

ACADEMY COLLECTIONS
YEAR-END REPORT
ICHTHYOLOGY
2012

Fish Collection:

www.ansp.org/research/systematics-evolution/collections/ichthyology/

Holdings: As of 31 Dec 2012, approximately 139,279 cataloged lots of 1,423,437 specimens including 1,418,107 in alcohol, 3,530 in glycerin (cleared & stained) and 1,800 dry skeletons [does not include 1,889 lots and 2,477 specimens recorded as deaccessioned = true, storage = HWF tank, and/or inventory = M (missing)]. Tissue collection includes 6,000 cataloged samples representing about 1,500 species. Cataloged image collection includes 2,597 digital photos and radiographs. **Strengths:** taxonomically diverse with an estimated 15,000 marine and freshwater species especially well represented among eels, catfishes and characiforms; world-wide in scope with exceptional holdings of freshwater fishes of North and South America and marine fishes of the Bahamas, Western Atlantic and Indian Oceans; historically valuable specimens including collections of Edward Drinker Cope (1840–1897) and Charles Lucien Bonaparte (1803–1857). **Rankings:** Among top five ichthyology centers in North America with 2nd largest collections of primary fish types and pre-1900 specimens; largest collections of Bahamas and Mongolian fishes and perhaps the 2nd largest collection of South American fishes in the World.

2012 Personnel

Full Time

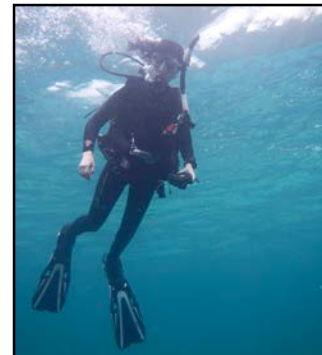
Dr. John G. Lundberg	Curator & Chaplin Chair, Oct 1999–present
Dr. Mark H. Sabaj Pérez	Collection Manager, 2000–present
Kyle R. Luckenbill,	Research & Curatorial Assistant, Oct 2003–present
Dr. Katriina L. Ilves	Chaplin Postdoctoral Scientist, 28 Sep 2009–30 Sep 2012

Research Associates

Dr. Mariangeles Arce Hernandez	2012–present
Dr. Kerin Claeson	2012–present
Dr. Katriina L. Ilves	2012–present
Dr. John P. Sullivan	2009–present

Volunteers: Jen Byrne, Michael Fath, Laura Krasnow, Catarina Pien (115.5 hrs), Korie Rogan, Daniel Russo & Dennis Winters (158 hrs).

2012 marked the departure of **Katriina L. Ilves**, Postdoctoral Scientist whose position was supported for 3 years by Academy benefactor **Gordon Chaplin**. Katriina's work focused on changes in the diversity and community structure of reef fishes of the Bahamas, continuing a legacy of Bahamas research started in the 1950s by former Curator of Fishes James Böhlke and Charles C.G. Chaplin, Gordon's father. During her time at the Academy, KLI led two highly successful expeditions to the Bahamas in 2010 and 2012, and added 3,976 specimens (610 lots) and 2,614 tissues to the Fish Collection. Katriina is currently a Rebanks Postdoctoral Scientist at the Royal Ontario Museum working on the phylogenomics of Neotropical cichlid fishes. She remains an Academy Research Associate and intends to continue her Caribbean reef fish research in the future.



2012 Stats

Research Visitors (Post-doctoral, etc.)	11 visitors for 21 days
Student Visitors (K-12, collegiate)	108 visitors for 138 days
Other Visitors (Behind-the-scenes tours, etc.).....	155 visitors for 96 days
New Taxa described	1 species (fossil)

†*Ictalurus countermani* Lundberg & Luckenbill, 2012

Accessions	12,110 specimens
.....	1,903 lots

12,110 specimens in 1903 lots were newly cataloged into fish collection.
See "Collection Growth" for description of newly cataloged specimens.

Outgoing Loans.....	74
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50 specimen loans plus 24 tissue loans for **74 total loans**

Specimens/Lots Loaned	7,390 specimens
.....	615 lots

7,165 specimens in 409 lots (specimen loans) plus 225 samples in 206 lots (tissue loans)

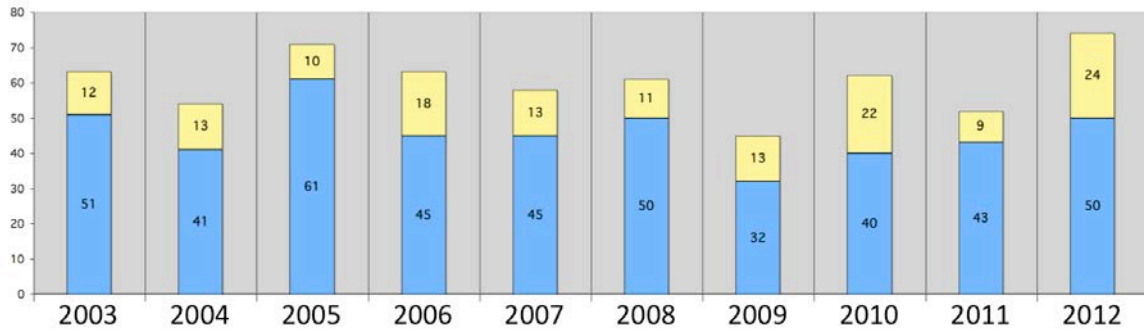
Information Requests.....	216
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Ichthyology responded to a total of 216 internal/external invoiced requests pertaining to the collection, library and expertise of staff (and apart from invoiced loans of specimens/tissues). Adding in specimen loans (50 invoices) and tissue loans (24), Ichthyology responded to a total of 290 invoiced requests, **making 2012 the busiest year of service in departmental history since tracking of such activities began in 2001.**

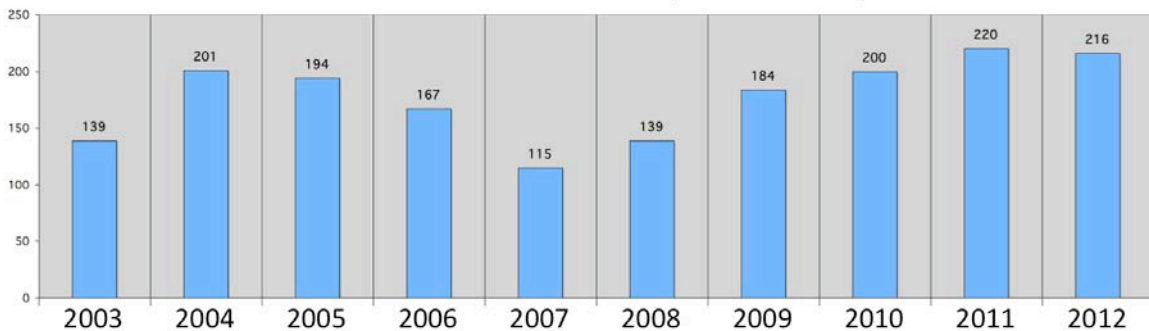
2012 requests were exceptionally large for images and radiographs, especially of type specimens. Large sets of images and radiographs of Neotropical fishes (Characiformes) were released for display via websites for the Encyclopedia of Life (<http://eol.org>; 423 total) and a Brazilian-led inventory (<http://www.projeto-saci.com>; 542 total). A variety of images were prepared and/or provided to other Academy departments for use in the Bicentennial Exhibit & Video, Annual Report, *Frontiers* Magazine, Institutional Advancement and Public Programs. In total, about 1137 permissions were granted of images and radiographs pertaining mostly to fishes in the Academy collection.

2012 was an above average year for specimen loans (50 invoices) and an **exceptional year for tissue loans** (24 invoices) and returns of specimens on loan or transferred to Academy Ichthyology (722 specimens in 135 lots). The largest tissue loan (75 samples) was issued to Michael Alfaro at UCLA to develop a family-level tree of life for ray-finned fishes (Actinopterygii) using UCEs (ultra-conserved elements, or regions of DNA that are identical across a wide variety of taxa).

Invoiced Loans of Specimens (blue) & Tissues (yellow)



Invoiced Museum Transactions (loans excluded)



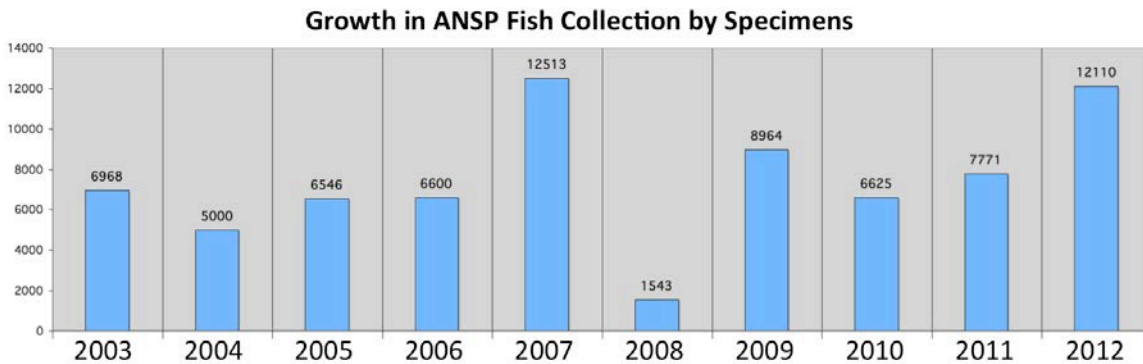
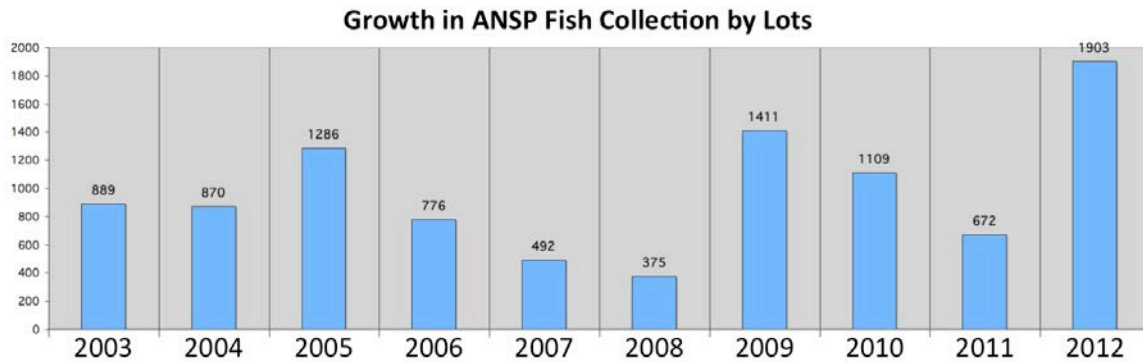
Collection Growth

A total of 1,903 lots (12,110 specimens) were newly cataloged into the Fish Collection in 2012, **the largest yearly cataloging effort since 1994** (when 1,924 lots of 28,111 specimens were added). Newly acquired and cataloged material consisted of 583 lots (3,168 specimens) resulting from gifts to the Academy (22 lots, 81 specimens) and expeditions to the Bahamas led by **Katriina Ilves** (267 lots, 1,083 specimens), and to Brazil (238 lots, 1,450 specimens) and Finland (21 lots, 301 specimens) by **Mark Sabaj Pérez**.

The majority of newly cataloged fishes came from the backlog shelves via curatorial work funded by **Mr. Shewell Keim**: 1,320 lots of 8,942 specimens. The majority of newly cataloged backlog is from past trawling surveys led by **John Lundberg** in the Amazon River, Brazil (440 lots, 1,405 specimens) and Orinoco River, Venezuela (145 lots, 798 specimens). Additional backlog was cataloged from Fowler's collection and specimens received since Fowler's time. The combination of successful fieldwork by departmental staff and funded efforts on backlog made for a remarkably productive year of databasing fish records.

2012 was also marked by **significant growth in cataloged tissue samples**. The Fish Collection has about **6,000 cataloged tissues** with about 1,800 newly added in 2012 from backlog and recent fieldwork (excluding KLIs 2012 Bahamas Expedition). The cataloged fish tissues represent an estimated 1,500 species of 150 freshwater and marine families primarily from South America, the Bahamas, Mongolia, Zambia and Thailand. An additional 2,000–2,300 tissues remain uncataloged as backlog, mostly from expeditions to the Amazon River, Brazil (1993–1996: ca. 257 samples), Bahamas (2012: ca. 1,079 samples), Guyana (2002, 2003), Mongolia (2012: ca. 155+ samples), Peru, and Venezuela (2004, 2005, 2010: ca. 544 samples). Since the tissue collection began in 2000, a total of 1,749 samples (via 155 loan invoices) have been provided to professionals and students around the world.

With respect to fish imaging, a total of 469 digital images were taken of specimens in 148 lots, and 154 of those images have been edited. In addition, 41 digital x-rays were prepared for specimens in 32 lots. Most of those images and x-rays remain to be cataloged so that they can be viewed via the collection's on-line database developed by Steve Dilliplane and **Mark Sabaj Pérez**: <http://clade.ansp.org/ichthyology/FTIP/search.php>.



2012 Peer-Reviewed Publications (Curators, CMs, Res. Assoc. with 1° address at ANSP)

Conway, K.W., N.K. Lujan, **J.G. Lundberg**, R.L. Mayden & D.S. Siegel. 2012. Microanatomy of the paired-fin pads of ostariophysan fishes (Teleostei: Ostariophysi). *Journal of Morphology*, 273(10): 1127–1149. doi: 10.1002/jmor.20049. Epub 2012 Jul 19.

Dahdul, W.M., J.P. Balhoff, D.C. Blackburn, A.D. Diehl, M.A. Haendel, B.K. Hall, H. Lapp, **J.G. Lundberg**, C.J. Mungall, M. Ringwald, E. Segerdell, C. Van Slyke, M.K. Vickaryous, M. Westerfield, & P.M. Mabee. 2012. A unified anatomy ontology of the vertebrate skeletal system. *PLOS One*. 7(12; e51070): 1–10.

Ilves, K.L., A.M. Quattrini, M.W. Westneat, R.I. Eytan, G.W. Chaplin, H. Hertler, & **J.G. Lundberg**. *In Press*. Detection of shifts in coral reef fish assemblage structure over 50 years at reefs of New Providence Island, The Bahamas highlight the value of the Academy of Natural Sciences' collections in a changing world. *Proceedings of the Academy of Natural Sciences of Philadelphia*, v. 162: 61–87.

Lundberg, J.G., & **K.R. Luckenbill**. 2012. A Late Miocene channel catfish (Siluriformes, Ictaluridae, *Ictalurus*) from the St. Marys Formation, Calvert Cliffs, Maryland, USA. *Notulae Naturae* No. 485 [not 484]: 1–32.

Lundberg, J.G., R. Covain, J.P. Sullivan & S. Fisch-Muller. 2012. Phylogenetic position of *Pimelabditus moli* Parisi and Lundberg, (Teleostei: Siluriformes), a recently discovered pimelodid catfish from the Maroni River basin. *Cybium*, 36(1): 105-114.

Lundberg, J.G., C. Cox Fernandes, R. Campos-Da-Paz, & **J.P. Sullivan**. *In Press*. *Sternarchella calhamazon* n. sp., the Amazon's most abundant species of apteronotid electric fish, with a note on the taxonomic status of *Sternarchus capanemae* Steindachner, 1868 (Gymnotiformes, Apterontidae). Proceedings of the Academy of Natural Sciences of Philadelphia, v. 162: 157–173

Sabaj Pérez, M.H., & J.L.O. Birindelli. *In Press*. *Hassar shewellkeimi*, a new species of thorny catfish (Siluriformes: Doradidae) from the upper Tapajós basin, Brazil. Proceedings of the Academy of Natural Sciences of Philadelphia, v. 162: 133–156

Sullivan, J.P., J. Muriel-Cunha & **J.G. Lundberg**. *In Press*. Phylogenetic relationships and molecular dating of the major groups of catfishes of the Neotropical superfamily Pimelodoidea (Teleostei, Siluriformes). Proceedings of the Academy of Natural Sciences of Philadelphia, v. 162: 89–110.

Tiemann, J.S., & **M.H. Sabaj Pérez**. *In Press*. Illinois status survey of the redbreast dace *Clinostomus elongatus*: the newest addition to the state's native fish fauna. Transactions of the Illinois State Academy of Science, v. 105 (no. 3 & 4).

2012 Proposals (submitted, pending & awarded)

K.L. Ilves (PI), & C.C. Baldwin (CoPI). Molecular systematics and comparative phylogeography of Caribbean reef fishes. Preliminary Proposal submitted 9 Jan 2012 to National Science Foundation Systematics & Biodiversity Science Cluster. Objectives of proposed research: to explore evolutionary patterns and processes across dozens of Caribbean reef fish species, and to test hypotheses about the roles of geological events, historical climate changes, and deep-water channels in structuring their genetic diversity.
Status: INVITED for FULL PROPOSAL [Note: 31.7% (less than one-third) of pre-proposals submitted to SBS Cluster were invited to submit full proposals].

Ilves, K.L. (PI). Revisiting reefs: A 55-year comparative analysis of reef fish communities at Andros Island, The Bahamas in a regional ecological and evolutionary context. Invited full proposal submitted 28 September 2011 (pre-proposal approved 29 Aug 2011) to National Geographic Society, Committee for Research and Exploration.
Status: FUNDED. Award 9056-12 (notice received 10 January 2012). Funds awarded to ANSP: \$19,920 (for fieldwork).

Lundberg, J.G. (PI), **M.H. Sabaj Pérez** (CoPI) and multiple PI/CoPIs. Collaborative Research: CSBR: Natural History Collections: Georeferencing U.S. Fish Collections: a community-based model to georeferencing natural history collections. Full proposal (No. 1203053) submitted 12 Oct 2011 to National Science Foundation, Division of Biological Infrastructure (Biological Research Collections). ANSP 3 YR Budget: \$145,513.
Status: FUNDED 27 Jul 2012.

Lundberg, J.G. (PI), **M.H. Sabaj Pérez** (CoPI) & K.O. Winemiller (CoPI). Baseline Survey of the the Lower Xingu River Rapids, Brazil: a Highly Diverse, Globally Unique, and Immediately Imperiled Ecosystem. Preliminary Proposal (No. 1221334) submitted 9 Jan 2012 to National Science Foundation, Division of Environmental Biology (Biodiversity: Discovery & Analysis).
Status: INVITED for FULL PROPOSAL 12 May 2012.

Lundberg, J.G. (PI), **M.H. Sabaj Pérez** (CoPI) & K.O. Winemiller (CoPI). Collaborative Research: Baseline Survey of the Lower Xingu River Rapids, Brazil: a Highly Diverse, Globally Unique, and Immediately Imperiled Ecosystem. Full Proposal (No. 1257813) submitted 2 Aug 2012 to National Science Foundation, Division of Environmental Biology

(Biodiversity: Discovery & Analysis). ANSP 3 YR Budget: \$456,874; Texas A&M Univ. 3 YR Budget: \$126,585.

Status: FUNDED 28 Feb 2013 [with revised ANSP Budget: \$400,000].

Ortí, G. (PI), R. Betancur-R. (CoPI), **J.G. Lundberg** (CoPI), & R.P. Vari (CoPI). Evolutionary history of the largest clade of freshwater fishes: phylogenomic, morphological, paleontological, and biogeographic analysis of the Ostariophysi. Preliminary Proposal submitted 9 Jan 2012 to National Science Foundation, Division of Environmental Biology (Phylogenetic Systematics).

Status: DECLINED for FULL PROPOSAL [resubmitted Jan 2013]

2012 Presentations (particularly at professional meetings)

Ivles, K.L. Oral presentation: Comparative Cenozoic biogeography of marine Holarctic fishes: towards an integrated understanding of geological and climate driven divergences. Joint Meetings of Ichthyologists and Herpetologists (and 7th World Congress of Herpetology), Vancouver, British Columbia. 8–14 Aug 2012.

Lundberg, J.G. Oral presentation (invited speaker): Sources and impacts of uncertainty in paleogeography and historical biogeography. Instituto Nacional de Pesquisas da Amazônia, Manaus, Brazil. Aug 2012.

Lundberg, J.G. Oral presentation (invited speaker): Unending discoveries and the persistence of puzzles in the growing tree of catfish life. University of Toronto, Scarborough, Ontario. Nov 2012.

Lundberg, J.G. Workshop (invited participant): Information network of the fish fauna of Madeira River Basin. The main goal of this workshop was to discuss preliminary results of fish surveys in Brazil and Bolivia, and to plan for manuscripts based on a data set of three subprojects of the Projeto Madeira: community and population ecology and fisheries. Manaus, Brazil. 21–24 August 2012.

Lundberg, J.G. Workshop (invited participant): The role of mountains, landscape, and climate in generating Amazon/Andean Biodiversity. National Evolutionary Synthesis Center, Duke University, Durham, North Carolina. 31 Oct–2 Nov 2012.

Sabaj Pérez, M.H. Oral presentation: Can the America's oldest continuously operating natural history museum survive another 200 years? Joint Meetings of Ichthyologists and Herpetologists (and 7th World Congress of Herpetology), Vancouver, British Columbia. 8–14 Aug 2012.

Sabaj Pérez, M.H. Oral presentation (invited speaker): Taxonomy and classification of thorny catfishes (Doradidae). All-Aquarium Catfish Convention sponsored by The Potomac Valley Aquarium Society, Herndon, Virginia. 18–21 Oct 2012.

Sabaj Pérez, M.H. Oral presentation (invited speaker): 2006 Expedition to Mongolia. Science on Tap Series hosted by National Mechanics Bar & Restaurant, Philadelphia. 2 Apr 2012.

Tiemann, J.S., & **M.H. Sabaj Pérez**. Poster presentation: Illinois status survey of the redbside dace *Clinostomus elongatus*: the newest addition to the state's native fish fauna. 50th Annual Meeting of the Illinois Chapter of the American Fisheries Society, Starved Rock State Lodge, Utica, Illinois. 21–23 Feb 2012. *Won best poster award.*

2012 Field Work Activity

BAHAMAS: Andros Island

Katriina L. Ilves, Chaplin Postdoctoral Scientist, led a highly successful collecting expedition to Andros Island in the Bahamas. KLI was joined by ichthyologists Dr. Carole C. Baldwin from the Smithsonian Institution and Dr. Mark W. Westneat from the Field Museum of Natural History, doctoral student Andrea M. Quattrini from Temple University and Yale postdoc Ron I. Eytan, and ANSP Ichthyology benefactor **Gordon W. Chaplin**. The expedition yielded a total of 1,083 specimens (267 lots) and 1,079 tissues primarily of coral reef fishes, continuing the Academy's long legacy of ichthyological research in the Bahamas dating back to the 1950s. As a result of those efforts, the Academy has the largest collection of Bahamas fishes in the World. The expedition was funded by the National Geographic Society, Committee for Research and Exploration (Award 9056-12 to Katriina L. Ilves, PI).

BRAZIL: Lower Xingu River

Mark Sabaj Pérez and Ichthyology Research Associate **Dr. Mariangeles Arce** joined Dr. Leandro Sousa, Professor at Universidade Federal do Pará, on a two-week expedition to the Lower Xingu River, a major tributary of the Amazon River. The primary goal of the expedition was to test logistics and equipment for a project proposed to the National Science Foundation and funded in 2013 (NSF proposal developed in 2011 with support from **Wistar Morris**). The Lower Xingu is the site of a major dam construction project that is well underway and will soon disrupt the natural course of the river, particularly its large and complex labyrinth of powerful rapids (see below). The trip was highly successful and resulted in 1,450 specimens (238 lots) and 335 tissue samples added to the Fish Collection, with a similar number of specimens and duplicate tissue collection deposited at the Instituto Nacional de Pesquisas da Amazônia in Manaus, Brazil. This represents the largest collection of Lower Xingu fishes in a US institution, and includes representatives of a variety of new and undescribed species. Funding for the expedition included private donations from **Mr. Shewell Keim** for equipment and collections supplies, and from **Julian Dignall**, founder of planetcatfish.com, for travel.



BRAZIL: Rio Madeira

John G. Lundberg was invited in August to accompany a team of Brazilian researchers working on a large-scale inventory of the rio Madeira, the largest tributary basin to the Amazon. Based at the Universidade Federal de Rondônia (UNIR) in Porto Velho, the Projeto Madeira team and JGL conducted trawling surveys in the rio Madeira and its tributaries.

FINLAND

Mark Sabaj Pérez and Dr. Michael Hardman collected fishes and tissues in southern Finland for comparisons to related taxa in Mongolia. Fieldwork included collections at 5 sites netting a total of 301 specimens (21 lots) representing 14 species plus 44 tissue samples. All of the material was deposited at ANSP and represents our collection's first fishes from Finland. The fieldwork was funded by the All Cypriniformes Species Inventory (NSF DEB-1022720 to PI Larry Page, Univ. Florida).

MONGOLIA: Hangay Plateau

Mark Sabaj Pérez joined ichthyologist Dr. Tamra Mendelson, University of Maryland, Baltimore County, and an international team of geologists led by Dr. Karl Wegmann, North Carolina State University, for a two-week expedition to the Hangay Plateau in west-central Mongolia. The 2012 fishing expedition complemented the one of 2011 led by the same trio, and completes the ichthyological fieldwork for a large geological project entitled: Collaborative Research: Intracontinental Deformation and Surface Uplift: Geodynamic Evolution of the Hangay Dome, Mongolia, Central Asia. Data on fish diversity, genetics and biogeography will augment geological data to estimate the timing and uplift of the Hangay Plateau.

The 2012 trip was equally successful, yielding 1,000s of specimens and 100s of tissues, mostly from regions north and west of the Hangay Plateau that were previously unrepresented in the Fish Collection. The fishing highlight was a 1.34-meter taimen seined above a gill net set overnight in a tributary of the Selenge River (and returned unharmed). Tissues resulting from the collection will be sequenced at the Smithsonian Institution's Laboratories of Analytical Biology with data incorporated into the Barcode of Life Database (BOLD:



<http://www.barcodinglife.com/>). Tissues collected during the 2011 expedition have already been sequenced, producing 412 successful DNA barcodes of which 385 are in the BOLD database. The 2011 and 2012 expeditions were funded by the NSF Division of Earth Sciences, Continental Dynamics Program (Award Number 1009702 to PI Karl Wegmann, North Carolina State University). The success of recent fieldwork has afforded the Academy the largest collection of Mongolian fishes and their tissues in the World.

UNITED STATES: Delaware Valley

Mark Sabaj Pérez and three high school students from Friends Central, Wynnewood, sampled fishes in three streams in the Delaware Valley (Mill Creek, Pennypack Creek and trib Neshaminy River) as part of their three-week senior project. MSP and the students collected, identified and deposited in the collection 103 specimens (19 lots) representing 14 species of local species.

2012 Highlights (accessions, fundraising activity, etc.)

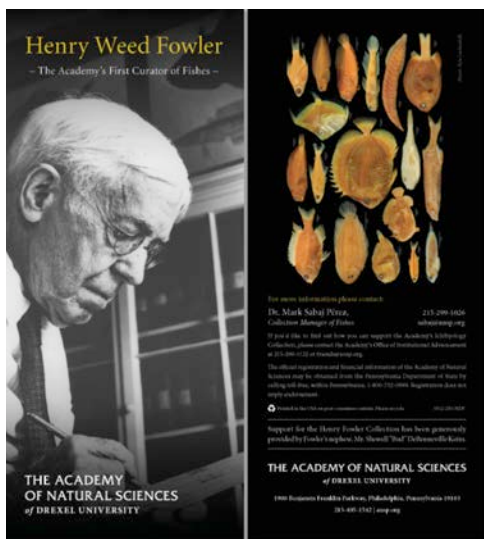
Mr. Shewell “Bud” DeBenneville Keim, nephew of Henry W. Fowler, the first Curator of Fishes at the Academy, continued his generous support of Academy Ichthyology with a second donation of \$25,000 in 2012. The funds provided salary support for **Mark Sabaj Pérez** and **Kyle Luckenbill**, and facilitated purchases of equipment and supplies for fieldwork and the Fish Collection. Academy Editor Mary Alice Hartsock featured Mr. Keim’s fond remembrances of “Uncle Henry” in a “Spotlight” article on Fowler for the Spring 2012 issue of *Frontiers Magazine*. Mr. Keim’s daughter, **Carol Crane**, also sent five boxes of 36 books and other material (certificate, letters, newspaper clippings, music sheets, bird plates, reprints) previously kept by Henry Fowler and his family. The books and Fowler memorabilia were incorporated into the Ichthyology Library and departmental archives (see IMT inv. 2012-218).



On New Year’s Day, 2013, Mark and his daughter Sofia had the pleasure of visiting Mr. Keim at his place on Shell Point, near Fort Myers, Florida. Mark presented Mr. Keim with a preview of the manuscript describing his new patronym, *Hassar* “shewellkeimi”, as well as a first-hand look at one of the paratype specimens. Mr. Keim kindly shared stories of Uncle Henry as well as his own work as an engineer for the US Department of Defense. The day was made complete when Mr. Keim’s daughter and son-in-law, **Carol & Bryan Crane**, treated Mark and Sofia to a tour of the sounds and bays of Fort Myers on their boat.



Institutional Advancement intern Amanda McGrosky prepared a beautiful collection brochure on Henry Weed Fowler, the Academy’s first Curator of Fishes from 1902–1965. The brochure features images, data and/or text contributed by **Kyle Luckenbill, John Lundberg, Mark Sabaj Pérez & Academy Archives**.



John Lundberg served as Senior Editor and **Kyle Luckenbill** served as Production & Illustration Editor on the Special Bicentennial Volume of the Proceedings of the Academy of Natural Sciences of Philadelphia to be published in March 2013. Volume 162 included 14 articles (214 p) contributed by a total of 30 authors including Academy Curators, Archivist, Collection Managers, Postdoctoral Scientists, Historian, Benefactor, Exhibits Coordinator, Research Associates and colleagues. The volume focused on Academy research, collections, and history with topics spanning diatoms & Dr. Ruth Patrick, Devonian fossils including a new species of sarcopterygian (lobe-finned fish), Mongolian crane flies, marine gastropods, Bahamas fishes, phylogenetic relationships of pimelodoid catfishes, new species of knifefish and thorny catfish (the latter named for Ichthyology benefactor **Mr. Shewell Kiem**), 18th Century Lepidoptera and a remarkable daguerreotype found in Archives, and the history of women associated with the Academy. The volume's cover featured an imaged excerpt from the Academy's Constitutional Act of 1812 (Archives Coll. 527), and its capstone featured images by Greg Benson and Lauren Duguid of the Academy's Bicentennial Exhibit.

Kyle Luckenbill co-authored his first new species description with **John Lundberg** in the 485th issue of the Academy's *Notulae Naturae*: †*Ictalurus countermani*, a 10 million-year-old fossil channel catfish from the Miocene Calvert Cliffs of Maryland. The fossil species extends the known native geographic range of *Ictalurus* onto the mid-Atlantic slope and indicates extirpation of the genus from that region before recent transplantations of modern channel and blue catfishes. The species is named for Mr. William Counterman, formerly of the Calvert Marine Museum, who collected the fossils and generously provided them to the authors for study.

Volunteers **Catarina Pien & Dennis Winters** contributed a combined 273.5 hours to Ichthyology in 2012. Catarina took photographs and edited images of fishes collected by Herbert Huntingdon Smith (1851–1919) and his wife Amelia Woolworth Smith from 1882 to 1886 during The Naturalist Brazilian Expedition to southern Brazil. Their fish collection, one of the oldest from that region, is deposited at the Academy and includes many type specimens of species described by Edward Drinker Cope in 1889. A total of 67 of Catarina's images were posted to Facebook in June for study and to confirm identifications. In the Fall of 2012, Catarina began her graduate studies with Dr. David Ebert at Moss Landing Marine Lab, California State University. Dennis continued his editing of images of type specimens for the collection's website, part of the fish type imaging project funded by the National Science Foundation (DBI 0749515 awarded to PI **John Lundberg** and CoPI **Mark Sabaj Pérez** in 2008).

Fish images by **Mark Sabaj Pérez** were featured in the newly published book by Jan H.A. Mol: *The Freshwater Fishes of Suriname*, BRILL, Leiden. i+x, 889 p. Photos of fishes taken by MSP in the field and lab appear in 114 separate figures throughout the book. WINS student **Mjaan Mclvor** also provided two photos taken during her 2011 internship in Ichthyology. MSP also contributed to the design and imagery of the book's cover.

Mark Sabaj Pérez mentored and supervised three high school students, Franz Hueber, Noah Schoenberg and Jamie Ulrich, from Friends Central for their 3-week senior project. MSP and the students revisited 3 streams in the Delaware valley previously sampled over 100 years ago by Henry W. Fowler, Curator of Fishes from 1902–1965. They collected, sorted, identified and cataloged into the Academy fish collection 103 specimens (19 lots) representing 14 species. The students also earned service hours by helping to measure and restore proper alcohol levels to the large wooden tanks holding oversized specimens in the basement collection (some of which had dropped to less than 15% ethanol).

John Lundberg continued his service to the American Society of Ichthyologists and Herpetologists as a member of its Board of Governors and Nominating Committee for Honorary Foreign Member in Ichthyology, and Chair of its Web Committee. **Mark Sabaj Pérez** also continued his service to the Society as Chair of its Collections Committee and member of its Web Committee. **MSP** maintains the ASIH list of Standard Symbolic Codes for Institutional Resource Collections in Herpetology and Ichthyology (1,465 entries as of 25 Feb 2013), and participated in

the Society's Graduate Students/Professionals Networking event held at the 2012 Joint Meetings in Vancouver, British Columbia.

Gregory Watkins-Colwell, Collections Manager at the Yale Peabody Museum, and **Mark Sabaj Pérez** organized a full-day symposium for the 2012 Joint Meetings of Ichthyologists and Herpetologists (and 7th World Congress of Herpetology) held in Vancouver, British Columbia. The title of the symposium was: Technology and Innovation in Herpetology and Ichthyology Collections. A total of 24 speakers gave 22 15-minute talks on a wide variety of collections-related topics including historical perspectives, digitization and georeferencing, tissue/DNA storage and recovery, NextGen sequencing, histological, zoo and project-based specimens, use of specimens in conservation and pedagogy, rehydration of fluid-preserved specimens, regulatory compliance, and NSF programs and initiatives.

Over the course of the year, Ichthyology staff remained actively involved in a variety of ANSP and Drexel related public programs and initiatives, and routinely provided ANSP Communications, Exhibits, Education and Institutional Advancement staff with expertise, specimens, data, media and tours. Much of that effort was directed towards the Bicentennial Exhibit and public programming for "Fish Month" (December).

For the Bicentennial exhibit, **Mark Sabaj Pérez** assembled and arranged a variety of fish specimens and jars from the collection into the Wall of Biodiversity. On public display were 5,390 specimens (55 lots) including an albacore tuna, *Thunnus alalunga*, caught on hook and line by writer Ernest Hemingway of the coast of Cuba in 1934. MSP researched 32 lots of the fishes on display, and compiled text highlighting interesting facts about the specimens/species represented and their relevance to Academy research, collection strengths, and past and present Curators, Associates and Benefactors. The text was to be incorporated into an iPhone App designed to engage visitors with additional information on the items showcased from each Academy collection; however, technical glitches prevented the App from going live.

Katriina Ilves volunteered significant content and suggestions for development of the Bahamas kiosk by the team of outside contractors hired to produce the Bicentennial Exhibit. Unfortunately, her contributions and expertise remained underutilized due to the contractor's inexperience with assembling natural history exhibits and their limited understanding of natural history research. The highlight of the Bahamas kiosk was a wonderfully rendered life-size photo of KLI and **Gordon Chaplin** in front of shelves full of Academy specimens.

Mark Sabaj Pérez was filmed and interviewed by Director Gerry Hooper for the Academy's Bicentennial video. MSP also assisted Hooper's crew with filming in the Fish Collection and provided images of fieldwork for production of the video. MSP also provided images to Karen Spiro for use in the Bicentennial laser light show. For Fish Month, MSP assembled and provided supporting text and images for an exhibit of 88 specimens of North American "Fish Cats" (Ictaluridae) featured in a wooden display case in Science Live. To promote behind-the-scenes tours, MSP helped Exhibits Designer Lauren Duguid assemble specimens (18 lots) and data for display in the lobby case near the Academy's main entrance.

John Lundberg and **Katriina Ilves** were members of the organizing committee for the Academy's Bicentennial Symposium. This highly successful event was held October 11-12, 2012, on-site at both the Academy's main building and at Drexel University. The Symposium featured eight leading scientists invited from the USA, UK, and Canada to present their research in the fields of systematics and ecology, and a student poster session with presentations by 50 students hailing from local institutions and those around the Northeast.

During Fish Month, **Katriina Ilves**, **John Lundberg**, **Kyle Luckenbill**, **Mark Sabaj Pérez** and Academy volunteers maintained a strong presence in Science Live with displays and interpretations of specimens from the collection. The highlight was a large stuffed and dry mounted Atlantic sturgeon (*Acipenser oxyrinchus*, ANSP 37631). Young visitors were especially engaged by the challenge of matching disarticulated sturgeon scutes to those articulated on the mount. All visitors were most impressed by the fact that the sturgeon was real. JGL, KRL and MSP also hosted 13 free behind-the-scenes tours for 72 total visitors during the first three weeks of Fish Month (data compiled by Lois Kuter). For Fish Discovery Weekend, Ichthyology staff helped develop and participated in various public activities coordinated by Jeff Lindenmuth (e.g.,

12 Days of Catfish). MSP gave auditorium presentations on Saturday and Sunday that included a narrated slide show of fishes and fieldwork from his expeditions to Asia and South America, and interactive displays of Neotropical fishes from the collection. At the close of the presentation, young visitors were invited onstage to learn and practice throwing a small cast net over a juvenile specimen of a channel catfish (*Ictalurus punctatus*, ANSP 179468) sacrificed from the Academy's "Outside In" children's exhibit in 2003.

All ichthyology staff, **Katriina Ilves**, **Kyle Luckenbill**, **John Lundberg**, and **Mark Sabaj Pérez**, was on board for Academy Member's Night September 14th. KRL gave a demonstration of the department's digital x-ray equipment by preparing radiographs of primary type specimens and objects provided by visitors. JGL gave a lesson on how to identify and diagnose new species using as examples those he has described and a variety of bullhead specimens (*Ameiurus*) from the collection. KLI & MSP pulled and displayed 70 lots of 480 specimens representing 38 species for visitors to match to printed color photos of 16 species portrayed in the PIXAR movie "Finding Nemo". Veronica Slobodian, a student visiting from Brazil, also participated in the event. Veronica treated visitors to an enthusiastic explanation of her research on Neotropical catfishes while measuring the specimens she came to study at the Academy.

Academy Ichthyology continued to work with Women in Natural Sciences Manager **Betsy Payne** and her WINS high school students. In February, **Katriina Ilves** gave lessons on squirrel fish identification and **Mark Sabaj Pérez** gave behind-the-scenes tours to 16 WINS I students, WINS coordinators and benefactors. In May, **Katriina Ilves** participated in WINS day with an assembly and discussion of various marine reef fishes from the collection. Over the Summer and into the Fall, WINS II student **Debbie Lynn Mayo** interned in Ichthyology under the supervision of **Kyle Luckenbill** and MSP. Debbie Lynn took photographs and edited images of various specimens of Neotropical fishes to be posted on Facebook for identification.

In May, **Mark Sabaj Pérez** joined Paul Callomon and Jason Poole onstage in the auditorium to provide running commentary during the movie "Sharktapus" for Mega-Bad Movie Night coordinated by Jill Sybesma. Prior to the showing, MSP assembled in Dino Hall and interpreted a display of 40 sharks and related taxa pulled from the fish collection for movie goers to enjoy. In June, MSP gathered information and specimens relative to Crete for a luncheon presentation organized by Sara Hertz for Drexel Benefactor Dr. Nick Vidalakis, Chairman and CEO of the Vidalakis Family Partnerships (VFP) and Nancy Vidalakis. MSP also participated in a "Back from the Field" reception for Academy board members with a display and interpretation of specimens collected during his Mongolian expeditions. In December, MSP and Betsy Payne hosted behind-the-scenes tours for a group of 22 high school students associated with the Baltimore Aquarium's "Aquarium on Wheels" youth program coordinated by Kathy Fuller. In December, **Kyle Luckenbill** assembled fishes from the collection for "Weird stuff in a jar day", coordinated by Anthony Paino for the public museum.

Academy Ichthyology featured prominently in 2012 issues of *Frontiers Magazine*. For the Spring issue, **Mark Sabaj Pérez** contributed text and photos for a 2-page article edited by Mary Alice Hartsock on the 2011 Expedition to Mongolia led by geologist Karl Wegmann of NC State University and funded by the National Science Foundation. The cover of the issue features a photo by Tamra Mendelson of MSP seining with two colorful ger poles as brails. **Katriina Ilves** contributed text and photos for a 2-page article edited by Mary Alice on KLI's expeditions to the Bahamas, and her postdoctoral research on changes in reef fish communities over the past 60 years. Sofia Sabaj Pérez even made an unbilled appearance on p. 17 of the Fall Issue in a photo of a "young visitor" practicing her skills with forceps during Member's Night.

Other media highlights included a photo of a jar of porcupinefish (ANSP 103493, 103494) from the Bicentennial Exhibit featured in Philebrity.com (<http://www.philebrity.com/2012/03/21/and-now-from-our-friends-at-the-academy-of-natural-sciences-weird-stuff-in-jars-part-tres/>); and comments by **Mark Sabaj Pérez** featured in a Philly.com article on "The Evolution of Fatherhood" (<http://www.philly.com/philly/blogs/evolution/159231755.html>) posted 15 June.

Scale Tales: DNA from 158-year old trout clarifies its origin, but muddles its name



In 1871, Edward Drinker Cope described *Salmo stomias* (currently valid as *Oncorhynchus clarkii stomias*, Greenback Cutthroat trout) based on syntype specimens (ANSP 7825 & 7826) in the Academy Fish Collection. Recently, those two specimens yielded DNA to a team of researchers led by Jessica Metcalf, Postdoctoral Scientist at the University of Colorado, Boulder. Working at CU and at the Australian Centre for Ancient DNA (ACAD), Jessica recovered DNA sequence data for fragments of two mitochondrial genes (ND2 and CO1). Analysis of the DNA sequence data from the ANSP syntypes, alongside important documents recovered from Academy Archives with help from Clare Flemming and Megan Gibes, helped resolve a longstanding mystery surrounding the origin of Cope's cutthroat trout.

First, it is reasonably clear that the syntypes were collected and sent to the Academy by Dr. William Alexander Hammond (1828–1900), Abraham Lincoln's Surgeon General during the Civil War and founder of the Army Medical Museum (now the National Museum of Health and Medicine). Cope assumed that the cutthroats, like other Hammond specimens sent to the Academy, were collected while Hammond served as surgeon on an Army expedition under the command of Lt. Francis T. Bryan. Bryan's expedition traveled from Fort Riley, Kansas, to Fort Bridger, Wyoming, and back again in 1857 (and was preceded by a similar expedition in 1856, though unaccompanied by Hammond). The oldest label associated with the specimens indicates "Fort Riley, Kansas" and their origin subsequently became associated with the headwaters of the South Platte River in Colorado (e.g., Evermann & Cox, 1896).

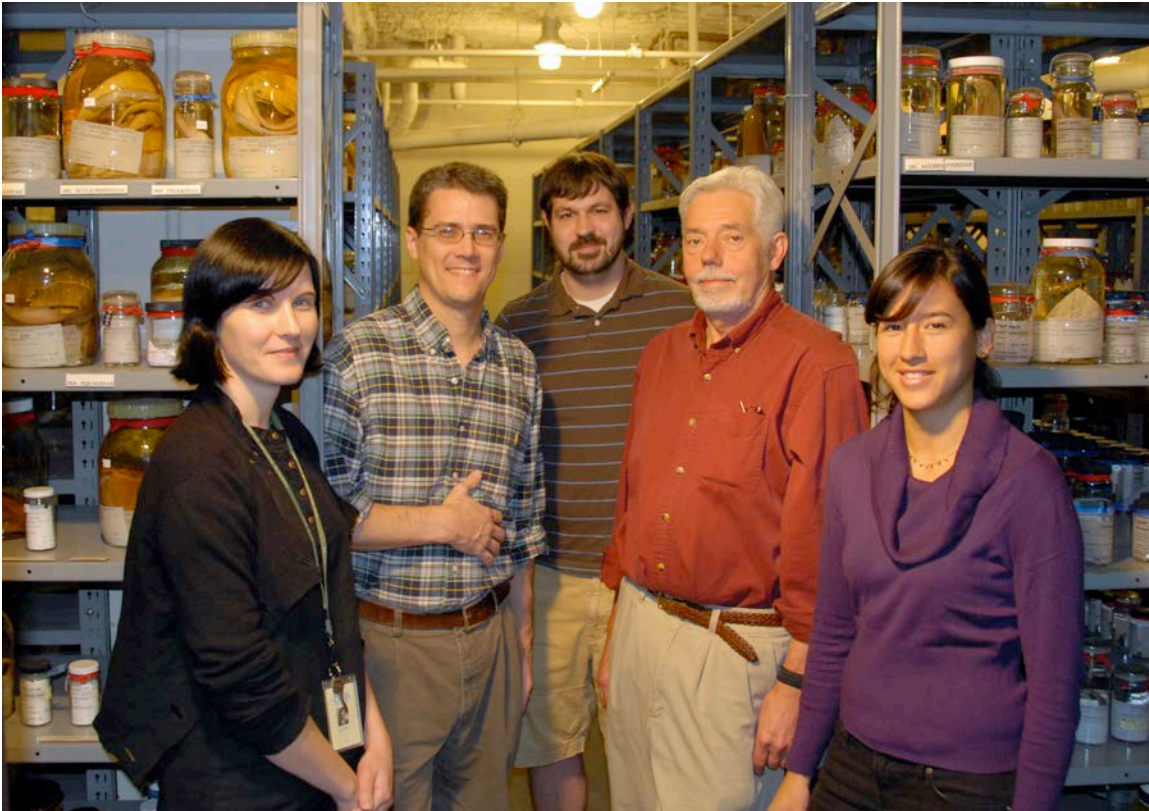
The DNA sequence data, however, groups Hammond's cutthroats with the Rio Grande Cutthroat, *Oncorhynchus clarkii virginalis* (Girard, 1856), sampled from New Mexico [not with populations considered to represent the original South Platte River cutthroats]. Hammond's field notes and correspondences in the Academy Archives confirm that he: 1) never entered the South Platte River drainage during Bryan's 1857 expedition, but instead traveled through the trout-less waters of the Laramie plain and North Platte River in Wyoming, and 2) was stationed as a medical doctor near Santa Fe, New Mexico, from 1849 to 1852. In a letter to Dr. Joseph Leidy dated June of 1855, Hammond confided that he was headed back to Santa Fe with a topographical survey. A subsequent letter to John Le Conte, 12 May 1856, suggests that samples collected on that trip to New Mexico were sent to ANSP in 1856.

Based on the DNA sequence data and Hammond's letters, the ANSP syntypes of Cope's Greenback Cutthroat appear to have originated from tributaries of the Rio Grande near Santa Fe, New Mexico, ca. 1855-1856, not the upper South Platte River in Colorado. That relocation has muddled the nomenclature of cutthroats. Technically, Cope's (1871) cutthroat, *Oncorhynchus clarkii stomias*, is a junior synonym of Girard's (1856) *Oncorhynchus clarkii virginalis*, the scientific name in use for the Rio Grande Cutthroat Trout. In other words, Cope's scientific name is neither valid, nor applicable to South Platte River cutthroats. However, Cope's name *stomias* has long been used for the South Platte River trout, commonly known as the Greenback Cutthroat and, incidentally, Colorado's state fish. Furthermore, the Greenback Cutthroat was thought to have gone extinct in 1937. But, Jessica and her team identified a single surviving population of Greenbacks in Bear Creek (Arkansas River Basin) based on DNA comparisons of modern cutthroats to historical specimens in other museums. It remains uncertain whether the

scientific name *stomias* will be applied to the Bear Creek population in Colorado. Based on their DNA fingerprints, the type specimens of Cope's *Oncorhynchus clarkii stomias* are neither Greenback Cutthroats, nor from Colorado.

The results of the cutthroat research by Jessica and her colleagues appear in several recently published scientific articles (Metcalf et al., 2007; 2012) and a popular article in *Colorado Outdoors* (Rogers, 2012). Their work is a remarkable example of how old, historically valuable museum specimens coupled with state-of-the-art DNA sequencing technology present new frontiers for taxonomic and systematic research, not unlike those presented by the West to explorers like Dr. Hammond and Lt. Bryan.

2012 Academy Ichthyology Department



From left to right: Dr. Katriina L. Ilves, Chaplin Postdoctoral Scientist; Dr. Mark H. Sabaj Pérez, Collection Manager; Kyle R. Luckenbill, Research & Curatorial Assistant; Dr. John G. Lundberg, Curator & Chaplin Chair; Dr. Mariangeles Arce Hernandez, Research Associate. Photo taken in 2011.

*14-page report prepared by Mark Sabaj Pérez and submitted 1 March 2013.
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