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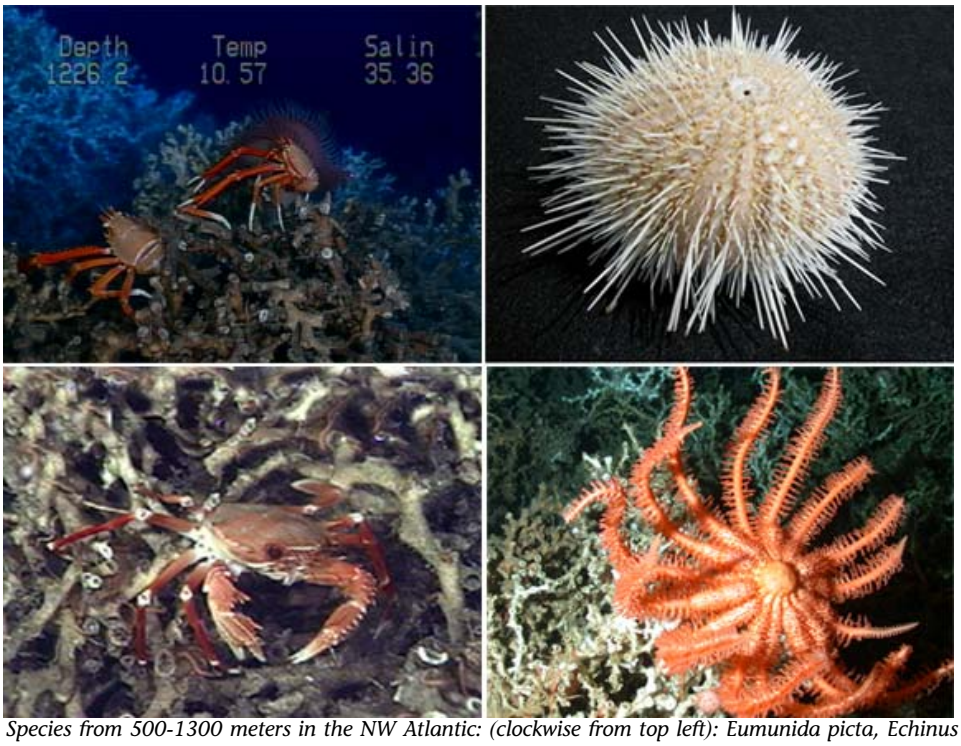
Into the Deep off North Carolina

Martha Nizinski

Deep coral reef systems are a hot topic and are receiving increased worldwide attention. Yet, deep coral habitats have been poorly studied, particularly in the western Atlantic. These habitats appear to be much more extensive and important than previously known, but there is much that we do not know about these vast systems. For example, an adequate survey of the habitat and the associated fauna has not been conducted to determine what organisms utilize these habitats and the surrounding substrates. Additionally, it is unclear whether the deep coral habitat is essential to mega-invertebrates and fishes or whether they occupy it opportunistically.

Dedicated research on the deep reef systems off the coast of North Carolina began in 2000 when ichthyologists Steve Ross (University of North Carolina at Wilmington) and Ken Sulak (USGS) proposed to investigate the ecology of vertebrate and invertebrate communities associated with deep corals in the southeastern Atlantic. In 2002, **Martha Nizinski** (NMFS) was invited to join the science team as co-PI and invertebrate specialist. The primary objectives of the research are to identify and characterize fish and invertebrate communities living on and near coral banks (i.e., biodiversity, habitat associations, abundance and community structure), classify habitat affinity for deep coral



Species from 500-1300 meters in the NW Atlantic: (clockwise from top left): Eumunida picta, Echinus gracilus, Novodinia antillenis and Bathynectes longispina.

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COVER STORY CONT.

associated fauna, and characterize and map coral banks. Recently, the objectives have expanded to include projects on coral aging, and phylogenetic, phylogeographic and community genetics.

The majority of this research has been conducted using the manned submersible "Johnson Sea Link." Data gathered in this way have proved to be invaluable since organisms can be observed *in situ*, videotaped, photographed, and then collected for identification and voucher. Additionally, we are attempting to fill data gaps in information on microhabitat utilization and behavioral ecology for the majority of deepwater invertebrates we observe. Five expeditions and approximately 62 dives later, we are just beginning to scratch the surface (or the depths?) of the massive amount of information available. Studies elsewhere (e.g., northeastern Atlantic) revealed that deep reefs harbor extensive, species rich invertebrate populations, perhaps rivaling shallow tropical systems. However, evaluation of invertebrate species richness between shallow and deep reefs based on comparisons of similar taxonomic groups is underway. Martha is concentrating her efforts on the decapod crustaceans. **Steve Cairns** (NMNH), **Allen Collins** (NMFS), **Dave Pawson** (NMNH), **Mike Vecchione** (NMFS) and **Liz Shea** (NMFS) have all contributed their time and taxonomic expertise to identify specimens of corals, sponges, echinoderms, and cephalopods, respectively. To date, known ranges for several species have increased, a few species thought to be rare are commonly observed in and around reef habitat, and potentially one new species of snapping shrimp has been discovered. Data collection, both at sea and in the laboratory, continues. Two cruises are scheduled for later this year; one in late September to the Gulf of Mexico funded by MMS and USGS and an Atlantic cruise in October funded by NOAA's Office of Ocean Exploration.

Martha Nizinski aboard the R/V Seward Johnson.

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LETTER FROM THE EDITOR

In August of 1999, I took over the production of the No Bones from **Linda Cole**. That first issue brought about a new style and production value for our departmental newsletter. The new face of the newsletter was thanks to **Molly Ryan**, our resident guru on the relatively new program from Adobe called Page Maker. Molly would continue to provide guidance, as I would occasionally stray from the original format and layout.

I would like to thank those, who over the years, have guided me and assisted in the production. The editors over the first few years were **Brian Kensley** followed by **Marsha Sitnik**. The staff, as it is for this final issue, came on board when Marsha left. They have done a wonderful job at producing their own issues and assisting me in the editorial process.

The new No Bones will follow the same format but will now be done with Adobe InDesign. Over the next year, I will stay on as an advisor for the new editor of No Bones, **Elizabeth Nelson**. I hope all of you will be as helpful to her as you have been to me.

- Geoff Keel

RESEARCH

Hunting Cerion on Long Island, Bahamas

Jerry Harasewych

Our research team arrived on Long Island in two waves. **Jerry Harasewych** and John Wise, of the Houston Museum of Natural Science, flew in to Stella Maris Airport at sunset last November 30th with shovels, screens and machetes. After visiting the Family Island Administrator and the Department of Agriculture of Long Island as required by the collecting permit, they began surveying the roads and trails for beach access along the rugged coast of the narrow, 80 mile long island before being joined by **Yolanda Villacampa** and Gretchen Carpintero from George Washington University on December 4th. Over the course of this ten day expedition, they sampled 40 stations that spanned the length and breadth of the island, including the type localities of the seven species of the land snail *Cerion* endemic to Long Island. Two broadly ranging species with type localities on other islands were also sampled over the range of their distributions.

Team members Stephen J. Gould, Steve Pappas, Jerry Harasewych and Gretchen Carpintero dig for fossil shells. (Photo by Yolanda Villacampa)

One might ask why is Jerry, who has spent his career working primarily with deep sea gastropods, leading an expedition to collect land snails? The short answer is that he was invited to join a collaboration with Stephen J. Gould and Glenn Goodfriend, both noted authorities on the notoriously diverse genus *Cerion*, primarily to provide the molecular component for an NSF supported study into the origin of geographic diversity and fossil history of *Cerion*. Shortly after the group's first expedition to Long Island in December 2001, which included Gould, Goodfriend, Harasewych, Villacampa, Carpintero, and Steve Pappas, Gould died in May of 2002, and Goodfriend in October 2002, leaving Harasewych as the only remaining PI on the grant. After spending the intervening years recovering notes, specimens and data from Goodfriend's and Gould's labs, and reading prodigiously the vast body of literature on *Cerion*, Jerry decided that time had come to continue and complete the study.

Living Cerion caerulescens. (Photo by Jerry Harasewych)

Nearly every published paper dealing with *Cerion* includes the statement that it is "the most morphologically diverse of all pulmonate genera" with roughly half of named taxa (over 630 in number) forming an incoherent, or "crazy-quilt" distribution among the islands of the Bahamas. Much of this profusion of taxa can be attributed to the overenthusiasm of late 19th and early 20th century taxonomists: roughly 60 species have been described from the vicinity of Nassau alone. By contrast, Long Island is home to only 9 described taxa. Two have type localities on adjacent islands, while 7 are endemic to Long Island. Much of the endemic diversity is concentrated along a roughly ten kilometer stretch of coastline along the NE coast of Long Island. Here, *Cerion fernandina, C. stevensoni, C. malonei*, and *C. mcleani* each are restricted to a narrow stretch or coastline, with distributions abutting and occasionally producing very narrow clines between them. Through a combination of morphometric analyses of patterns of variation in living and fossil shells and molecular data derived from mitochondrial and nuclear genes, the project hopes to distinguish between several scenarios for the origin of the geographic variation, among them, that the clines are primary, resulting from *in situ* differentiation due to an environmental gradient, and that the clines are due to secondary contact due to colony destruction from fires and hurricanes and subsequent recolonization.

The grant had budgeted for three expeditions to Long Island. The

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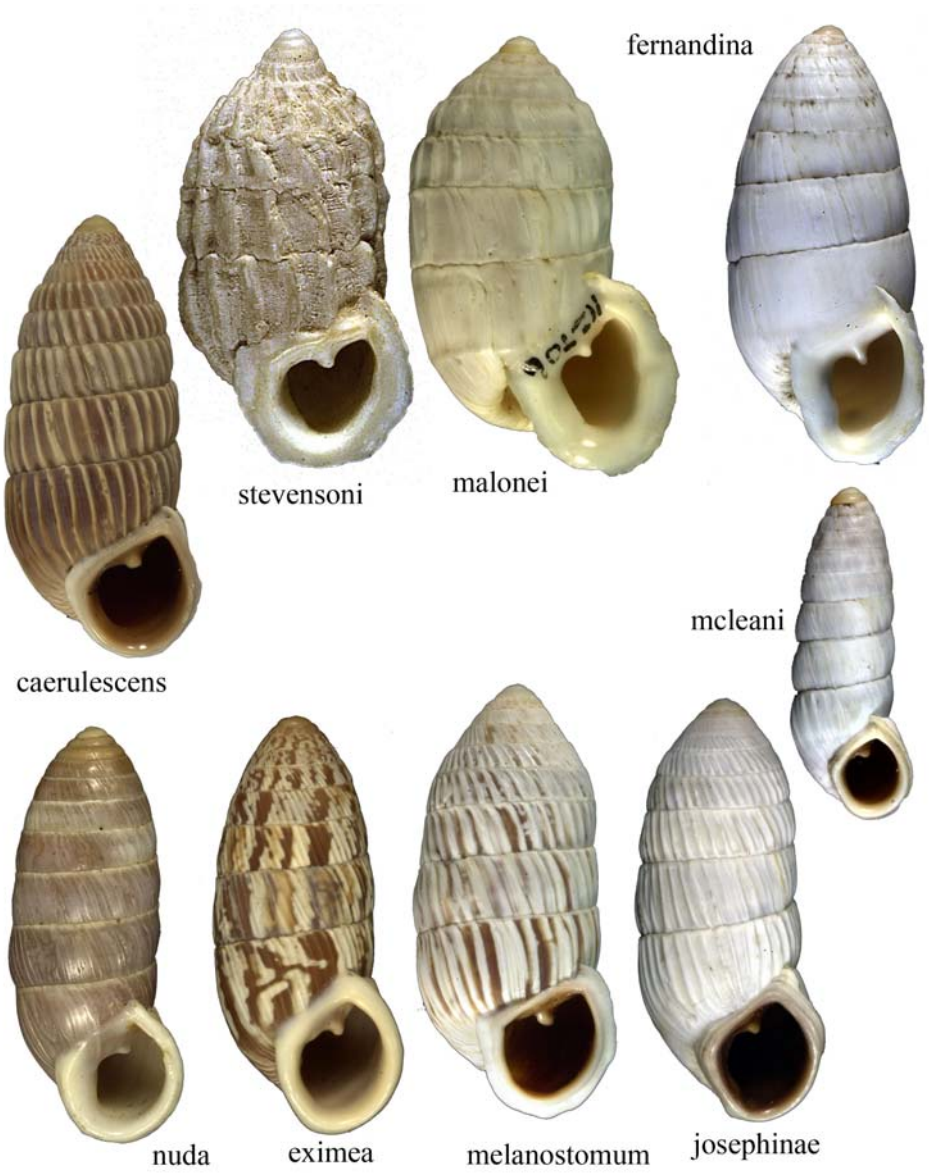
first, in 2001, included not only sampling for living populations, but also digging pits to a depth of 6 feet or more and sifting the sand for fossil *Cerion* to be individually dated. The focus of the second expedition was to survey the entire *Cerion* fauna of Long Island, with concentrated sampling in the area containing the closely abutting endemic species, concentrating on collecting living specimens for molecular and morphometric studies, and determining precisely the exact boundaries and areas of transition. Fossil collecting was largely limited to *Cerion* from exposed outcrops.

How hard could it possibly be to survey 10 km of coastline starting with an automobile and a road that runs the length of the island? Hint: The hardest part is to get from the road to the shoreline, even equipped with GPS topographic maps, and machetes. Once a way to the shore had been found or created, with machetes and spray paint playing important roles here, we would divide into two teams of two, heading in opposite directions and walking or climbing as quickly as possible for two hours, then turning around and collecting on the way back. When comparing GPS readings against the maps back at Stella Maris, we were often dismayed to find that 2 hours translated into barely a kilometer!

At the end of the trip, we had collected some of the most remote and inaccessible portions of the Long Island coastline, located the boundaries between the taxa of interest, even finding an unsuspected intervening population of *C. caerulescens* between *C. stevensoni* and *C. malonei*. Although we were successful in collecting *Cerion josephinae* and delimiting its range, we could not find its published type locality. Clench described this species in 1935 as coming from Tate's Bay, S. E. Long Island, Bahamas Islands, based on material collected on Nov. 19, 1923. Tate's Bay does not appear on any of the eight topographic sheets issued by the Government of the Bahamas, nor could its locality be found in the records of the MCZ. Despite inquiries at local government offices and among elderly looking citizens, we could not find anyone who knew anything about "Tate's Bay."

A final, pleasant surprise to this expedition was the ease with which we were able to bring 40 lots of living *Cerion* through Customs and APHIS. Great thanks are due to Dr. David Robinson of the U.S. Department of Agriculture, for his help with permitting and importation issues.



Species of extant Cerion from Long Island, Bahamas. (Photo by Jerry Harasewych)

SPOTLIGHT ON STAFF

Klaus Ruetzler's New Assistant

Carla Dietrich

Carla Dietrich. (Photo by Yolanda Villacampa)

I was born in the mid-seventies in Buenos Aires, Argentina. Ten years later, during a heartfelt conversation with my father, I decided that I would become a zoologist. I studied three years in the University of Buenos Aires, but I left the big city seeking a change in lifestyle. I made my way southwest to the Andes, to settle down in San Carlos de Bariloche, one of the most beautiful places in the world.

I continued my studies at the University of Comahue, where I completed a Master's in Herpetology under the mentorship of Dr. Nora Ibarguengoytia and Dr.Victor Cussac. My dissertation involved the analysis of the growth dynamics of two sympatric lizards, *Phymaturus patagonicus* and *Homonota darwini,* which share rock promontories in the cold temperate Patagonian steppe in Argentina.

Living in Patagonia allowed me to participate in a variety of field research outings, not only with herpetologists, but also with ornithologists like Dr. Lorenzo Sympson who studies behavior of the Andean Condor and other avians.

I came to Washington D.C. in March of 2004 after completing my studies. I started working as a volunteer at the Smithsonian in the Division of Amphibians and Reptiles with Dr. James Schulte. Our project focused in identifying and describing species of the group *Liolaemus pictus* from southern Chile and Argentina.

Six months ago, I started working in IZ for **Klaus Ruetzler** as his research assistant. Being primarily a herpetologist with a huge love towards basic science and research, I am very happy to study such a different group of animals (marine sponges) in such a different ecosystem like the Caribbean reefs. My experience in histology has been of great use in my lab work with the sponges, and I'm constantly learning. I am delighted to have the opportunity to contribute to the research here at the Smithsonian and it is an honor to work with Dr Ruetzler.

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ANNOUNCEMENTS

A New Addition to IZ's Extended Family

Chris Tudge

Chris Tudge, Research Associate in Crustacea, his wife Karen Mudar and daughter Laura Tudge were very pleased to welcome home their new daughter and sister, Hannah Tudge, to the US. before last Christmas. Hannah was born on September 5, 2003 in Kunming, Yunnan Province, China, the same town as her big sister, who is now 3.5 years old. Chris and Karen spent 2 weeks in China over Thanksgiving going through procedures, and Hannah formally arrived in the US on December 4th. She is settling in fast and is a frequent visitor to IZ, just like her dad. She loves crabs already, but is in training to be corporate lawyer, as everybody knows you can't make a living in taxonomy or science these days. Hannah's mother, Karen, is enjoying her new job in the Archaeology Program of the National Park Service, but Chris is less enthusiastic about his new role as a stay-at-home dad. He loves the company, but not the hours!

Laura, Karen Mudar, Chris Tudge and Hannah.

TRAVEL

Mollusk curators **Jerry Harasewych** and **Ellen Strong** traveled to the Smithsonian's Tropical Research Institute (STRI) Naos Island Laboratories on the Pacific coast of Panama to spend the week of March 8-14 preparing for a workshop on the phylogeny of marine gastropod snails, which will be held next January at STRI. They looked at possible collecting sites and identified which animals are present in abundance so that they could be used by all of the 10-12 workshop participants for collecting morphological and molecular data. The workshop will be held in the winter because that is the dry season when the tides are lowest, and species can be collected most easily. They are working with STRI staff Helena Fortunato to set up the workshop, with sponsorship from SI's Marine Science Network.

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Rützler, K. and **C. Dietrich** (Eds.).

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COLLECTIONS

IZ Receives Important Freshwater Snail Collection

Bob Hershler

Montana State University biologist Daniel Gustafson recently donated to the NMNH a large collection of freshwater mollusks from northwestern North America. This is but one of many such donations he has made to the museum in the past decade. Gustafson has generously donated portions of his collections in order to help support the research program of **Robert Hershler**, who shares with Gustasfon an interest in the systematics and biogeography of the diverse, speciose fauna of northwestern aquatic mollusks. They have previously published one collaborative paper (Proceedings of the Biological Society of Washington, 2001: 114: 297-308) based on these collections and are planning several others at this time. Gustafson's collections contain many undescribed species and are also noteworthy because of the quality of this material. The collections consist of large series of dry shells, anaesthetized animals (suitable for anatomical study), and specimens preserved in concentrated ethanol (suitable for molecular analyses).

VISITORS

Philippe Bouchet, Museum National d'Histoire Naturelle, Paris, France (12/03-12/07) collaborated on a grant proposal. **Sponsor: Ellen Strong.**

Alberto Lindner, Duke University, Durham, North Carolina (12/09-12/22) stylasterid research, consulted with Cairns, photographed types of Dana corals. **Sponsor: Steve Cairns.**

Peter Etnoyer, Aquanautix Consulting, Los Angeles, California (12/13-12/17) examined deep-sea corals, consulted with Cairns. **Sponsor: Steve Cairns.**

Arnold "Butch" Norden, Resource Planning E-4, Annapolis, Maryland (12/13) studied Plummers Island land snails. **Sponsor: Robert Hershler.**

Jyotsna Sharma-Srinivansan, University of Texas, San Antonio, Texas (12/15-12/22) studied the systematics of marine free-living nematodes from Gulf of Mexico. **Sponsor: Duane Hope.**

Jack Burch, University of Michigan, Ann Arbor, Michigan (01/03-01/07) studied freshwater type mollusks. **Sponsor: Robert Hershler.**

Nancy Budd, University of Iowa, Iowa City, Iowa (01/05-01/11) examined fossil corals, consulted with Cairns. **Sponsor: Steve Cairns.**

Suzanne Williams, Natural History Museum, London, United Kingdom (01/10-01/14) worked in the turbinid collection. **Sponsor: Jerry Harasewych.**

Gina Quinones, Montclaire State University, Montclaire, New Jersey (01/12-01/14) identified Antarctic mollusks for graduate research. **Sponsor: Jerry Harasewych.**

Christopher Taylor, Illinois Natural History Survey, Champaign, Illinois (01/12-01/15) studied crayfish collections. **Sponsor: Rafael Lemaitre.**

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RESEARCH CONT.

A New Denizen of Hydrothermal Vents

Marilyn Schotte

Since 1977, when the first biological communities associated with hydrothermal vents were discovered on the floor of the ocean in the region of the Galapagos Rift, many other vents have been discovered world-wide with very diverse assemblages of animals living near them. These vents, which may be hot or cold-water, are a function of volcanic processes in rift zones caused by sea-floor spreading. They have been best documented in the eastern Pacific but occur also in the western Pacific, the Hawaiian Islands, the Bismarck Sea and possibly in the Mid-Atlantic Ridge. Animals living at these sites exist in what used to be thought of as a toxic environment of hydrogen sulfide and little or no oxygen. But adaptations have allowed clams, mussels, gastropods, limpets, worms, crabs, isopod and tanaid crustaceans to thrive here, because of the presence of tons of sulfur-oxidizing bacteria and other microbes, which form the base of the food chain in this unique ecosystem. **Meredith Jones**, late curator from the division of Worms, was able to erect a new phylum in 1985, the Vestimentifera, which are worms of several feet in length found on the Galapagos Rift at depths of over 1,000 meters.

Decapod crustaceans found in this environment are known to include shrimp, a variety of brachyuran (or "true") crabs, squat lobsters and anomurans (crab-like species in which the abdomen is not reduced). **Rafael Lemaitre** has recently published the first known occurrence of a hermit crab from this kind of habitat. "Discovery of the first hermit crab (Crustacea: Decapoda: Parapaguridae) associated with hydrothermal vents": Cahiers de Biologie Marine 45:325-334. *Paragiopagurus ventilatus* was collected at 128 to 281 meters from the Tashi fishing grounds off eastern Taiwan. It was collected by a Taiwanese-French expedition, using a beam-trawl directly over the hydrothermal vents, which can often be located by bubbles rising to the surface.

P. ventilatus was not observed *in situ* but is believed to live close to the chemosynthetically-based vent ecosystem, though probably not dependent on it. This species possesses bacteria laden setae on the legs and mouthparts like many other decapods associated with vents and seeps. Similarly, in a recent paper by Darryl Felder and **Brian Kensley**, an axiid shrimp from a cold-water seep in the Gulf of Mexico was shown to also have dense setae fouled with debris, possibly associating it with a similar trophic community.

Paragiopagurus ventilatus (Photo by Rafael Lemaitre)

LIBRARY

INVERTEBRATE ZOOLOGY LIBRARIES NEW TITLES

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MUSEUM NEWS

IZ Reinvents Itself Again

Marilyn Schotte

Over the decades, the organizational structure of the biological departments in the museum has seen many permutations and some reappear more than once. Back at the turn of the 20th century, when Charles Walcott was Director of the United States National Museum, the first Head Curator of Biology was named when the paid staff of biologists totaled 15. Later, Waldo Schmitt became the head of this department, which then split into two departments: Zoology and Botany. This occured in 1947 when some new positions were added.

After 1957, when the Russians surprised America with Sputnik and an apparent edge in science, the staff grew rapidly in number. In the 1960's a separate Department of Entomology was created and in 1965 the rest of Zoology was divided into the Departments of Vertebrate Zoology and Invertebrate Zoology, the situation which existed when most of us began our careers here. Then Director Robert Fri announced in February of 2000 that IZ, VZ, Botany and Entomology would fuse to become the Department of Systematic Biology, which was so large that staff meetings could be held only in Baird Auditorium. With the advent of Director Cristian Samper and on advice from the Science Commission, this structure was dismantled in November 2003 into three resulting units: Botany, Entomology and Zoology.

After a year of analysis, staff in Zoology concluded that nothing was to be gained by forging IZ and VZ, except for forming a central pool of administrative and clerical functions and staff. So in 2005 IZ and VZ reverted back to full department status as was the case in 1965. **Jonathan Coddington** became the head of IZ and Rich Vari occupies that position in VZ. A new chairman for IZ is being sought by recommendation from input from all staff members, who were interviewed by the search committee of **Dave Pawson**, **Bill Moser** and **Marilyn Schotte**.

Other changes for IZ that occurred in 2005 included:

--A completely new telephone system (the Voice Over Internet Protocol) was installed, with new phone numbers. The system brings with it new features like conference call, address book, fast dial and other advanced capabilities.

--In the future, "No Bones" will be produced by **Elizabeth Nelson,** who is IZ's current contact person to the Director's Office.

--The division of Crustacea endured a rearrangement of offices recently to make room for a new, well-appointed Visitors' Lab with working space for five visiting scientists.

--The annual IZ departmental Christmas Party, which never changed anyway through the reorganizations of the last forty years, will go on.....but is referred to these days as the "Holiday Party."

VISITORS CONT.

Louise Crowley, American Museum of Natural History, New York City, New York (01/18-01/21) studied marine bivalves, Arcoida. **Sponsor: Ellen Strong.**

Ron Vasile, Canal Corridor Association, Lockport, Illinois (02/02-02/04) worked on William Stimpson's diary and US North Pacific Exploring Expedition. **Sponsor: Rafael Lemaitre.**

Stephanie Clark, University of Alabama, Tuscaloosa, Alabama (02/08) studied Physidae. **Sponsor: Ellen Strong.**

Rosemary Baron-Szabo, Knoxville Institute of Paleontology, Knoxville, Tennessee (02/08-02/11) examined Tertiary Scleractinia. **Sponsor: Steve Cairns.**

Guenter Schuster, Department of Biological Sciences, Eastern Kentucky University, Richmond, Kentucky (02/14-02/17) studied crayfish. **Sponsor: Karen Reed.**

John Guinotte, MCBI, Marine Conservation Biology Institute, Redmond, Washington (02/17) consulted with Drs. Bayer and Cairns about calcium carbonate compensation depth and its relation to deep-water coral distribution. **Sponsor: Steve Cairns.**

Martin Thiel, Universdad Catolica del Norte, Facultad Ciencias del Mar, Coquimbo, Chile (02/22-02/23) conducted a literature search in Crustacea Library and consulted with colleagues in IZ. **Sponsor: Marilyn Schotte.**

Peter Hovingh, Utah Museum of Natural History, Salt Lake City, Utah (02/24) examined western US and Canada leech collection. **Sponsor: Bill Moser.**

Paul Johnson, Tennessee Aquarium Research Institute, Cohutta, Tennessee (02/28-03/03) studied and photographed freshwater snails and mussels for the Bahaba River Basin, Alabama. **Sponsor: Robert Hershler.**

James Thomas, NOVA University – Oceanographic Center, Dania, Florida (02/28-03/03) examined leucothoid amphipod collections. **Sponsor: Elizabeth Nelson.**

Alberto Lindner, Duke University, Durham, North Carolina (03/08-03/10) did stylasterid research, consulted with Cairns, photographed types of Dana corals. **Sponsor: Steve Cairns.**

Patricia Lindner, Duke University, Durham, North Carolina (03/02-03/11) photographed Dana coral types. **Sponsor: Steve Cairns.**

Arnold "Butch" Norden, Resource Planning E-4, Annapolis, Maryland (03/23) gathered station data on Plummer's Island mollusks. **Sponsor: Paul Greenhall.**

Keith Crandall, BrighamYoung University, Utah, (03/11) studied crawfish collection for morphological and molecular projects. **Sponsor: Rafael Lemaitre.**

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Schotte, M. and **B. Kensley**. 2005. New species and records of Flabellifera from the Indian Ocean (Crustacea: Peracarida: Isopoda). Journal of Natural History 39(16):1211-1282.

Sternberg, R.v. and **M. Schotte**. 2004. A new species of the anchialine shrimp genus Procaris (Decapoda: Caridea: Procaridae) from Mexico. Proceedings of the Biological Society of Washington 117(4):514-522.

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Subba Rao, N.V. **Indian Seashells, Pt. 1: Polyplacophora and Gastropoda.** Records of the Zoological Survey of India Occasional Paper No. 192. Kolkata: Zoological Survey of India, 2003.

World Congress of Malacology Perth, Western Australia, 11-16 July, 2004: Molluscan Megadiversity: Sea, Land and Freshwater. Perth: Western Australian Museum, 2004.

Wu, Wen-Lung. **Latin-Chinese/ Chinese-Latin Dictionary of Seashell Names.** Taipei, 1999.