	Cancellaria sp. cf. C. crawfordiana (Dall, 1891)
11	Amphissa versicolor Dall, 1871
76	Mitrella carinata (Hinds, 1844)
1	Nassarina penicillata (Carpenter, 1864)
20	Conus californicus Hinds, 1844 MS Reeve, 1844
13	Barbarofusus barbarensis (Trask, 1855)
2	Fusinus luteopictus (Dall, 1877)
1	Volvarina taeniolata Morch, 1860
21	Mitra idae Melvill, 1893
10	Acanthina spirata (Blainville, 1832)
1	Ceratostoma nuttalli (Conrad, 1837)
1	Forreria belcheri (Hinds, 1844)
8	Maxwellia gemma (Sowerby, 1879)
1	Maxwellia santarosana (Dall, 1905)
1	Ocenebra atropurpurea Carpenter, 1865
6	Ocenebra foveolata (Hinds, 1844)
8	Pteropurpura festiva (Hinds, 1844)
1	Pteropurpura macroptera (Deshayes, 1839)
2	Pteropurpura trialata (Sowerby, 1841)
6	Roperia poulsoni (Carpenter, 1864)
2	Thais emarginata (Deshayes, 1839)
1	Trophon catalinensis I. Oldroyd, 1927
1	Nassarius delosi (Woodring, 1946)
4	Nassarius fossatus (Gould, 1849)
1	Nassarius insculptus (Carpenter, 1864)
9	Nassarius mendicus (Gould, 1849)
56	Nassarius perpinguis (Hinds, 1844)
5	Nassarius tegula (Reeve, 1853)
135	Olivella baetica Carpenter, 1864
78	Olivella biplicata (Sowerby, 1825)
18	Terebra pedroana Dall, 1908
5	Crassispira sp.
25	Kurtziella plumbea (Hinds, 1843)
31	Megasurcula carpenteriana (Gabb, 1865)
3	Megasurcula stearnsiana (Raymond, 1906)
1	cf. Mitromorpha sp.
7	Ophiodermella ophioderma (Dall, 1908)
1	Pseudomelatoma penicillata (Carpenter, 1864)
3	Tenaturris sp. cf. T. merita (Hinds, 1843)
1	Odostomia sp.
45	Turbonilla sp.
167	Glycymeris subobsoleta (Carpenter, 1864)
71	Corbula luteola Carpenter, 1864
2	Hiatella arctica (Linnaeus, 1767)

LOCALITY NUMBERS 4508	SPECIES
4	Panopea generosa (Gould, 1850)
4	Platyodon cancellatus (Conrad, 1837)
8	Parapholas californica (Conrad, 1837)
4	Zirfaea pilsbryi Lowe, 1931
1	Modiolus capax (Conrad, 1837)
13	Mytilus californianus Conrad, 1837
5	Septifer bifurcatus (Conrad, 1837)
43	Nuculana taphria (Dall, 1896)
5	Nucula exigua Sowerby, 1833
1	Periploma planiusculum Sowerby, 1834
1	Thracia sp.
5	Anomia peruviana Orbigny, 1846
11	Pododesmus macroschisma (Deshayes, 1839)
29	Ostrea lurida Carpenter, 1864
14	Argopecten aequisulcatus (Carpenter, 1864)
2	Chlamys hastata (Sowerby, 1843)
4	Hinnites giganteus (Gray, 1825)
75	Leptopecten latiauratus (Conrad, 1837)
20	Pecten diegensis Dall, 1898
1	Pteria sterna (Gould, 1851)
40	Americardia biangulata (Broderip & Sowerby, 1829)
12	Trachycardium quadragenarium (Conrad, 1837)
2	Glans subquadrata (Carpenter, 1864)
2	Chama arcana F.R. Bernard, 1976
4	Pseudochama exogyra (Conrad, 1837)
1	Donax californicus Conrad, 1837
140	Donax gouldii Dall, 1921
3	Here excavata (Carpenter, 1857)
26	Lucinisca nuttalli (Conrad, 1837)
3	Lucinoma annulata (Reeve, 1850)
11	Parvilucina sp.
17	Spisula dolabriformis (Conrad, 1867)
17	Spisula hemphilli (Dall, 1894)
2	Tresus nuttallii (Conrad, 1837)
12	Mysella tumida (Carpenter, 1863)
10	Pristes oblongus Carpenter, 1863
4	Petricola carditoides (Conrad, 1837)
2	Heterodonax pacificus (Conrad, 1837)
1	Semele decisa (Conrad, 1837)
1	Semele incongrua Carpenter, 1864
3	Semele rubropicta Dall, 1871
1	Semele rupicola Dall, 1915
3	Ensis myrae Berry, 1953
17	Siliqua lucida (Conrad, 1837)
7	Solen sicarius Gould, 1850
6	Florimetis obesa (Deshayes, 1855)
1	Macoma nasuta (Conrad, 1837)
4	Macoma secta (Conrad, 1837)
6	Tellina bodegensis Hinds, 1845
1	Tellina idae Dall, 1891
7	Tellina nuculoides (Reeve, 1854)

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1	Diplodonta orbellus (Gould, 1851)
1	Amiantis callosa (Conrad, 1837)
1	Chione californiensis (Broderip, 1835)
3	Chione undatella (Sowerby, 1835)
6	Irus lamellifer (Conrad, 1837)
9	Protothaca staminea (Conrad, 1837)
12	Saxidomus nuttalli Conrad, 1837
2	Tivela stultorum (Mawe, 1823)
1	Transennella tantilla (Gould, 1853)
2	Ventricolaria fordii (Yates, 1890)
18	Cryptochiton stelleri (Middendorff, 1846)
1	Callistochiton palmulatus (Carpenter in Pilsbry, 1893)
1	cf. Callistochiton sp.
1	Nuttallina fluxa (Carpenter, 1864)
1	cf. Cyanoplax sp.
3	Stenoplax conspicua (Pilsbry, 1892)
1	Mopalia acuta (Carpenter, 1855)
2	Mopalia muscosa (Gould, 1846)
1	cf. Mopalia sp.
33	Dentalium neohexagonum Pilsbry & Sharp, 1897
73	Dentalium pretiosum Sowerby, 1860
17	Cadulus sp.
5	Porifera
4	Corallinaceae
1	Isurus sp.
1	Myliobatis californica Gill, 1865
1	Osteichthyes
1	Semicossyphus pulcher (Ayres, 1854)