# *Research & Collections News*

The Occasional Newsletter of the Research and Collections Staff
Natural History Museum of Los Angeles County

**re•search** (rī-sûrch′, rē′sûrch) *n*. **1.** Scholarly or scientific investigation or inquiry. See synonyms at **inquiry**. **2**. Close, careful study. **3.** When performed on collections, the *raison d'être* of all great natural history museums.

## November, 2004

(covering the months of September and October, 2004)

## Collection News

***Our Collections on the National Scene***

Dr. John Heyning, Deputy Director of Research & Collections and President of the National Science Collections Alliance, spearheaded the publication of a nationally distributed brochure, *"Collective Knowledge: The Value of Natural Science Collections,"* that details the critical role of museum collections in society. This beautifully produced publication highlights the importance of museum collections as they relate to our understanding of climate, biodiversity, medicine, human health, teaching, natural resources, and more. Copies have been given to Dr. Pisano for distribution to all of the Museum's Board of Trustees and to our Museum's Advancement department. See Jody Martin if you would like to see a copy.

***Botany Move***

The first phase of the transfer of the botanical specimens to the Jepson Herbarium, U.C. Berkeley, was completed on October 20, 2004. This included the algae, lichen and mosses, with the exception of the wet collections. Despite rainy weather the movement of the 63 cabinets from the 1913 Herbarium and the third floor of the Museum as well as the North Grand warehouse went according to schedule. If all goes as planned and Berkeley receives the grant money they have applied for, the remainder of the botanical specimens, the fungi, should be moved within the next two years. Earlier in the year, the ferns were transferred to the Rancho Santa Ana Botanic Garden, and the fossil plants from the Statz collection were transferred to the Institut für Paläontologie der Universität Bonn.

## Field Work

***Vertebrate Paleontology***

Dr. Luis Chiappe conducted field work in Kazakhstan during August (too late for inclusion in the last newsletter). The goal of this pilot expedition was to prospect a series of 90-million-year-old rocks in search of dinosaurs. Virtually nothing is known about the dinosaurs from this part of the world. The expedition focused on outcrops located to the east of the Aral Sea and collected the remains of a small carnivorous dinosaur, which,

although fragmentary, represent the best preserved carnivorous dinosaur from Kazakhstan.

***Vertebrate Paleontology***

In early September, Dr. Xiaoming Wang led a few Chinese paleontologists to a new Pliocene (~5–2 million years ago) locality in the Kunlun Pass of the Tibetan Plateau. At an elevation of 4,760 meters (15,616 feet), this is one of the highest late Tertiary fossil mammal localities in the world. Among the discoveries is an ankle bone (astragalus) of a chalicothere (lower photograph), an extinct odd-toed herbivore with claws. This is tantalizing find because chalicotheres, usually browsers of tree leaves using their long claws to reach up, are always associated with tall trees. However, trees have been long gone from the high plateau, and its present vegetation is commonly dwarfed plants and low grasses. The chalicotheres, therefore, are evidence of an ancient environment that no longer exists today, presumably because the elevation was much lower and the climate more equable at the time when these extinct mammals lived. Plans are in the works to apply for funding from the National Geographic Society.

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***Crustacea***

Todd Haney and Dr. Jody Martin spent late August and early September on a research cruise on board the *Atlantis,* the mother ship of the Deep Submergence Vehicle *Alvin*. The tiny *Alvin* submarine made dives to more than 3,258 meters (over 2 miles) deep off the coasts of Washington and Oregon. Haney and Martin were studying crustaceans associated with pieces of wood in the deep sea as part of a study organized by Dr. Janet Voight of the Field Museum of Natural History, Chicago. At left is a photograph of the front of the Alvin with one of the pilots (Bruce Strickrot) and chief scientist Janet Voight (in blue) checking the collecting devices on the front platform; on the next page are a deep sea amphipod crustacean (left) with unusual yellow eyes, and the *Alvin*

as it is lowered into the Pacific Ocean by the crane of the *Atlantis* with one of our intrepid explorers inside (at right).

## Meetings, Workshops, and Presentations

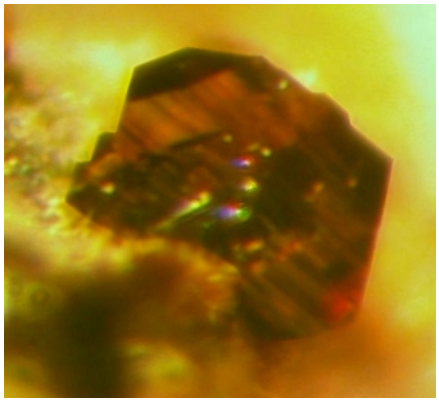
***Vertebrate Paleontology***
In October, Dr. Luis Chiappe participated in the Fifth International Meeting of the Society of Avian Paleontology and Evolution in southern France. He presented a paper on a peculiar fossil assemblage unearthed from 115-million-year-old rocks in Spain. This assemblage is composed of four tiny birds belonging to three different species, which are interpreted as part of an ancient (presumably dinosaur) regurgitated pellet. At this meeting, he also formed part of a panel discussing the development of feathers and the avian hand, and their implications for understanding the origin of birds.

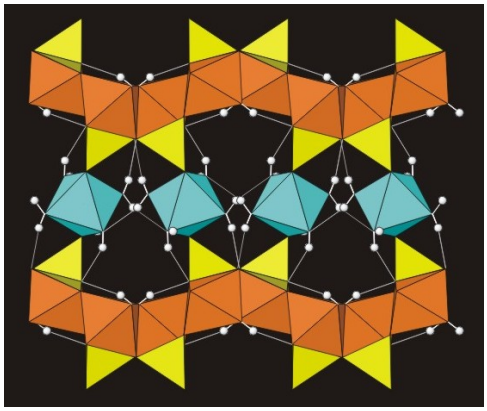
***Polychaete Worms***
Dr. Kirk Fitzhugh was an invited speaker at the French Systematics Society's annual meeting during the first week of October. He presented two talks while there: "The Popperian Myth in Phylogenetic Systematics" and "The Requirement of Total Evidence and Phylogenetic Systematics," both as part of the symposium "*Philosophy of Systematics*."

***Anthropology***
Assistant Curator of Latin American Anthropology Dr. W. Warner “Bill” Wood traveled to New York in October where he was invited by the Rockefeller Foundation MEXfund workshop on global philanthropy to present his research findings on Zapotec textiles and globalization. The talk was entitled: “Crafting Zapotec Textiles: Looking at Globalization from the Ground Up.”

***Conservator***
From October 1- 4, Tania Collas attended the 2004 Western Association for Art Conservation meeting in Santa Fe, New Mexico. There, she presented two talks, “Microenvironments for Pyrites and Other Unstable Minerals” and “Earthquake Strapping for Collections” (co-authored with Vicki Gambill), in addition to fulfilling duties as WAAC Treasurer.

***Mineral Sciences***
In September, Dr. Anthony Kampf attended the 5th International Conference on Mineralogy and Museums held at the School of Mines in Paris, France. He presented a paper on the occurrence of the rare cobalt-iron arsenate, cobaltarthurite (below, at left), in the Bou Azzer district in the Anti-Atlas Mountains of Morocco and reported a highly accurate determination of its atomic structure (at right). Dr. Kampf also attended meetings of the International Mineralogical Association's Commission on Museums, on which he is the United States representative.





***Malacology***
Dr. Angel Valdes attended the PEET (Partnerships for Enhancing Expertise in Taxonomy) conference and workshop that took place in Urbana-Champaign, Illinois, in September as the Museum's only representative to this NSF-funded program.

***Crustacea***
Dr. Jody Martin was an invited speaker on crustaceans from hydrothermal vents at Loma Linda University.

***Ornithology***
Dr. Ken Campbell attended the Sixth meeting of the Society of Avian Paleontology and Evolution (SAPE) in Quillan, France, Sept. 28th to Oct 3rd, 2004. Since 1985, SAPE has been an informal international group of scientists whose mission is to promote international collaboration and cooperation in scientific studies devoted to understanding the evolution of birds, especially through their fossil remains. At the Fifth meeting of the society in Beijing, China in 2000, Ken was elected President of the society and given the charge to develop a constitution and bylaws that would form the basis for the formal establishment of the society. The constitution and bylaws were adopted at the Quillan meeting, and Ken was elected first President of what is now an officially established international scientific society.

Ken also presented a paper describing the wrist and hand of *Archaeopteryx*, the oldest known fossil bird, and he illustrated some of the many ways that they differ from those of theropod dinosaurs. The reported differences cast further doubt on the existence of a link between the evolution of dinosaurs and birds. Ken also co-authored a paper presented by Dr. Z. Bochenski that described research on the extinct turkey from Rancho La Brea. Dr. Bochenski was a postdoctoral research fellow here at the Museum in 2003-04, during which time he conducted extensive research on the La Brea turkey while based

at the George Page Museum. On his way back to Los Angeles, Ken spent two days at the Natural History Museum in London where he continued his research on *Archaeopteryx*.

# External Funding

***Vertebrate Paleontology***
Dr. Luis Chiappe recently received the prestigious *Friedrich Wilhelm Bessel Research Award,* which carries with it funding for collaborative research in Germany. More details can be seen under the heading "Miscellaneous" later in this newsletter.

***Vertebrate Paleontology***
Dr. Xiaoming Wang recently received ¥400,000 (approximately $50,000) from the Chinese Academy of Sciences for his research on "Evolution of Cenozoic Mammals in Tibetan Plateau and Its Surrounding Regions." This is a matching grant for a previous award to Xiaoming as an "Outstanding Overseas Young Scholars" from the Chinese National Natural Science Foundation.

# Public Outreach

(see also National Media Attention under the heading Miscellaneous on page 9)

***Polychaete Worms***
Dr. Kirk Fitzhugh taught an in-depth graduate course titled "Philosophical Foundations of Phylogenetic Systematics" at El Colegio de la Frontera Sur (ECOSUR) in Chetumal, Mexico, from mid October through early November. The course included participants from ECOSUR as well as from Mexico City. A formal course plan has been submitted, and the plan is for Kirk to continue to teach this subject on an annual basis, thus promoting and facilitating additional systematics students from other Central American countries.

***R & C and The Haunted Museum: Lost Expedition***
As is always the case with any major public event, many of the R & C staff participated in this special event organized by Advancement for Museum members and donors. Howell Thomas and Doug Goodreau (Vertebrate Paleontology), Angel Valdes (Malacology), Kimball Garrett (Ornithology) and Jim Dines (Mammalogy) were cast as members of a lost expedition that now "haunts" the Museum's halls. The ghostly crew, which also included the Insect Zoo's Brent Karner, educated and entertained guests of all ages with demonstrations and specially chosen specimens from the Museum's research collections.

***Ornithology***
On 15 October Kimball Garrett gave a presentation on shorebird use and habitat issues along the lower Los Angeles River for a workshop on habitat management in that area sponsored by the Southern California Wetlands Recovery Project. As part of the workshop he also led a field trip along the lower river in Long Beach for agency personnel and interested citizens.

***Page Museum***
John Harris, Chris Shaw and Shelley Cox were all filmed at the Page Museum (October 21) for a feature entitled "Ice Age 101" that provides salient facts about the Pleistocene Ice age for the European and Australian releases of the DVD of the Fox feature film "Ice Age."

Shelley Cox and John Harris provided "behind the scenes" tours for more than sixty participants in Memberships' "Scavenger Safari at the Page Museum" on October 23.

The Alliance Board met at the Page Museum on September 29. John Harris gave a presentation on new research and collection findings at Pit 91 during the course of the meeting, and afterwards he and Chris Shaw gave a tour of the ongoing excavation to the board members.

***Mineral Sciences***
The Gem and Mineral Council was welcomed at Jewel Tunnel Imports in August, where Rock Currier, owner/proprietor, once again opened his immense Baldwin Park warehouse to Gem & Mineral Council members and guests for a very special open house to benefit the Council. In October, Council members were invited to an Open House at the home of Bill and Jeanne Larson in Fallbrook; the Larsons auctioned off a selection of fine gems and minerals, generously provided by them and their company, Pala International, to benefit the Gem & Mineral Council and the Museum's gem and mineral collection.

Distinguished Visitors

***Polychaete Worms***
Polychaetes hosted 2 international visitors. Dr. Markus Boeggeman (University of Osnabruck, Germany) came to study our extensive collection of goniadid polychaetes, while Dr. Rolando Bastida-Zavala (University Del Mar, Oaxaca, Mexico) worked on a faunal study of serpulid polychaetes from the eastern Pacific. Serpulids (also known as fan worms) are often transported throughout the world on ship hulls or in ballast water. *Ficopomatus enigmaticus* is one such species that forms large "reefs" on docks & pilings, causing physical & economic damage in harbors worldwide. Shown is a mass of *Ficopomatus* tubes plus one animal removed from its tube (at lower right).


***Crustacea***
Dr. Niel Bruce, of New Zealand's National Institute for Water and Atmosphere (NIWA), visited the Crustacea lab in October to work with Dr. Regina Wetzer on her NSF-funded isopod crustacean project. Together they have identified to the level of genus and species more than 1,000 lots (jars or vials containing one or more specimens) of sphaeromatid isopods from around the world, which are available not only for morphological studies but also for the molecular phase of the project.

# Recent Publications

Behrens D. W. & **Valdés**, A. 2004. A new species of Dendrodoris (Mollusca, Nudibranchia, Dendrodorididae) from the Pacific coast of North America. Proceedings of the California Academy of Sciences, 55: 408-413.
*This paper includes the description of a new species of nudibranch from Los Angeles and other southern California localities.*

**Brown**, B. V. 2004. Diversity of ant-decapitating flies (Diptera: Phoridae: *Apocephalus*) from the ALAS project: new results and projections. Sociobiology. 44: 683-688
*This paper describes some results from a large insect survey project in Costa Rica, in which we found an incredible number of ant-decapitating flies (115 species), 90% of which are new to science.*

Codorniu, L. and L. M. **Chiappe**. 2004. Juvenile pterosaurs (Pterodactyloidea: Pterodaustro guinazui) from the Lower Cretaceous of central Argentina Canadian Journal of Earth Science 41(1): 9-18.

**Chiappe**, L. M. 2004. The closest relatives of birds. Ornitología Neotropical 15 (Suppl.): 101-116.

**Chiappe**, L. M., Schmitt, J. G., Jackson, F. D., Garrido, A., Dingus, L., and Grellet-Tinner, G. 2004. Nest structure for sauropods: Sedimentary criteria for recognition of dinosaur nesting traces. Palaios 19: 89-95.

Corona, E. and B. V. **Brown**. 2004. Two new species of the *Apocephalus attophilus*-group of ant-decapitating flies (Diptera: Phoridae). Sociobiology. 44: 689-693.
*This paper is the result of a project undertaken by students in Brian Brown's laboratory.*

**Fireman**, J. R. 2004. "Invisible No More: The Place Called Los Angeles," The Historian 66 (Fall 2004): 517-523.

Grellet-Tinner, G. and L. M. **Chiappe**. 2004. Dinosaur eggs and nesting: Implications for understanding the origin of birds. In P. J. Currie, E. B. Koppelhus, and M. A. Shugar (eds.), pp. 185-214, Feathered dragons: studies on the transition from dinosaurs to birds.

Grellet-Tinner, G., **Chiappe**, L. M., and R. A. Coria. 2004. Eggs of titanosaurid sauropods from the Upper Cretaceous of Auca Mahuevo (Argentina). Canadian Journal of Earth Sciences 41: 949-960.

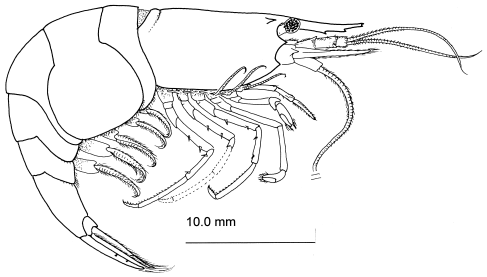
Hou L, **Chiappe**, L. M., Zhang F., and Chuong C-M. 2004. New Early Cretaceous Fossil from China Documents a Novel Trophic Specialization for Mesozoic birds. Naturwissenshaften 91: 22-25.

**Karr,** S. 2004. Indian Depredations along Texas's Rio Grande and Trans-Pecos Frontiers, 1877-1882: Rhetoric and Reality. New Mexico Historical Review 79, No. 2.

**Kung**, G. and B. V. **Brown**. 2004. Two new species of *Megaselia* Rondani (Diptera: Phoridae) from Costa Rica. Proceedings of the Entomological Society of Washington. 106: 751-756.

*This paper is the result of a project undertaken by students in Brian Brown's laboratory.*

**Martin**, J. W., and M. K. Wicksten. 2004. Review and redescription of the freshwater atyid shrimp genus *Syncaris* Holmes, 1900, in California. Journal of Crustacean Biology 24(3): 447-462.




*This paper presents an overview of what little we know about the biology, morphology, and natural history of an extinct shrimp (*Syncaris pasadenae*) that once lived in the Los Angeles River and its surviving northern relative in the San Francisco area. The study is based on extremely rare specimens in our Crustacea collection.*

Pol, D., Ji S.-H., Clark, J. M., and L. M. **Chiappe**. 2004. Basal crocodyliforms from the Early Cretaceous Tugulu Group (Xinjiang Province, China), and the phylogenetic position of *Edentosuchus*. Cretaceous Research 25: 603-622.

**Thacker**, C. E. 2004. Population structure in two species of the reef goby *Gnatholepis* (Teleostei: Perciformes) among four South Pacific island groups. Coral Reefs 23: 357-366.

*This paper presents some of the results from Christine Thacker's research trips to the South Pacific. Two very similar species of goby were examined for DNA sequence. The results indicate that populations of fishes across the Pacific are very young, and that those found in shallow water are even younger than those found in deeper water. This is consistent with varying times for reestablishment* of *habitat after significant sea level drops and rises in the Pleistocene.*

Van Valkenburgh, B., X. **Wang**, and J. Damuth. 2004. Cope's Rule, Hypercarnivory, and Extinction in North American Canids. Science, 306: 101-104.

Wallace, S. C., and X. **Wang**. 2004. Two new carnivores from an unusual late Tertiary forest biota in eastern North America. Nature, 431: 556-559.

*This paper announces the truly amazing finding of a lesser panda and a Eurasian badger at a fossil site in eastern Tennessee.*

**Wang**, X., R. H. Tedford, B. Van Valkenburgh, and R. K. Wayne. 2004. Phylogeny, classification, and evolutionary ecology of the Canidae, pp. 8-20. *In* C. Sillero-Zubiri, M. Hoffmann, and D. W. MacDonald (eds.), *Canids: Foxes, Wolves, Jackals and Dogs. Status Survey and Conservation Action Plan*. IUCN/SSC Canid Specialist Group. The World Conservation Union, Gland, Switzerland and Cambridge, United Kingdom.

**Wang,** X., and Z.-x. Qiu. 2004. Late Miocene *Promephitis* (Carnivora, Mephitinae) from China. Journal of Vertebrate Paleontology, 24 (3): 721-731.

# Miscellaneous

***National Media Attention***
Readers of **Time Magazine** will have already noted that Dr. Luis Chiappe (Vertebrate Paleontology) was involved in a recent article on primitive birds and dinosaurs (the October 25, 2004, issue of the magazine). Congratulations, Luis!

Our "**National Media Collections Day**" held in late August (see also the first item under Collection News on page 1 for a related brochure) resulted in several national and international news stories, including a great radio interview by Mike O'Sullivan entitled *Animals, Fossils Offer Clues to Environmental Change***, which** aired on ***Voice of America*** in several European and African nations. The printed version of the article is sent as a separate attachment along with this Newsletter.

***Awards and Recognition:***

***Vertebrate Paleontology***
Congratulations to Dr. Luis Chiappe (Vertebrate Paleontology) for receiving the extremely prestigious *Friedrich Wilhelm Bessel Research Award* from the Alexander Humboldt Foundation in Germany. This high honor recognizes outstanding research accomplishments and research promise, and only 10 awards are presented each year worldwide. The award is accompanied by funding to be used while conducting research in Germany. Luis's research topic will involve the study of a new small carnivorous dinosaur from the celebrated Solnhofen basin and research on the evolution of long-tailed birds; his host institution will be the Bayerische Staatssammlung für Paläontologie und Geologie—the Bavarian State Collection in Munich.

As a Humboldt laureate, Luis is also eligible to apply for funding each time that he needs to attend a scientific meeting in Germany and for supervising Humboldt postdoctoral fellowships. His status as a Humboldt Fellow also makes the Museum eligible to host Humboldt postdoctoral fellows. In the words of the Humboldt Foundation,

"The Alexander von Humboldt Foundation grants approximately 10 Friedrich Wilhelm Bessel Research Awards annually to young, top-flight scientists and scholars from abroad who are already recognized as outstanding researchers in their fields. The research award has been endowed by the Federal Ministry of Education and Research in recognition of their research achievements to date. The award-winners are also invited to work on research projects of their own choice in cooperation with colleagues in Germany for periods of between six months and one year."

More information about the Humboldt Awards can be found at:
http://www.avh.de/en/programme/preise/bessel.htm

***Conservation***
Congratulations to Tania Collas, our Conservator, for her recently awarded Professional Associate status in the American Institute for Conservation.

***Crustacea***
Congratulations to Dr. Jody Martin (Crustacea) on his election to the rank of Fellow of the American Association for the Advancement of Science (AAAS) for his "distinguished and vital research in crustacean evolution and systematics." Jody has been invited to the AAAS national meeting in Washington, DC, in February to receive his award.

*Because this is the last R & C Newsletter for calendar year 2004, the R & C staff takes this opportunity to wish all of you a happy and safe holiday season and a bright and productive New Year.*

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# Animals, Fossils Offer Clues to Environmental Change

*Mike O'Sullivan*

*1 September 2004*
*Voice of America*

Scientists worldwide are tracking changes in our natural environment to better understand issues like global warming. Researchers at the Natural History Museum of Los Angeles say some changes are natural and others are caused by humans, and the challenge is to distinguish between the two.

The scientists are part of a global effort to track changes in the atmosphere and oceans by monitoring plant and animal populations.

Leslie Harris is the Los Angeles Natural History Museum's collections manager for polychaetes, which are segmented worms equipped with bristles. Polychaetes come in many sizes and are common in the ocean, and Ms. Harris says they serve as a barometer of ocean health.

**Researcher Leslie Harris examining a polychaete from the MekongDelta,Vietnam** (VOA photo - M. O'Sullivan)

"For example, if we go out to the Hyperion sewage plant, they have an ocean discharge of the sewage from the city of Los Angeles," she said. "They pump out millions and millions of gallons of sewage every day. Well, if you take samples of the sea bottom and then identify and count the animals that are in the sediments, you'll find that polychaetes often dominate. And by looking at the types of polychaetes and where they live, we see how much of an effect there is from the outfall and how far it reaches."

Some of the bristled sea worms actually thrive on processed wastewater, but the creatures may also be harmed by escaping contaminants.

While some scientists study living creatures, others turn to the fossil record for clues about the earth's past climate. Temperatures have shifted dramatically over the ages, and paleontologists see evidence of that. Luis Chiappe, curator of Vertebrate Paleontology at the museum, first studied dinosaurs in his native Argentina. In 1997, he co-discovered a large collection of fossilized dinosaur eggs in the Patagonia region. Today he is studying the remains of an ancient Tyrannosaurus Rex from the eastern part of the U.S. state of Montana.

He says fossilized plants and animals from the Mesozoic era reveal a very different climate from today's. Now, eastern Montana, where this dinosaur was found, has hot summers and cold winters, but 65 million years ago, conditions were very different.

"It was a lot warmer than today, and essentially tropical forests formed the shores of a seaway, because at the time, there was a seaway that connected the Gulf of Mexico with the Arctic," he said. "And T-Rex and other dinosaurs, triceratops and so on, they all lived on the western side of the coastal plains of the seaway."

Over time, the earth has experienced ice ages alternating with periods of global warming. Paleontologist Ken Johnson says the shells of ancient mollusks found near Los Angeles illustrate that history.

**Jar of specimens**
(Photo courtesy - Natural History Museum of Los Angeles County)

"And we study them because they act as ancient thermometers," he said. "They show us what the ocean temperatures were like in the past."

During the ice ages, mollusks now found in Alaska lived near Los Angeles. When temperatures were higher, the Los Angeles coast was home to mollusks that now live off the coast of Central America.

Researcher Sam McLeod points out the fossilized skull of a gray whale that lived off the coast of California 100,000 years ago. It was a time of global warming when the polar ice was melting and sea levels were high. He says the changes seen in these fossils show that such cycles were natural.

"Now we don't understand all the details about how and why global warming occurs, or why you have the reverse, which is ice ages, where you have a lowering of the sea levels because the water gets tied up in the glaciers and the polar ice," Mr. McLeod said. "But it is a natural phenomenon that does occur. It can have severe impacts. But it's something that has occurred many times in the past, and we know is going to happen in the future, and apparently we're in the middle of at least a slight global warming period right now."

He adds that humans are contributing to the warming process by releasing so-called greenhouse gases into the atmosphere. While scientists debate the precise extent of the human impact, he says that global warming has the potential of creating major changes in the earth's environment.

Researcher Regina Wetzer studies sea life to monitor the biodiversity of the local waters. She says new species are easy to find on any California beach because so many species remain unclassified. She points to some tiny sea creatures in a petri dish.

"It's a common myth that we know everything that's out there," she said. "It's very easy to go to the shore and look at organisms this size, a few millimeters or even a few centimeters across, and many of them are new and have not been previously described. So in order to be able to look at anything like global change down the line, we need to know who's there first and describe them. And that's where the role of museums come in."

She says that, unfortunately, many species are being lost before they can be described, sometimes through natural processes and sometimes as a result of human activity.

Scientists need not look far to find species that have become extinct. In the neighboring city of Pasadena, a species of freshwater shrimp, called the Pasadena shrimp, appears to be gone. The shrimp were once abundant in local rivers, but the rivers were paved over with drainage channels and the last specimens of the Pasadena shrimp were collected in 1933.

Scientists say there is a trade-off. Humans need a place to live, and in creating it, they may displace other species. But George Davis, crustacea manager for the Natural History Museum, says it is not a matter to be taken lightly, and that crustaceans like this small shrimp are also important.

"Crustaceans are at the base of the food chain, right there with plankton and what have you," he said. "And if you wipe it out, you wipe out an awful lot of the marine environment, which eventually is going to affect man as well. So it's a good idea to know

what we've got before we get rid of it, and in this case, I don't think we'd want to get rid of it."

Mr. Davis adds that another threatened arthropod could well have met its end at human hands, depriving medicine of an important diagnostic tool. For years, horseshoe crabs were harvested from beaches and ground up for fertilizer. But scientists discovered that the crab's blood contains a substance that reacts to endotoxins, dangerous chemicals produced by certain bacteria. The pharmaceutical industry uses blood drawn from the creature for a diagnostic serum, then the crab is returned unharmed to its natural habitat.

Humans are not the only creatures that change an ecosystem. Invasive plant or animal species can have an unexpected effect on the local ecology. Changes in the weather have an even greater impact. These scientists say that the balance of nature is delicate, and their challenge is to monitor these shifts and understand the extent to which humans are causing them.