



NO BONES NEWSLETTER

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IZ Microtechniques Laboratory Gets Make-Over

Jon Norenburg

Have you ever noticed how new techniques, such as molecular methods, often are accompanied by the latest and newest in technology, like chairs, work-benches, and equipment? Thanks to Ross Simons and the NMNH Director's Office, IZ and the hard work of **Tim Coffe**r the aging tools of the microtechniques lab now can be used in efficiently organized surroundings. We replaced the clutter of desks, kitchen steam table, and assorted odds and ends masquerading as furniture. The warehouse of glassware, filter paper and weighing boats, etc. has been moved out and into secure storage in the hallway. Old, antiquated or non-functional equipment was surplused. Even the seemingly simple ability to control all of the lab's overhead lighting from a central point just inside the main entryway door needed to be addressed.



Tim Coffe sawing steel for bench frames
(Photo by Yolanda Villacampa)

However, it may be some time before the lab is equipped to modern standards for morphology studies, with appropriate preparatory, microscopy and imaging tools. Nevertheless, the increased efficiency is a major blessing. In the past, three people in this large room seemed like a crowd. Now, the histology facilities can be used by four people simultaneously,

as opposed to two previously, and the ultramicrotomy area can be used by



Ph.D. candidate Svetlana Maslakova sectioning nemertean tissue
(Photo by Karen Reed)

two people simultaneously rather than one: that is if we had a second microtome. These work stations, plus the Critical Point Dryer and Freeze Drying stations, can be occupied while other people still have unimpeded access to the hood, sinks, refrigerator and freezers.

At the heart of the renovation are the new benches purchased by the Director's Office and heroically assembled and installed by Tim Coffe. In addition, our past experience in creative recycling and Tim's ingenuity in scavenging continue to be put to good use in equipping the lab with cabinetry and other fixtures. Tim obtained valuable help from several sources: the shop staff, Richard Mapp for allowing him to weld in the basement, metal workers for fine and not-so-fine points of welding, painters, installers, electricians and plumbers for their ready cooperation in completing this rather ad-hoc project in a timely fashion that we could afford and be pleased with the result.

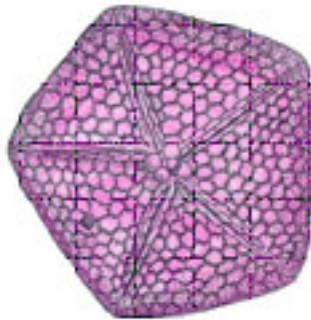
FROM THE CHAIR'S CHAIR

Deep-Sea Dreams, Deep-Sea Nightmares

Dave Pawson

In 1975 I made my first dive in the submersible Alvin, to a depth of 9,250 feet, about 100 miles south-east of New York, in the company of NOAA fish guy and old friend, Dan Cohen. The dive was a fantastic experience, and it shaped my life in research from that day to this. The night after that dive, I dreamt that I was in the Alvin, sitting on the deep-sea floor, and staring through my viewing port at a nearby rock face.

There on the rocks was a group of about 20 little pinkish-red edrioasteroids, all busily feeding. The edrioasteroids, relatives of sea stars,

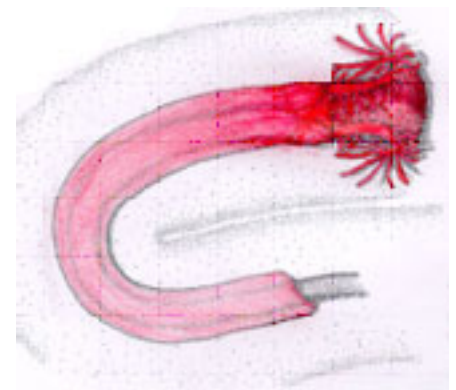


Edrioasteroid - *Stromatocystites* Devonian era, 370 million years ago. (After Bather. Color added by Doris Vance.)

were star-shaped, with five food grooves radiating from the central mouth. I should mention here that edrioasteroids have been extinct for 300 million years! I have experienced hundreds of reruns of this powerful dream, and on everyone of hundreds of subsequent submersible dives, I have half-expected to see live edrioasteroids. No luck yet!

Two years after this first dive I was again with Dan Cohen, this time in the Tongue of the Ocean, Bahama Islands. We had completed a tiring dive during which we ran several transects across a muddy seabed and counted thousands of fishes and invertebrates. The pilot dropped the iron weights and we gently lifted off, at a depth of 7,020 feet, to begin our unstoppable ride to the ocean surface. As we began to move upwards I casually looked through my viewing port. We passed a small muddy shelf. I was astonished to see, in the pool of

light, about 20 specimens, 12-24 inches long, of the weird acorn worms known as lophenteropneusts. Their brightly colored bodies, dark carmine red anteriorly and lighter posteriorly, were conspicuous on the light beige mud. These amazing animals, known previously from several seafloor photographs that showed them and their distinctive spiral fecal trails, had never previously been seen alive. I had packed my camera away, and I could do nothing but watch helplessly as these gorgeous and exotic worms fell away from my view and receded into the darkness. Have they been seen alive or collected since 1977? I haven't seen any records in the scientific literature. Ole Tendal (1998, Deep-Sea Newsletter 27:21-24) has summarized what little we know of these animals.



Lophenteropneust (After Lemche et al., 1976. Color added by Doris Vance.)

We never returned to the Tongue of the Ocean because later in 1977 the Alvin was in the Pacific, and hot volcanic vents were discovered. From that moment on, further research in the Alvin in the Bahama Islands took a back seat. We made numerous dives in the Bahamas in the

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O U T R E A C H

Reconnaissance of a Dead-Cold Trail*Paul Greenhall*

The Mollusk unit hosted Mr. Russell Barsh from the Samish Indian Nation, Anacortes, Washington, in the fall. He was referred from the Repatriation Office, NMNH. Mr. Barsh was interested in seeing all material from the Northwest Boundary Survey collected by Dr. C.B.R. Kennerly from 1857-1861. Kennerly worked as a surgeon and naturalist on several government surveys. According to the United States Geological Survey's Northern Prairie Research Center, the Northwest Boundary Survey was a well-funded joint American/British effort to survey the border between the U.S. and Canada. Unfortunately, nearly all documentation of the American portion of the survey was lost. For nearly 30 years, the results of the British portion of the survey remained unknown until located at the Royal Observatory Library in England.

Russell Barsh's goal was to verify the amount of invertebrate material available, determine what sort of preservative Dr. Kennerly may have used, and find out why he only collected certain mollusks. EMU, NMNH's new catalog program, listed twenty-eight lots of bivalves and gastropods from Puget Sound, WA collected by Kennerly. Twenty-five of the lots were holotypes (specimens used to describe a species). All lots were located and flagged in preparation for his visit. Information gathered from these specimens will be used by Mr. Barsh to reconstruct the relic or subfossil invertebrate popu-

lations and determine what types of parasites were present during the 1800's. Native Americans used many of the mollusks for food and possibly for trade.

Mr. Barsh also met with **Jerry Harasewych** to discuss available options in order to reconstruct the relic population by studying NMNH material. Dr. Harasewych mentioned that the late Dr. Glenn Goodfriend's amino acid racemization research would have provided a useful technique for accurate dating of shelled organisms and thus reconstructing the faunas. He added, "Glenn was able to determine the lifespan of an individual specimen, something that other techniques, like Carbon-14 dating, are unable to do."

Access to most of the material for molecular analysis was declined because the majority of the specimens are holotypes. Mr. Barsh was satisfied with the valuable information shared, and believes he will be able to analyze available tribal archaeological material, and possibly study the Natural History Museum of Los Angeles County's recent mollusk collection of the same period.

According to Mr. Barsh, the Samish Indian Nation is encouraging its science students to collaborate with researchers through available fellowship programs nationwide. He hopes that Smithsonian researchers will be interested in such a collaboration.

P U B L I C A T I O N S

Alvarez, B., R.W.M. van Soest & K. Ruetzler. 2002. *Svenzea*, a new genus of Dictyonellidae (Porifera: Demospongiae) from tropical reef environments, with description of two new species. *Contributions to Zoology* 71(4):171-176.

Diaz, M.C., K. Ruetzler, C. Cary & I. Feller. 2002. Distribution and phylogenetic affinities of nitrifying microbes associated to epibiont sponges of nutrient limited *Rhizophora* mangrove stands. *Bolletim Museu Istituto di Biologie, Genova* 66-67:170.

Hershler, R., D.B. Madsen & D.R. Currey. 2002. Great Basin Aquatic Systems History. *Smithsonian Contributions to the Earth Science* 33:1-405.

Kornicker, L.S. 2002. Comparative morphology of the fifth limb (second maxilla) of myodocopid Ostracoda. *Journal of Crustacean Biology* 22(4):798-818.

Opishinski, B.T., M.L. Spaulding, K. Ruetzler & M. Carpenter. 2001. A real-time environmental data monitoring, management and analysis system for the coral reefs off the coast of Belize. In: *Proceedings, Oceans 2001 Conference, IEEE Oceanic Engineering Society and the Marine Technology Society, Honolulu, Hawaii* 10 pp.

Ruetzler, K. 2001. Exploring Neptune's gardens: From landlubber to reef biologist. *Atoll Research Bulletin* 494:176-197.

Ruetzler, K. 2002. Sponges on coral reefs: A community shaped by competitive cooperation. *Bolletim Museu Istituto di Biologie, Genova* 66-67:170.

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L I B R A R Y

No new titles at this time.

FROM THE CHAIR'S CHAIR CONT.

Johnson-Sea-Link submersibles, but apparently these worms lived only in great depths, well beyond the reach of the Johnson-Sea-Link.

I have dreamed hundreds of times about those magnificent worms.

Fast forward to the 1990's when hundreds of beautiful little delft blue sea cucumbers were found around a cold seep in the Gulf of Mexico. This distinctive new deep-sea species was also found at the Central America wreck off Cape Hatteras, its lovely blue color contrasting nicely with the substratum of 40-lb. gold bars! A scientist on the Central America Recovery Group mailed me two color photographs of these animals - precious photos, for the negatives had been lost,

and these one-of-a-kind prints showed the little animals in all their small-scale glory. Alas, the package of photos was irradiated, and the prints are forever glued together, face-to-face, like some sort of nightmarish sandwich.

Deep-sea dreams and nightmares. Sometimes my nights seem like a scene from one of Moliere's plays. I'm sure my experiences are not unique, and no doubt everyone who has dived in a submersible has amazing tales to tell, and has dreamed dreams.....

The deep-sea - a great unfamiliar and forbidding world - is reluctantly and slowly revealing some of its secrets. It has been said that we

have explored perhaps 50 square miles of the deep ocean floor; we have another 150 million square miles to go. Recent discoveries - ice worms, Pompeii worms, the "kingdom" Archaea, and bacteria living a half mile deep in the mud, offer promise of great and exciting new finds in the future. The deep sea, home to a vast and exotic fauna, is a great engine; it controls our climate and absorbs the carbon dioxide that we produce; it commands and deserves our attention. New research initiatives under development in the Invertebrate Zoology Section bid fair to throw some light on the deep sea. We must do more. We must better understand this vast habitat that occupies 75% of our planet. Mere dreams and nightmares are not enough!

O U T R E A C H

Back to Basics – American University Students Come To IZ

Chris Tudge & Barbara Littman

Some new young faces appeared in the corridors of IZ the last year or so. These were interns from the Biology Department at American University (AU) doing research projects with some IZ staff. Since Chris Tudge (Smithsonian Institution Research Associate and Assistant Professor at AU) facilitated the recent appointments of **Jon Norenburg**, **Frank Ferrari**, **Dave Pawson** and **Jerry Harasewych** as AU Research Faculty (2001) there has been opportunity to attract biology undergraduates and graduates from AU to IZ for valuable training in taxonomy and systematics and some of the tools used to accomplish them, histology and microscopy. This formal collaboration between two local institutions has had a small, but significant, beginning.

Starting in the fall semester 2001 there have been five AU students in IZ at various times, usually as official SI interns, through Mary Sangrey of the Academic Service Office. Two students, Katie Schneider and Hideka Shiraishi, conducted independent study projects as biology undergraduates while the other three students, Rebecca Ritger, Shubh Sharma and Virginie Wembey, are undertaking their research projects as Biology Master's students. Rebecca and Hideka also undertook their research internships as part of an advanced microscopy and histology course offered through the Department of Biology at AU, and under the joint supervision of Jon Norenburg and Chris Tudge. All of the student projects involve either histology and paraffin wax thick-sectioning techniques, trans-

mission electron microscopy (TEM), scanning electron microscopy (SEM), or all three. The histology and TEM training is all carried out in the IZ histology lab (see cover story) under the guidance of Jon Norenburg and with training and assistance of IZ histologist, **Barbara Littman**. The SEM projects have involved training and direction from Scott Whittaker and Susann Braden of the NMNH SEM lab.

Hopefully continuation of this IZ and AU Biology Department collaboration will provide the impetus for further training of budding microscopists and taxonomists. For the present IZ curators see valuable projects started, sometimes completed, and students aspiring to return for further work or training.

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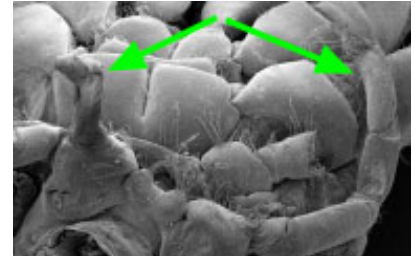
O U T R E A C H C O N T.

AU STUDENTS RESEARCH PROJECTS

Katie Schneider: Investigation of the male sexual tube of a marine hermit crab (2001-2003)

Katie first used SEM to investigate the external morphology of the unusual male sexual tube in a local hermit crab, *Catapagurus sharreri* (family Paguridae). She found that the single, extensive tube has complex micro-morphology that includes ridges, wrinkles and setae. The next semester she undertook a second, but related, project on the same structure,

but this time she employed histological techniques to visualize the internal morphology and tissue structure of this impressive sexual tube. Currently Katie, Chris Tudge and Rafael Lemaitre are working on a manuscript describing the reproductive morphology of *C. sharreri*, based on her impressive work.



SEM of hermit crab sexual tubes
(Photo by Katie Schneider)

Shubh Sharma: Investigation of the male sexual tube of a land hermit crab (2002-2003)

Shubh Sharma embedding tissue
(Photo by Karen Reed)

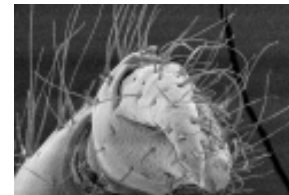
Shubh is learning histology and SEM techniques to investigate the reproductive morphology of a hermit crab. Her chosen hermit crabs are the land crabs, family Coenobitidae, and she is undertaking a comparative

analysis of the morphology of the sexual tubes (possibly not homologous structures?) of *Coenobita perlatus* and *C. clypeatus*. This project will constitute Shubh's Master's thesis.

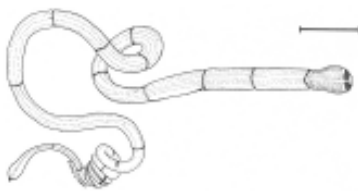
Hideka Shiraishi: Investigation of an undescribed nemertean and a newly described hermit crab (2002)

Hideka enrolled in the advanced microscopy course and chose to learn about histology and TEM with Jon Norenburg on an undescribed nemertean worm and SEM with Chris Tudge on a tiny, newly described

species of hermit crab, *Catapaguroides hooveri*. After completion of his project Hideka said he would be back to do some more of this interesting research.



SEM of hermit crab chela
(Photo by Hideka Shiraishi)

Rebecca Ritger: Investigating an undescribed Floridian nemertean (2002-2004)

Undescribed species of nemertean
(Drawing by Rebecca Ritger; scale bar = 1 mm)

Rebecca is a Master's student supervised by Jon Norenbrug and Chris Tudge and is working on the description and phylogenetics of a new species of nemertean worm. Rebecca enrolled in the advanced microscopy

course to learn the skills she needed to complete her thesis project. Nemerteans often need the application of multiple forms of microscopy to complete their taxonomic descriptions.

Virginie Wembey: Investigating zebrafish embryo eye structure (2003)

Virginie is a Master's student at AU and is interested in the structure of neurons in the eyes of

developing zebrafish embryos (*Brachydanio rerio*). Virginie will learn TEM here in IZ this semester and will

use this new skill to elucidate differences in ultrastructure of zebrafish eyes raised in different light regimes.

V I S I T O R S

Alison Sanchez, Alexandria, VA (1/22-1/31) worked on octocoral sclerite preparation. Sponsor: **Steve Cairns**

Jay Schneider, Dept. of Earth Environmental Sciences, George Washington University, Washington, DC (1/23-1/24; 1/31) worked with clam specimens of the genus *Isognomon*. Sponsor: Doug Erwin (Paleobiology), **Bob Hershler**, **Yolanda Villacampa**

Tiago Quental, Harvard University, Cambridge, MA (1/27) attended a discussion/session lecture on evolution. Sponsor: **Kristian Fauchald**

Nikolai Korovchinsky, Institute of Ecology and Evolution, Russian Academy of Science, Moscow, Russia (1/27-2/25) worked on the taxonomy of freshwater cladocerans. Sponsor: **Frank Ferrari**

James Williams, US Geological Survey Center for Aquatic Resources Studies, Gainesville, FL (2/10-2/14) photographed freshwater clam types, studied general collection holdings, and scanned various articles from Mollusks Library. Sponsor: **Robert Hershler**

T R A V E L

Jerry Harasewych traveled to Fort Lauderdale, FL Jan. 30 - Feb 2. He was both scientific judge for the Boward Shell Show in Pompano Beach and speaker at the banquet. He scheduled time to examine and identify specimens and planned with Florida Atlantic University colleagues a week long deep water dredging cruise to the northern Bahamas this May using the Research Vessel Bellows.

On February 14-18, **Jerry Harasewych** will traveled to Denver, CO to attend the American Association for the Advancement of Science (AAAS) meeting. There he was inducted as an AAAS Fellow. He also meet with colleagues to discuss the future direction of *Cerion* land snail work on Long Island, Bahamas.

A N N O U N C E M E N T S

The USAP Image Project has begun! Thanks to the National Science Foundation's Office of Polar Programs funds, Antarctic specimens (invertebrates, birds and fossils) will be photographed and SEM negatives, publications and original drawings will be scanned. Approximately 6500 images will be produced. These images will be attached to the EMu cataloging system for use by researchers and the public through the NMNH Web site. Contractors working on this project are Heather Dannenfelser, Josh Harris, Yuri Kantor, Guido Pastorini and Diane Pitassy. Updates on this project will appear in future newsletters.

Dave Pawson has been awarded a grant by the Smithsonian Women's Committee for "Diffusion of knowledge - bringing Invertebrate Zoology research and collections to visitors at the Natural History Museum". IZ staff will be setting up tables in the public areas with displays of invertebrates, and will be on hand to provide commentary and to answer questions. The grant funds will cover the production cost for brochures, information sheets, and other handouts to be used with these displays.

PUBLICATIONS CONT.

- Ruetzler, K. 2002.
 a. Family Placospongiidae Gray, 1867 (Order Hadromerida) pp.196-200.
 b. Family Alectonidae Rosell 1996 (Order Hadromerida) pp.281-290.
 c. Family Clionidae D'Orbigny, 1851 (Order Hadromerida) pp.196-200.
 d. Family Spirastrellidae Ridley & Dendy, 1886 (Order Hadromerida) pp.220-223.
 e. Family Timeidae Topsent, 1928 (Order Hadromerida) pp.266-267.
 f. Family Acanthochaetidae Fischer, 1970 (Order Hadromerida) pp.275-278.
 g. Family Tetillidae Sollas, 1886 (Order Hadromerida) pp.85-96
In: Hopper, J.N.A. & R.W.M. van Soest, eds., *Systema Porifera*, Kluwer Academic, Plenum Publishers, New York

Ruetzler, K. 2002. Impact of crustose clionid sponges on Caribbean reef corals. *Acta Geologica Hispanica* 37:61-72.

Tudge, C.C. & C.W. Cunningham. 2002. Molecular phylogeny of the mud lobsters and mud shrimps (Crustacea: Decapoda: Thalassinidea) using nuclear 18S rDNA and mitochondrial 16S rDNA. *Invertebrate Systematics* 16:839-847.

NEXT ISSUE

APRIL

The April issue will be produced by Geoff Keel and Bill Moser. Please submit ideas and stories to them via e-mail by Friday, March 21, 2003. No Bones is distributed to all IZ staff electronically. Those on our distribution list who wish to receive it electronically should send this request to the editor Geoff Keel: keel.william@nmnh.si.edu.