

C-FACS faculty members and their graduate/undergraduate assistants are involved in a broad spectrum of field and laboratory research programs targeted at wildlife ecology, conservation and protection. In an effort to enhance membership awareness, communication and collaboration, C-FACS periodically highlights select research initiatives via the

C-FACS Research and Resource Spotlight

UCO Natural History Museum (UCONHM)

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UCO Natural History Museum (UCONHM)

I was walking down the hallway the other day carrying a plastic storage container with the shell of an adult red-eared slider turtle inside when a student asked, “What are you doing with that?” I explained I was transferring a recently cataloged museum specimen from my office to the museum.

“We have a museum?” the student replied.

Most people think of a natural history museum as a place where you go to see dinosaur fossils, learn about biodiversity, and receive stark reminders that we are in the midst of a global conservation crisis. There is a storefront, you buy tickets, visit the gift store, and uniformed personnel contribute to your experience. Most natural history museums are not like that. Only large, well-funded natural history museums can afford to maintain a state-of-the-art public interface. Typically, there is no public interface. Moreover, even at the American Museum of Natural History the public interface is a secondary enterprise – the real museum is behind the scenes, often in the bowels of the building, where the specimens are housed, and the only uniforms are latex gloves and lab coats, and the latter is optional.

Most museum workers do not engage the public as part of their daily work. Instead, they engage the specimens, typically as taxonomic experts with a lifetime of fascination with one taxon or another. This is the case with the UCO Natural History Museum (UCONHM), where 9 faculty members, assisted by a team of student workers, fuss over the care of a large and diverse, but mostly unseen collection of specimens.



Display of UCONHM specimens at the Oklahoma Science Museum.

Brief History of UCONHM

The oldest specimen in our collection is a bird collected in 1901, almost 50 years before Howell Hall was built. Until the mid 1970's, collections slowly grew and were used mainly for teaching. During a 20-year period starting in 1975, the Biology Department hired seven faculty members who were passionate about museum work. It was more or less an accident –museum curation was not expected for any of these faculty positions. Nevertheless, the new faculty began building research collections in seven different divisions – mammals, birds, herpetology, terrestrial invertebrates, aquatic invertebrates, plants, and fungi.

Until 1997, individual curators, with little institutional support – no dedicated space, scarce financial resources, no paid collection manager or student workers, and no long-term goals - maintained these collections as labors of love. In 1997, space constraints relaxed when the Howell Hall Annex was built, and two finished rooms became dedicated museum space – a herbarium and an invertebrate room. In 1999, the increased space allowed us to receive a major donation; retiring NESU professor Paul Wilson donated his entire research collection, over 40,000 owl pellets, to UCONHM. In 2008, Bill Caire was the PI on a successful \$195,346 NSF grant to build more dedicated museum space and purchase proper cabinetry for storing specimens. As part of the NSF grant, UCO administration agreed to hire a permanent collection manager, dedicate resources to hire student workers, and provide faculty release time to individual curators. Two new rooms were built and dedicated to the museum, a wet room for vertebrates stored in alcohol, and a dry room for vertebrate skeletons. During the last decade the museum has grown and continued to gain momentum. Lynda Loucks was hired as half-time Collections Manager, and we typically have five student workers working a total of 30 hours per week, year round.

Since 2008 there have been 52 students who have worked in some capacity in the museum. As the museum gained momentum, other universities, institutions, and individuals began to see UCONHM as a logical place for them to deposit or transfer their collections. In 2011, the estate of Alexander Nick donated an extensive taxidermy collection to the museum. During 2011-2017, Oklahoma Baptist University, Southeastern Oklahoma University, and St. Gregory's University transferred parts of their collections to UCONHM, and we established a relationship with the Oklahoma City Zoo whereby specimens that die in captivity at the zoo are deposited in UCONHM.



Students Examining Specimens of Threatened and Endangered Species from the UCO Wildlife Forensic Science Collection.

In 2014, the Forensic Science Institute established the UCO Threatened, Endangered, and Trafficked Wildlife Teaching Collection, a collaborative effort with the USFWS National Forensic Science Laboratory that includes over 200 seized specimens and products encountered in wildlife criminal cases.

In 2016, the Oklahoma Water Resources Board transferred hundreds of lots of fish collected from rivers across Oklahoma to UCONHM, and in 2017, Sheila Strawn donated a unique lichen collection to the museum upon her retirement. In addition, we are currently building a frozen tissue collection, establishing a photographic database, and maintaining a Dermestid beetle colony for preparing skeletal material. Collectively, the UCONHM maintains 14 separate collections and houses a total of 84,448 specimens.

UCONHM Research and Teaching Collections

Branch of Collection	Specimens	Curator (Emeritus Curator)
Plants	14000	Gloria Caddell
Fungi	4000	Clark Ovrebo
Lichen	989	Caddell/Ovrebo (Sheila Strawn)
Terrestrial Insects	5000	Wayne Lord (Marvin Mays, John Barthell)
Aquatic Invertebrates	6600	David Bass
Mammals	7300	Vicki Jackson (Bill Caire)
Birds	2500	Chris Butler (Bill Radke)
Reptiles/Amphibians	2100	Paul Stone
Fish	800	Paul Stone
Taxidermy Collection	145	Lynda Loucks
Frozen Tissues	800	Michelle Haynie
Owl Pellets	40000	Lynda Loucks (Paul Wilson)
Forensics Collection	200	Wayne Lord
Photographs	14	Lynda Loucks
Total	84,448	



A modern wet lab (Left) replaced a storage closet (Right) after the NSF Grant.

Use of the UCONHM Collections

Teaching - Most Biology Departments have teaching collections – specimens used for instructional purposes in the classroom or outreach in the community. Normally, students use teaching specimens to learn species identification or study some aspect of morphology. Specimens used in teaching are often handled by students as part of the learning process and frequently moved back and forth from classroom display to storage area. Specimens used in outreach are often transported away from the collection, packed in boxes and bounced around in cars. As a result, teaching specimens eventually become damaged, even from gentle handling. Thus, teaching specimens are viewed as somewhat disposable. Space and money limitations normally restrict the size of teaching collections to the specimens that are needed for teaching and outreach. For example, it is unlikely that a teaching collection would need three bald eagles, and spending time or money acquiring a fourth bald eagle would be a low priority.

The UCONHM teaching collection is used in at least 20 classes:

Biology for Majors-Diversity	Plant Taxonomy
Plant Kingdom	Plant Ecology
Mycology	Vertebrate Zoology
Invertebrate Zoology	Freshwater Ecology
Marine Ecology	Ecological Methods
Herpetology	Ornithology
Mammalogy	Entomology
Comparative Vertebrate Anatomy	Parasitology
Aquatic Entomology	Oklahoma Field Biology
Wildlife Forensic Science	Field Wildlife Forensics



UCO Students Participating in UCONHM Transformative Wildlife Learning Experiences.

Outreach - The UCONHM teaching collection is also used in a variety of outreach functions. These ventures have educational value in addition to increasing the exposure of UCONHM (and UCO) in the community. In the last decade, Lynda Loucks (Outreach Guru) has made 42 presentations to 17 organizations, about $\frac{3}{4}$ of which were schools or libraries. In addition, more than 20 groups, ranging from Girl Scouts to emeritus faculty, have been given guided tours of some or all of the UCONHM collections. The taxidermy collection has also been used for outreach, with displays featuring

UCONHM specimens in two departments on campus – Art and the Library – and in two displays at the Science Museum of Oklahoma.



Lynda Loucks and future museum workers.



Hyena and Dik-Dik on display at the UCO Main Library.

Research - Most of the specimens the UCONHM collections are not used in teaching or outreach but instead are part of research collections. Research specimens are valued primarily for the collection data associated with specimens, which most importantly includes three key facts: what it is, where it was collected, and when it was collected. Researchers use research specimens to advance their studies of biology. Research specimens properly curated yield important data on individuals, including data on food habits, predators, variability, body size, body condition, reproduction, and growth. Research specimens can also reveal information at the population and community levels, including data on population trends, local extirpations, biodiversity, shifts in range boundaries, and rates of biological invasions. Perhaps the most important contemporary use of research specimens is as an aid to understanding the impacts of global climate change. Because of their value, research

specimens are stored in safe places, often in the dark, where there is minimal chance of damaging specimens. Specimens are not disposable. Instead, the goal is to preserve them into perpetuity. Specimens are only handled when necessary. Whereas species diversity is important in research collections, a greater premium is often placed on increasing the number of specimens for a given species, particularly if these increases are associated with repeated samples of the same area over time.



UCONHM Mammalogy research specimens.

There have been 88 publications involving UCONHM research collections:

Branch of Collection	Number of Publications Involving the Museum
Mammals	14
Birds	3
Reptiles/Amphibians	7
Aquatic Invertebrates	44
Frozen Tissues	1
Plants	5
Fungi	13
Lichen	1
Total	88

In the last decade, 22 researchers from nine institutions have visited the UCONHM research collections to examine specimens and collect data from them. An additional 12 researchers have requested and received collection data from UCONHM without an on-site visit. In addition, we have loaned specimens approximately 50 times to researchers who needed to examine specimens but were unable to come to UCONHM.



UCONHM Student and Faculty Research Presentations and Publications.

Caribbean Aquatic Invertebrates Collection

UCONHM houses several unique and important collections. We will close by describing one in more detail: The Caribbean Aquatic Invertebrates Collection. Housed in the Aquatic Invertebrates Section of UCONHM and curated by Dr. David Bass, the Caribbean collection is one of the largest collections in the world of aquatic invertebrates from this region. Over 450 collections have been made from more than 200 sites across 16 small islands in the Caribbean basin since the 1980's. David Bass and his students have collected specimens from every type of freshwater habitat, including streams, rivers, ponds, lakes, reservoirs, springs, seeps, waterfalls, temporary pools, anchialine caves, groundwaters, artificial containers, and phytotelmata. Many species in this collection are endemic to the island, or specific site, from which they were found. In addition, macroinvertebrate samples collected while conducting several ecological investigations of Caribbean aquatic habitats are deposited in this special collection.



Dr. David Bass sampling invertebrates in the Caribbean.

For further UCONHM information, additional research and teaching details and opportunities for future collaboration, contact:

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