Research & Collections Newsletter

Fall 2016

re•search (ri-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.

Collection News

Malacology

Recently collected specimens of the large introduced species *Busycotypus canaliculata* (Linnaeus, 1758), the Channeled Whelk, were donated to Malacology. The specimens were found in Huntington Harbor during eel grass surveys by Santa Ana College biologist Kimo Morris. This species is common from Cape Cod, MA to central FL and was introduced to San Francisco Bay in the early 1960's.

Newly introduced species Busycotypus canaliculata *(Linnaeus, 1758) from Huntington Harbor.*

Dinosaur Institute

The Dinosaur Institute received a donation from Dr. William Hammer of Augustana College of two generators, two gas-powered jackhammers, one electric jackhammer, and one rock saw. These tools were previously used by Dr. Hammer and Nate Smith in their fieldwork in the Transantarctic Mountains, and will be used for an upcoming field season at the Shackleton Glacier in 2017–18. Dr. Hammer also donated a cast of the skull of the Early Jurassic theropod *Cryolophosaurus ellioti* (FMNH PR 1821) from the Hanson Formation of Antarctica. This is an exceptional cast that was produced by Research Casting International.

While in Argentina for the Society of Avian Paleontology and Evolution, Dr. Luis Chiappe acquired a cast of a newly discovered cervical vertebra from the giant bird *Gargantuavis philoinos* from the Late Cretaceous of Provence (south-eastern France). The locality of its discovery has yielded an abundant and diverse assemblage of vertebrates including fishes, turtles, crocodilians, pterosaurs and other non-avian dinosaurs, including ankylosaurs, theropods, ornithopods and many others. The Dinosaur Institute now has two elements from the rare bird.

Mineral Sciences

The William E. Phillips brown-orange diamond was generously donated by his family Lynn, Andrea, and Lucy! William E. Phillips donated a dozen colored diamonds to the NHM in 1961, and they are still on display today in the Gem Vault. The brown-orange diamond was a favorite of Mr. Phillips, and he wore it as a ring on his pinkie finger for 20 years. After Mr. Phillips' death in 1963, the ring was passed down to his son, Bob. Years later, when a white diamond fell out of Bob's wife's (Lucille) wedding ring, he had the brown diamond removed from the original setting and placed into a custom cast band for her. Lucille wore the diamond everyday of her life for the next 40 years. After she died in 2003, the ring passed to Lynn Phillips (grand-daughter of William E. and daughter of Bob and Lucille). It remained on Lynn's finger every day for nearly 13 years. This diamond is quite a personal gift, having been worn by three generations.

Originally, the diamond was colorless. In the 1940s it was sent the Lawrence Berkeley Lab for experiments (likely concerning diamond coloration, though the details are not known). While at the lab, it could have been irradiated (likely forming a green diamond) and then possibly heated to form this brown-orange color. Based on the time it was sent to the lab, it may very well have been a part of the first diamond coloration experiments performed at the lab!

Field Work

Dinosaur Institute

Rachel Racicot traveled to Namibia and South Africa in July–September to participate in fieldwork with a team including faculty, graduate students, and undergraduates from Vanderbilt, Stanford, the Smithsonian, Harvard, and the University of Toronto. The goal of the field season was to collect fossil data that will establish the cause of the "first mass extinction" of complex life. To this end, the team prospected for and successfully found Ediacaran and Cambrian trace and body fossils along with new sites for future exploration. The fieldwork enabled transformative experiences for the participating undergraduate and graduate students.

Rachel Racicot and colleagues investigating stromatolite fossils in Namibia.

Dinosaur Institute and USC doctoral student Nate Carroll spent the summer in Montana prospecting the Hell Creek Formation along the Cretaceous-Paleogene boundary for evidence of vertebrate fossils. He also collected new specimens of fossil amber with fossil inclusions from throughout these rocks, which will hopefully tell us more about the mass extinction that decimated the world's biota at the end of the Cretaceous 66 million years ago. Nate's study is part of his Ph.D. dissertation, supervised by Dr. Chiappe.

N. Smith and Sarah Edwards (DI volunteer) traveled to Ghost Ranch, New Mexico for several weeks of National Science Foundation and National Geographic-supported field work at the "Hayden Quarry". Along with colleagues from collaborating institutions, they collected over one thousand vertebrate specimens, including new material of early dinosaurs and their relatives. In particular, this year's expedition focused more heavily on screen-washing and collecting microvertebrate fossils from the quarry sites.

Nate Smith (far left), Sarah Edwards (4th from left) and colleagues with a Late Triassic aetosaur fossil jacket from the Canjilon Quarry near Ghost Ranch, New Mexico.

Haaga Dinosaur Expedition 2016 to the Gnatalie Quarry, Utah

L. Chiappe and Dinosaur Institute staff (Jose Soler, Erica Canola, Alyssa Bell, Nate Smith, Stephanie Abramowicz) along with Dr. Lori Bettson-Varga and Rancho La Brea Staff (Beau and Sean Campbell, and Laura Tewksbury) travelled to Bluff, Utah to continue working on Gnatalie. The expedition resulted in new important research collections and also provided training to the *Proyecto Dinosaurios* interns, and hands-on experiences to some Trustees and donors.

View of the Jurassic Gnatalie Quarry north of Bluff, Utah.

Augustyn Dinosaur Expedition 2016 to the Bisti Wilderness, New Mexico

Research Associate Dr. Mike Habib and crew visited the Bisti Wilderness in northern New Mexico to continue collecting dinosaurs and other fossil remains from the Late Cretaceous of this region. This year, the expedition started a research project focused on the microfauna of the Late Cretaceous Kirtland Formation. The expedition was also joined by Drs. Luis Chiappe and Ryan Tucker (Stellenbosch University, South Africa) who spent two days looking at the stratigraphy of the different fossil-rich sites.

Polychaetes

In July, Leslie Harris spent a week at Friday Harbor Laboratories, Washington helping students in Dr. Gustav Paulay's (Florida Museum of Natural History) *Marine Biodiversity Methods* class with their polychaete identifications. While there she collected several hundred specimens for the museum.

Leslie collecting under the miserable field conditions typical of Friday Harbor in summer

Malacology

Lindsey Groves and U.S. Geological Survey colleague/co-author Daniel Muhs spent a day collecting mollusk fossils from a low marine terrace at Punta Gorda and Pitas Pt., west of Ventura, for research purposes. These terraces may be as young as 1,000 years or as old as 8,000 years and are currently from 5 to 20 m above sea level. Ages of the mollusk shells will be determined via carbon 14 and/or amino acid dating techniques and sea-level uplift rates will then be determined and results will be published.

Marine Biodiversity Center

Crab snagged

In a serendipidous collecting event, Regina Wetzer and Dean Pentcheff of the Marine Biodiversity Center acquired a valuable tissue sample from the crab species *Cancer pagurus.* This is a commercially important crab in the family Cancridae, subject of a slowly-evolving systematics project in MBC and Crustacea. The project requires molecular-grade tissue samples from all species worldwide. The tricky bit is that *C. pagurus* is found in the eastern Atlantic and Mediterranean oceans — nowhere near here. At the Quality Seafood Market in Redondo Beach, the avid field collectors spotted an animal labelled "Euro Crab", immediately acquired a specimen, and learned from the vendor that it was an unusual import from Ireland. At a cost considerably lower than a research trip to the North Atlantic Ocean, we now have a definitively identified and properly preserved tissue sample. The rest of the specimen, we confess, we ate.

Cabrillo Inner Beach Survey

On June 24, Marine Biodiversity Center Research Associate Dean Pentcheff joined up with the Cabrillo Marine Aquarium's Inner Cabrillo Beach Survey for a morning of invertebrate surveying in San Pedro. This tri-annual survey has been collecting key data on biodiversity in the Port of Los Angeles for ten years. Thanks to Julianne Kalman Passarelli (CMA's Exhibits and Collections Curator), MBC has been given access to the survey to collect selected invertebrates for morphological identification and molecular sequence identification. CMA will benefit from having a comprehensive, curated, vouchered, and sequenced library of the species from their beach, and NHM benefits from local molecular-grade specimens for molecular biodiversity analysis — an excellent collaborative venture benefitting both institutions.

Marine Biodiversity Center and Polychaetes

What's up dock?

Regina Wetzer, Dean Pentcheff, and Leslie Harris spent a wet morning at the Ports O' Call Marina in San Pedro on September 8th. They were evaluating the state of the docks by the old Acapulco restaurant, which turned out to be old, rickety, and very nicely overgrown with a rich assortment of invertebrates and algae — perfect collecting grounds for the *Diversity Initiative for the Southern California Ocean* project. Several buckets worth of live material was brought back to the museum to sort out good specimens for photography and subsequent incorpo-

ration into the museum's permanent collections. Some of the specimens were kept alive for several days and used during the NHM Citizen Science Meetup in King Harbor on September 10 (see *Public Outreach*). The docks will be removed later this year during harbor renovations, at which time the whole crew will do more extensive sampling.

Marine Biodiversity Center, Polychaetes, and Crustacea

White Point Collecting Trip

Taking advantage of a particularly good daytime low tide for the summer months — well, almost daytime at 5:50am on June 23 — armed with flashlight and coffee in hand, members from the MBC, Polychaetes, and Crustacea sections visited White Point on a collecting trip. Many new molecular grade specimens were collected and will be added to the museum's collection.

Meetings, Workshops, and Presentations

History

On July 21, 2016, Curatorial Assistant Kristen Hayashi made a second presentation, on behalf of the Little Tokyo Historical Society, to the City of Los Angeles's Cultural Heritage Commission as part of an effort to obtain a historic cultural monument (HCM) designation for the former Japanese Hospital in Boyle Heights. Dr. William Estrada, Curator, spoke in support of the nomination, emphasizing the hospital's importance to the social history and diverse cultural heritage of Los Angeles. The commissioners voted unanimously to recommend that the Los Angeles City Council designate the hospital as a historic cultural monument. The Los Angeles City Council will make a final decision on the HCM designation for the Japanese Hospital in the coming weeks.

Kristen Hayashi and Michael Okamura of the Little Tokyo Historical Society present at the Japanese Hospital HCM nomination at City Hall.

Brian Brown discussing NHM's Urban Nature Research Center.

On August 25th, the History Department hosted a meeting of the San Gabriel Mountains National Monument Community Collaborative (SGMCC) — William Estrada serves on this board. Luis Chiappe offered a morning welcome with an emphasis on the benefits of collaboration between NHM researchers and the National Monument, followed by presentations by Brian Brown, Greg Pauly and Kimball Garrett on their ongoing research in

the Los Angeles basin. The purpose of the SGMCC is to offer advice and community input to the National Forest Service in the development of a Management Plan for the monument.

Dinosaur Institute

Luis Chiappe travelled to Washington, D.C. from June 27 to July 3, 2016 to deliver a plenary lecture: "Assembling the bird: morphological evidence from Mesozoic fossils elucidates the evolution of the avian body plan and systems", at the International Congress of Vertebrate Morphology (ICVM). His talk covered how new spectacular fossils of ancient, Mesozoic birds have transformed our understanding of the early evolution of the group, revealing often surprising insights into growth rates, reproduction, digestion, and, of course, flight.

Dr. Alyssa Bell spoke at the 35th Annual International Geological Congress from 27th August to 4 September, 2016 in Cape Town, South Africa. Her talk, co-authored with Luis Chiappe and Becky Wu, was titled: "Use of morphometric data in taxonomy and functional morphology: a case study of modern and Cretaceous diving birds."

Luis Chiappe attended the SAPE (Society of Avian Paleontology and Evolution) meeting in Argentina from July 28th to August 8th. Luis was voted in as the President of the Society for a term lasting four years. He also co-authored a paper titled: "Paleoatmospheric variations and the evolution of avian flight: evidence or coincidence."

Rachel Racicot presented “Fossil secrets revealed: X-ray CT scanning and applications in paleontology” as part of the Paleontological Society 2016 Short Course “Virtual Paleontology”, at the Geological Society of America Annual Meeting in September in Denver, CO.

Marine Biodiversity Center

Collections documents

Research Associate Dean Pentcheff of the Marine Biodiversity Center participated in the 2 August workshop on *Natural History Collections Documents: Physical Preservation, Metadata, and Document Databasing* at the Cheadle Center for Biodiversity & Ecological Restoration (University of California, Santa Barbara). Curating specimens also means curating their data. Sometimes that’s in the form of labels in jars, but often there are more or less extensive documents that are directly associated with (and document) collection artifacts. How should museum collections groups handle those specimen-related documents to maximize and preserve their research value? Thanks to a series of speakers and discussions, the group became far better acquainted with an archival approach to these resources. There were two key takeaway messages. First, making metadata about documents available digitally is highly worthwhile, even if the document contents are not (or not yet) digitized. Second, it’s important to draw on the expertise of professional archivists who can readily advise on both the appropriate preservation and the digital exposure of the existence of collections-associated documents.

Society for the Preservation of Natural History Collections

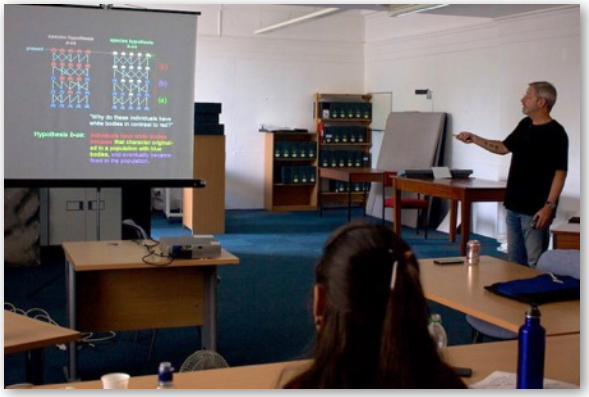
Lori Bettison-Varga and Regina Wetzer attended the 31st Annual Meetings of the Society for the Preservation of Natural History Collections in Berlin. A link to the program is at http://www.spnhc2016.berlin/page05.html. Themed “Green Museum — How to practice what we preach?” the meetings were an action-packed week. Regina reported on the findings of the NHM crowdsourcing pilot, “The Crab Shack Experience” (http://research.nhm.org/mbc/crabs/SPNHC2016-CrabShack.pdf). For Regina, the week culminated with a two day immersion workshop *Museum environments: Managing risk and sustainability* led by Rob Waller and Jeremy Linden. A resource on sustainable preservation practices summarizing a few of the topics covered can be accessed from within the Museum network at http://research.nhm.org/mbc/collectionsclimate.

Mineral Sciences

American Crystallographic Association Meeting

Recently Aaron co-chaired two sessions at the American Crystallographic Association Annual Meeting in Dever, CO. The first scientific session, titled *Mineralogical Crystallography* (co-chaired with Nicole Valdez, Uni. Idaho), aimed to highlight geoscience research where crystal structure determination was a key component. Submitted papers ranged on topics from crystal chemistry, petrology, mineral physics, time-resolved spectroscopy, biomineralization, and mineralogy in medicine. Aaron gave a talk titled "*In Situ* Ion Exchange in Nanoporous Zirconium Silicate Gaidonnayite" that discussed how gaindonnayite is able to absorb Cs in different ways depending on its local chemical/temperature environment. The second session was an undergraduate and graduate research symposium (co-chaired with Kim Stanek, Virgina Tech.) The Chief Executive Officer of The ACA gave a talk on the use and importance of crystallography to science and engineering.

Polychaetes



Kirk's workshop.

Leslie Harris and Kirk Fitzhugh attended the *12th International Polychaete Conference,* held at the National Museum of Wales, Cardiff, 1–5 August. Prior to the IPC Kirk presented his week-long workshop on *Philosophy of Biological Systematics*. At the conference Kirk was a plenary speaker, delivering *A solution to going down the rabbit hole of systematics*, and was also co-author on 2 posters. Leslie co-authored 5 posters and 1 talk. Together with museum research associate Larry Lovell, they presented a successful bid to host the 13th IPC in Long Beach, CA, in 2019.

Leslie and one of her posters

Nogueira, J., Fitzhugh, K., Hutchings, P., Carrerette, O. A new hypothesis of phylogenetic relationships within the polychaete family Telothelepodidae (Annelida, Terebelliformia).

Lovell, L.L., Fitzhugh, K., Harris, L.H. Taking a closer look: a SEM review of Levinsenia (Paraonidae).

Harris, L.H. 4 new & 1 revalidated species from California (Polychaeta).

Tovar-Hernandez, M.A., Harris, L.H. Sabellids from the Chukchi Sea, Alaska (Sabellidae).

Sivadas, S.K., Harris, L.H. Carvalho, R., Ingole, B. Standardizing Polychaete taxonomy for the improvement of marine ecology and conservation studies ont he Indian subcontinent.

Sivadas, S.K. Harris, L.H., Carvalho, R., Ingole, B., Harris, L. The status of marine polychaete research in India.

Keppel, E., Chang, A., Marraffini, M., Harris, L.H., Ruiz, G. NIS Surveys: Polychaete diversity in San Francisco Bay, California (USA) (talk).

On June 13, Leslie Harris was an invited speaker at the Antelope Valley Dive Club. She spoke about her ongoing research on introduced and invasive species associated with marine debris produced by the 2011 Japanese tsunami. Another dive club, the Orange County Underwater Photographic Society, heard Leslie speak about flatworms on September 13, learning far more than they either needed to know, or in the case of parasitic worms, ever wanted to know. Despite all the groans and horrified reactions the audience thoroughly enjoyed the talk and came away with increased appreciation for the amazing diversity within invertebrates.

Polychaetes and Marine Biodiversity Center

Leslie Harris and Dean Pentcheff attended the September general meeting of the Southern California Association of Marine Invertebrate Taxonomists (http://scamit.org). SCAMIT is dedicated to promoting the study of invertebrate taxonomy and standardization of regional taxonomy via monthly meetings, sharing information, an interactive database, and since 1994, the production of an official taxonomic listing now followed by members, academics, marine labs, and government agencies. Leslie, the vice-president of SCAMIT, gave a recap of meetings for the last year and managed to fill the schedule for the coming year with new workshops — something unprecedented in SCAMIT's 34 year history. Dean, as webmaster, updated the group on current status of the website and potential changes for the future. 20 people attended in person while another 10 listened in remotely from as far away as Montana and Texas.

Meeting attendees; Leslie in the front and Dean in the back

UNRC

Richard Smart gave a presentation at the Back Bay Science Center in Newport Beach on August 29 about the value of citizen science to NHM and its citizen scientists. About 30 people were in attendance. Presentations were also given by representatives from USC Sea Grant, Crystal Cove Alliance, ReefCheck, California Coastal Commission, and Citizen Science Academy-Newport Beach Voyager Program.

Brian Brown and Greg Pauly spoke at the San Gabriel Mountains National Monument Community Collaborative meeting. The meeting took place in the Times Mirror Room on Aug 26, and was hosted by Dr. William Estrada, who is one of the group's members.

L.A. County Library Meeting on June 21

Citizen Science Program met with administrators with the L.A. County Libraries to discuss holding a community bioblitz. Different locations were discussed, and Pico Rivera was determined to be the best based on a city park being nearby, and the best possibility of having a lot of people attend (200). Saturday, October 15 is the date with more details to be determined.

BrianBrown was featured on "This Way Up" on 20 June:
http://www.radionz.co.nz/national/programmes/thiswayup/audio/201805011/la-wildlife-survey

External Funding

Dinosaur Institute

Nate Smith finalized the transfer of an NSF award: "NSF DEB-1646699 Collaborative Research: ARTS — Revisionary systematics of fossil and living Caribbean faviid and mussid reef corals (Cnidaria, Anthozoa, Scleractinia)" that focuses on revising the taxonomy of phylogenetics of reef corals. This award also supports post-doc Rachel Racicot's position. The remaining portion of the award will fund $32,328 to the NHM.

Nate Smith finalized the transfer of an NSF award: "NSF EAR-164781 Collaborative Research: An exceptional window into Late Triassic terrestrial ecosystems from the Western United States" that focuses on interpreting faunal change in the Late Triassic of North America and integrating data from the pale-oenvironment, plant record, sedimentology, and vertebrate fossils. The remaining award will fund $61,624 to the NHM.

Nate Smith received a new NSF award from Polar Programs: "Collaborative Research: Understanding the evolution of high-latitude Permo-Triassic paleoenvironments and their vertebrate communities" that involves new fieldwork and collection of vertebrate fossils and geological samples from the Shackleton Glacier region of the Central Transantarctic Mountains. The award will fund $162,800 to the NHM.

Rachel Racicot was awarded the Los Angeles Chapter of the American Cetacean Society's John E. Heyning Research Award in the amount of $1,000 to study ziphiid (beaked whale) inner ears, primarily from the LACM collections, using CT scans.

Rachel Racicot also received the John E. Heyning Award from the Society for Marine Mammalogy. This award will fund $5,000 for additional CT scanning of ziphiid (beaked whale) inner ears.

Public Outreach

Dinosaur Institute

Jose Soler and Nathan Carroll participated in the LA County Fair's Jurassic Planet exhibit. Jose and Nathan ran multiple paleontology mini-classes for children and fair visitors at the "Paleontology Stage", where they shared their expertise and fieldwork stories, and also talked about the NHM paleontology collections and Dinosaur Institute research.

Jose Soler at LA County Fair

History

Leather cattle brand samples piqued the interest of many visitors during the two-day L.A. Urban Nature Fest in June. Collections Managers John Cahoon and Betty Uyeda talked about 19th century Los Angeles ranchos, their cultural impact, and how their place names are still with us today. Pictured is Betty alongside the display that included one of our oldest brands dating back to circa 1836, plus a brand for the city of Los Angeles and one for the city of Anaheim.

Echinoderms & Malacology

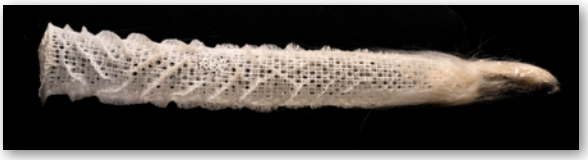
Cathy Groves and Lindsey Groves participated in the 2nd annual *L.A. Urban Nature Fest* on June 25–26. Cathy discussed sea star wasting disease and intertidal keystone species with visitors and Lindsey exhibited introduced and invasive freshwater and terrestrial mollusks of southern California. Pacific Conchological Club members Phil Liff-Grieff, Lawrence Moser, Andrew Hoekstra, and Scott Zaragoza also participated in the *Nature Fest* and exhibited local shells, micro-mollusks, and demonstrated iNaturalist to interested visitors. Many thanks to Christy Evans for volunteering on Saturday.

Cathy Groves (Echinoderms) discussing echinoderms with young visitors to the Nature Fest.

Pacific Conchological Club member Phil Liff-Grieff demonstrating the world of micro-mollusks with Nature Fest visitors.

Marine Biodiversity Center

Scavenger Safari: Sponges



The July Scavenger Safari led by Kathy Omura and Regina Wetzer took visitors behind the scenes on a sponge journey: from bathtubs to fiber optics. The phylum Porifera (sponges) contains the simplest multi-cellular animals in the animal kingdom. Their simple bodies make some of the most amazing glass skeletons, while others pair perfectly with a warm bath and scented salts. Shown in the photo is *Euplectella*, the glass sponge.

#ASKACURATOR

#ASKACURATOR Day took place on September 13 with 1,344 museums from 53 countries answering pressing curatorial questions. The NHM figured prominently (@NHMLA). Regina Wetzer brought a long-time Museum favorite, *Bathynomus giganteus,* the largest species of pill bug in the world, and the recently collected sessile and stalked barnacles from a humpback whale found in San Pedro.

Marine Biodiversity Center, Polychaetes, and Citizen Science

Marine Invertebrate Citizen Science Meetup

On Saturday 10 September, Regina Wetzer (MBC), Dean Pentcheff (MBC), and Leslie Harris (Polychaetes) teamed up with Richard Smart (Citizen Science) to host a great marine-themed Citizen Science Meetup at Redondo Beach. The goal was to test out how it may be possible to involve Citizen Scientists in the exploration and documentation of marine invertebrates in Southern California. Unlike birds and bees, marine invertebrates take a bit of specialized effort to access. We took advantage of the "fouling communi-

ty" that inhabits the floating docks of the Redondo Beach Marina. These are animals of multiple phyla that can be hand-collected using a scraper and trays — an activity over 30 Citizen Scientists pursued with enthusiasm. Once collected, we brought specimens into the Redondo Beach SEA Lab, an L.A. Conservation Corps facility providing public education at the waterfront. The participants had a great time exploring marine biodiversity, and posted nearly sixty iNaturalist observations at the event at: https://www.inaturalist.org/projects/nhm-bioblitz-king-harbor-marina. Thanks go to Leslie Harris (Polychaetes) for guidance on quality iNaturalist photographs,

Richard Smart (Citizen Science) for arranging the challenging logistics of getting dozens of people onto private docks, Linda Chilton of USC Sea Grant for superb field and lab assistance, Maria Madrigal and Rebecca Fent of SEA Lab for facilitating the use of their wonderful facility, and Julie Coll of Waterfront Education for arranging access at the marina.

Marine Biodiversity Center & Crustacea

L.A. Urban Nature Fest

On June 25–26th, the Marine Biodiversity Center partnered with Crustacea to showcase local marine fauna for the 2nd annual *L.A. Urban Nature Festival.* Stellar specimens from both collections were chosen for display for the public. In particular, specimens of taxa that play important and interesting roles in the local California marine habitat were presented to bring awareness of the incredible diversity that can be found just a few miles away at our beaches.

A worm specialist in the making!

Polychaetes

L.A. Urban Nature Fest

Kirk Fitzhugh and Leslie Harris presented an array of marine and terrestrial worms at their station during this year's Urban Nature Fest. Using a mix of living and dead specimens they enthralled museum-goers with tales of weird worms and the little-known role of introduced earthworms as drivers of community change in the U.S.

UNRC

The Nature Conservancy L.A. Office Interns and LEAF Interns - SLIME Presentation on July 25

Jann Vendetti and Richard Smart hosted 3 L.A. office interns from the Nature Conservancy, as well as 4 interns and 1 mentor from the TNC LEAF program. Participants got a tour of the malacology collection, discussed the importance of a museum collection, discussed how citizen science can expand the scope and scale of field work, and they were trained on how to use the iNaturalist mobile app to participate in the SLIME project. Miguel Ordeñana joined the group for lunch as conversations continued.

AIN Presentations in Nature Lab on July 5

Miguel Ordeñana and Richard Smart gave two presentations to the two 1st/2nd grade AIN camps. We talked about local wildlife, showed them the L.A. Nature Map display in the Nature Lab, and encouraged them to work with their parents to participate in citizen science. Two campers ended up sending in 4 photos by e-mailing nature@nhm.org!

Home School Day at the La Brea Tar Pits on June 14

The Citizen Science Program taught 15 home school parents how to set up an iNaturalist account, join NHM projects, and how to make observations. Miguel Ordeñana also gave two 20-minute presentations about studying L.A. biodiversity to 50 parents and children.

AIN Field Trip to Kenneth Hahn Recreation Area on June 30

Richard Smart worked with the AIN 5th/6th grade campers and instructors on a day long field trip to collect aquatic and terrestrial invertebrates at Kenneth Hahn Recreation Area. Twenty campers used dip nets and aerial notes to collect invertebrates, while Richard took photos and uploaded to the L.A. Nature Map, and to an AIN 2016 project page on iNaturalist. Exactly 32 observations were made: http://www.inaturalist.org/projects/adventures-in-nature-2016

Photography for Science workshops — L.A. Urban Nature Fest on June 25 & 26

Citizen Science Program hosted four workshops during the *L.A. Urban Nature Fest.* Workshops gave tips to participants on how to take photos of wildlife (with their mobile phones), so their photos can be reliable data points for NHM's citizen science projects. Workshops were held at 11am and 1pm both days, each was 30 minutes long, held in the Edible Garden. 80 participants.

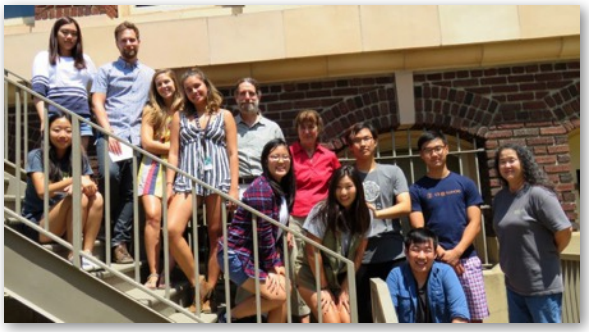
Student Mentoring and Research

Dinosaur Institute

The Dinosaur Institute would like to welcome back Ms. Leslie Insixiengmay as our newest work-study student with USC. Leslie joined the DI this summer on *Proyecto Dinosaurios,* a six-week program developed to enhance the representation of minority students in the Geosciences. Leslie will be working with Stephanie Abramowicz, DI illustrator, to digitize the collection and help with research support.

Marine Biodiversity Center

Advanced Research Internship Program (ARIP)



The Marine Biodiversity Center hosted seven high school interns for two weeks in July as part of the Advanced Research Internship Program (ARIP) organized by the AGM Institute. ARIP is designed to give high school and undergraduate students pursuing a career in the sciences practical experience working in a laboratory and conducting primary research to build the necessary skills to be contributing members of the scientific community. MBC staff had the pleasure of mentoring these students conducting field collections of fresh marine invertebrate material that was brought back to the NHM Collaboratory and processed through a molecular pipeline for DNA barcode generation. The MBC wishes our ARIP students the best of luck in their future endeavors!

Environmental Studies Intern

The Marine Biodiversity Center had the pleasure of hosting Katya Balakhovsky this summer as a USC Environmental Studies Intern. Katya played an integral role in the MBC's work this summer, helping with field collections of new material, which she then sorted and identified in the lab with the guidance of MBC staff. Katya continues to volunteer her time in the MBC this fall.

New students

The Marine Biodiversity Center is also pleased to welcome two new students to the lab! Jessica Carrillo, a sophomore studying Biomedical Engineering at USC, will be volunteering for the lab in her free time this fall. Sujin Jeong is a sophomore studying Psychology and Human Biology at USC. She is joining the MBC team as a work-study student.

Sujin and Jessica.

Volunteers and Research Associates

Anthropology

Ethnology

The Anthropology department would like to welcome volunteer Gabe Palos! Gabe has been working on the floor as a volunteer for about a year and started working with KT Hajeian at the end of July. Gabe is an entrepreneur and freelance graphic designer with a dream to design for the museum. As the self-employed owner of Dream Design, he uses his creative skills to design promotional product packaging and branding. His experience with photography, photo editing, and packaging are particularly useful in helping the Anthropology department update storage materials and prepare images of collection items for researchers and others to access online via our collection search.

In this picture Gabe is working on a box that he created to safely store three elaborately feathered bows from Bolivia.

Dinosaur Institute

The Dinosaur Institute welcomes Ms. Carry Wade as our newest volunteer. Carry is a singer/songwriter who has been captivated by the incredibly beautiful emerald green sauropod bones she works on upstairs. Originally from the East Coast, Carrie looks forward to participating in next year's field season and other NHM events.

Distinguished Visitors

Crustacea

Venice Arts collection visit

Venice Arts, an award-winning non-profit arts organization that offers free media arts education programs for low-income youth in the Los Angeles area, visited the Crustacea collection with their Advanced Photography students, a small group of their most dedicated high school students. The students were excited to interview a "real scientist", Dr. Jody Martin, and have access to the amazing diversity of forms and shapes in our collections to incorporate into their art projects.

Polychaetes

Dr. Cinthya Santos (Universidade Federal Fluminense, Rio de Janeiro, Brazil) spent part of her sabbatical year working in the Polychaete Collection from June 22 to July 2. Her current research is focused on revising the genus *Platynereis* and evolutionary relationships within the family Nereididae. She intends to return to us later this year for a longer stay.

Sheila and Steve Brennan, great-grandchildren of Captain Allan Hancock, joined Leslie Harris and Bailee Desrocher for a tour of the Allan Hancock Foundation and Museum at USC. Hancock was one of our major benefactors. His family owned a major portion of Rancho La Brea; in 1913 he gave this museum exclusive rights to excavate the tar pits. Later he donated the 35 acres that make up Hancock Park, home of the Page Museum, to L.A. County. An ardent sailor and naturalist, he created the Allan Hancock Foundation (AHF) to house the massive collections amassed during his voyages to the Galapagos and staffed it with taxonomists to work up the specimens. Marine studies continued there up through the 1980s. Starting in the 1970s, USC began to transfer the AHF's vast holdings to this museum, giving us one of the world's largest & most important invertebrate collections. About 90% of our Polychaete Collection originally belonged to the Hancock Foundation. Our other marine invert sections hold similarly high percentages of AHF material. Sheila became a Fellow to continue the Hancock family's legacy with the museum. She had been unaware of the extent of her great-grandfather's contribution to the marine sciences prior to touring the Polychaete Collection with Leslie earlier this year.

Sheila Brennan, holding a polychaete collected by her great-grandfather

The Hancock homestead among the tar pits.

Malacology

Ángel Valdés (Cal Poly Pomona) made several visits to Malacology to use the SEM and examine collection holdings of nudibranchs and opisthobranchs. Malacology Associate and Calif. St. Univ., Fullerton grad student Shawn Wiedrick visited the collection to research Indo-Pacific micro-turrid gastropods and California species of ocenebrine gastropods for his thesis research. Three specimens of a newly documented invasive gastropod species,

Busycotypus canaliculata (Linnaeus, 1758), were deposited in the Malacology collection by Kimo Morris (Santa Ana College, Biology Dept.) (see *Collection News* above). Malacology associate Roger Clark (Utah) visited the collection to examine holdings of North Pacific buccinid gastropods for research purposes. Advancement intern Zach Feig spent several days in Malacology sorting samples of Pleistocene invertebrates from Santa Rosa Island, California Channel Islands.

UNRC

Muki Haklay of the University of College London visited with the Citizen Science Program on August 11. Muki runs the Extreme Citizen Science Lab (https://www.ucl.ac.uk/excites/people/academic-staff/muki-haklay), and is heavily involved in the Citizen Science Association, and the European Citizen Science Association.

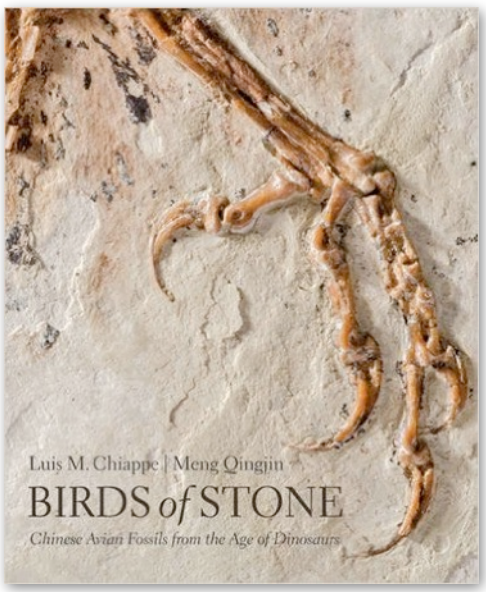
Muki was giving a brief tour of the museum (Nature Lab and Gardens), and learned more about NHM's citizen science efforts.

Recent Publications

Apesteguía, S., **Smith, N.,** Juárez Valieri, R., and P. Makovicky. 2016. An unusual new theropod with a didactyl manus from the Upper Cretaceous of Patagonia, Argentina. PLOS One. DOI: 10.1371/journal.pone.0157793.

Reconstruction of the short-armed theropod dinosaur Gualicho shinyae *(artwork by Jorge Gonzalez and Pablo Lara).*

Cempírek, J., Grew, E.S., **Kampf, A.R.**, Ma, C., Novák, M., Gadas, P., Škoda, R., Vašinová-Galiová, M., Pezzotta, F., Groat, L.A. and Krivovichev, S.V. (2016) Vránaite, ideally $Al_{16}B_4Si_4O_{38}$, a new mineral related to boralsilite, $Al_16B_6Si_2O_{37}$, from the Manjaka pegmatite, Sahatany Valley, Madagascar. American Mineralogist, 101, 2108-2117. DOI: 10.2138/am-2016-5686



The cover of Luis Chiappe's new book.

Chiappe, L. and M. Qingjin. 2016. Birds of stone: Chinese avian fossils from the age of dinosaurs. Baltimore, Johns Hopkins University Press.

Christy, A.G., Mills, S.J. and **Kampf, A.R.** (2016) A review of the structural architecture of tellurium oxycompounds. Mineralogical Magazine 80, 415-545. DOI: 10.1180/minmag.2016.080.093

This is a major survey paper which filled an entire issue of a high-impact mineralogical journal.

Cooper, M.A., Abdu, Y.A., Hawthorne, F.C. and **Kampf, A.R.** (2016) The crystal structure of gianellaite, $[(NHg_2)_2](SO_4)(H_2O)_x$, a framework of (NHg_4) tetrahedra with ordered (SO_4) groups in the interstices. Mineralogical Magazine 80, 869-875. DOI: 10.1180/minmag.2016.080.028

Darroch, S., Boag, T., **Racicot, R.**, Tweedt, S., Mason, S., Erwin, D. and M. Laflamme. 2016. A mixed Ediacaran-metazoan assemblage from the Zaris Sub-basin, Namibia. Palaeogeography, Palaeoclimatology, Palaeoecology. 459: 198–208. DOI:10.1016/j.palaeo.2016.07.003.

Gibbons, M. 2016. Building a magnetic stir plate. Western Association for Art Conservation Newsletter 38 (2): 14-15.

Kampf, A.R., Cámara, F., Ciriotti, M.E., Nash, B.P., Balestra, C. and Chiappino, L. (2016) Castellaroite, $Mn^{2+}_3(AsO_4)_2{\cdot}4.5H_2O$, a new mineral from Italy related to metaswitzerite. European Journal of Mineralogy 27, 687-696. DOI: 10.1127/ejm/2016/0028-2535

Kampf, A.R., Richards, R.P., Nash, B.P., Murowchick, J.B. and Rakovan, J.F. (2016) Carlsonite, $(NH_4)_5Fe^{3+}_3O(SO_4)_6{\cdot}7H_2O$, and huizingite-(Al), $(NH_4)_9Al_3(SO_4)_8(OH)_2{\cdot}4H_2O$, two new minerals from a natural fire in an oil-bearing shale near Milan, Ohio. American Mineralogist, 101, 2095-2107. DOI: 10.2138/am-2016-5680

This paper describes the first two terrestrial new mineral species from the state of Ohio.

Lessner, E., Stocker, M., **Smith, N.**, Turner, A., Irmis, R., and S. Nesbitt. 2016. A new taxon of rauisuchid (Archosauria, Pseudosuchia) from the Upper Triassic of New Mexico increases the diver-sity and temporal range of the clade. PeerJ 4:e2336 https://doi.org/10.7717/peerj.2336.

Mills, S.J., Grey, I.E., **Kampf, A.R.**, Birch, W.D., Macrae, C.M., Smith, J.B. and Keck, E. (2016) Kayrobertsonite, $MnAl_2(PO_4)_2(OH)_2 \cdot 6H_2O$, a new phosphate mineral related to nordgauite. European Journal of Mineralogy 27, 649-654. DOI: 10.1127/ejm/2016/0028-2524

Mills, S.J., Grey, I.E., **Kampf, A.R.**, Macrae, C.M., Smith, J.B., Davidson, C.J. and Glenn, A. M. (2016) Ferraioloite, $MgMn^{2+}_4(Fe^{2+}_{0.5}Al^{3+}_{0.5})_4Zn_4(PO_4)_8(OH)_4(H_2O)_{20}$, a new secondary phosphate mineral from the Foote mine, USA. European Journal of Mineralogy 27, 655-661. DOI: 10.1127/ejm/2016/0028-2525

Pape, T., A. Allison, D. J. Bickel, J. T. Carlton, T. Dikow, T. Donegan, D. W. Duszynski, M. S. El-Hawagry, N. L. Evenhuis, D. G. Fautin, S. D. Gaimari, B. Gharali, D. E. Greenwalt, H. Kaiser, A. H. Kirk-Spriggs, G. Lamas, O. Lonsdale, C. Mah, S. A. Marshall, R. Meier, M. Ohl, D. J. Patterson, L. Penev, **N. D. Pentcheff**, R. L. Pyle, D. J. Rubinoff, J. Runyon, O. Tallowin, S. Thorpe, B. Wang, F. Welter-Schultes, D. Yanega, D. Yang, G. Yao, and N. W. Yeung. 2016. Species can be named from photos [Correspondence]. Nature 537:307.

This brief note responds to a prior editorial in Nature *("Gotta name them all: how Pokémon can transform taxonomy" 2016. Nature 535:323–324). The editorial laudably encouraged Pokémon players to look for real biodiversity as they roamed the world capturing virtual biodiversity. Regrettably, it also included an intentionally depressing advisory that new species cannot be described without capturing and killing specimens. Our response, from a deliberately large group of authors, pointed out that the International Code of Zoological Nomenclature does, indeed, permit description of new species on the basis of photos (though this is rarely done, because of the high value of having a type specimen).*

Racicot, R., Gearty, W., Kohno, N. and J. Flynn. 2016. Comparative anatomy of the bony labyrinth of extant and extinct porpoises (Cetacea: Phocoenidae). Biological Journal of the Linnean Society. DOI: 10.1111/bij.12857.

Staff Departures & New Staff

Dinosaur Institute

The Dinosaur Institute welcomed Yun-Hsin "Becky" Wu, who has recently become our newest Graduate Student in Residence. Becky received a prestigious USC-Taiwan Fellowship. She will be supervised by Luis Chiappe.

Miscellaneous

Dinosaur Institute

Nate Smith was appointed an Adjunct Associate Professor in USC's Department of Earth Sciences, effective April, 2016 – June, 2019.

Mineral Sciences

GIA alumni party in Mineral Sciences

On August 17th, a fantastic party was sponsored by the Gemological Institute of America Alumni Association, The 24K Club, American Gem Society, West Coast Diamond Club, The Indian Diamond and Colorstone Association, and the Women's Jewelry Association. The event was held in the Gem and Mineral Hall with over 200 guests in attendance. The purpose of the event was to connect the diverse gem and jewelry experts in the Los Angeles area. Mineral Sciences showcased our newly updated research laboratory and highlighted non-destructive techniques that can now be conducted in-house to analyze gems and minerals, as well as our growing collection of fine gems. The party also celebrated Aaron's appointment as the new Curator of Mineral Sciences, and a drink called the 'Celestini' was named in his honor. We met a lot of amazing people and are developing collaborative projects with many of them.

Press Release: AGTA Prims wrote an article covering the GIA Alumni Party we had and highlighted the new lab. Check out the article here: http://www.agtaeprism.com/articles/20160824-gia.pdf

New Laboratory Equipment and Research Initiatives

A Proto powder X-ray diffractometer (XRD) was recently installed in the laboratory. This instrument has traditional powder XRD capabilities, as well as elemental analysis using X-ray fluorescence (XRF). The new powder XRD expands Mineral Sciences' X-ray capabilities by complementing the older single-crystal XRD that was acquired some years ago. The new instrument supports ongoing research in environmental mineralogy and metal separation studies using nanoporous materials, and will serve as a critical component to new projects in alpine mineralogy.

The alpine mineralogy project is a collaboration between Aaron Celestian and researchers at Western Washington Univeristy, The National Center for Atmospheric Reserach, the American Climber Science Program, University of Hawaii at Manoa, University Nevada Reno, University of Colorado, and the Chemical Sciences Division at NOAA. The current phase of the project is focused on the Peruvian Andes, which contain the largest alpine glacial field in the world. Glacier extent is receding at incredible rates there as a result of climate change and land-use changes. There will be significant impact to people who rely on seasonal glacial melt as a source of drinking water, as well as to the health of local ecosystems. Aaron's part is to determine dust mineralogy on an annual basis from over 100 locations in the glacial belt of the Peruvian Andes. This work will record atmospheric deposition of dust from natural and anthropogenic sources, determine provenance, and investigate possible effects these minerals may have on glacial melt rate.

Polychaetes

Leslie Harris is honored to announce the birth of a new godchild, *Philine harrisae,* thanks to the kindness of museum associates Angel Valdés and Don Cadien. The new species of opistobranch joins a healthy family of 12 polychaete species and the snapping shrimp genus *Leslibetaeus*.

Valdés Á., Cadien D.B. & Gosliner T.M. (2016). Philinidae, Laonidae and Philinorbidae (Gastropoda: Cephalaspidea: Philinoidea) from the northeastern Pacific Ocean and the Beaufort Sea (Arctic Ocean). *Zootaxa*. 4147(5): 501-537.

Diversity Initiative for the Southern California Ocean (DISCO)

A new program, coming from the marine invertebrate group, aims at greatly improving our ability to detect and track changes in the coastal invertebrate fauna of Southern California. The program is led by Regina Wetzer (Associate Curator) and Dean Pentcheff (Project Coordinator), and presently involves collections staff from MBC (Kathy Omura and Jenessa Wall), Crustacea (Adam Wall), and Polychaetes (Leslie Harris).

Why a new diversity initiative?

We know that our oceans are changing quickly, and our coastal biota are responding. Successful management requires that we know what species are where, and how their distributions change with time. Current monitoring technology, based on specialist identifications of individual organisms, just cannot keep pace.

Over the past decade or so, biodiversity researchers have established genetic identification of specimens based on relatively short sequences from one or a few genes (so-called "barcode" sequences). With intensive development over the years, this approach has proven itself to be effective and efficient across a broad range of taxa, marine and terrestrial.

Genetic "barcode" identification has the potential to vastly accelerate taxonomic analysis of environmental samples. For that to work, of course, there must be a library of reference sequences. The local problem is that the library for the marine invertebrates of Southern California is poorly populated — most local species have never had specimens reputably identified, sequenced, and filed in the *Barcode of Life* (BOLD) reference database.

The research program

Providing genetic reference sequences to BOLD from reputably-identified and vouchered specimens of all the shallow marine invertebrate species of this area is the first order of business for the DISCO project. Based on pre-existing surveys, we estimate there are about 3,000 – 5,000 species from Point Conception to the Mexican border, between 0 – 1,000m deep, and bigger than about 1 mm. We're proceeding by collecting and sequencing fresh specimens ourselves (regrettably, formalin-preserved specimens won't work) and partnering with organizations in the area that are already surveying or sampling marine invertebrates.

We are also collaborating with colleagues at USC and UCLA to better develop and optimize high-throughput genetic sequencing approaches to community analysis. While it is occasionally interesting to be able to make a species determination for a single specimen using a "barcode" sequence, it's much more interesting to inventory all the species in an entire community sample at once with a single high-throughput sequencer run. Modern genetic technology can enumerate, in one sequencer run, all the unique "barcode" sequences in a sample containing dozens or hundreds of specimens — that technology exists in prototype form. With a reference library in place, that list of sequences can yield a list of species. In some situations, it is possible to use just a water sample from a locality and enumerate local species based on the naturally-shed DNA in the water (so-called "environmental DNA" or "eDNA"). We are working with our collaborators to simplify this technology to the point that novel biodiversity research questions can be asked with those tools.

Combining a well-populated reference database with whole-community or eDNA approaches would enormously enhance our ability to see how our local ocean's life is changing — where species are appearing and disappearing. That knowledge is essential for informed coastal management.

Come by the Marine Biodiversity Center any time and talk with us about this new NHM initiative!

The *Research & Collections Newsletter* is issued quarterly by the Research and Collections staff of the Natural History Museum of Los Angeles County.

Editor: Dr. Joel W. Martin, Curator of Crustacea and Chief of the Division of Invertebrate Studies.

Layout: N. Dean Pentcheff.

All issues of the newsletter may be found at:
http://research.nhm.org/newsletters