



Inspire! Grants for Small Museums

Sample Application IGSM-253110-OMS-23
Project Category: Collections Stewardship and Access

University of Alabama (Alabama Museum of Natural History)

Amount awarded by IMLS:	\$47,575
Amount of cost share:	\$0

The Alabama Museum of Natural History will rehouse and digitize its beetle collection, consisting of approximately 50,000 specimens dating from the early 1900s. Museum staff will stabilize, catalog, and rehouse entomological specimens in improved storage cabinetry. Additionally, staff will work with volunteers and undergraduate students to digitize collection information and make collection information available to the public through an online database. Enhancing the storage conditions and increasing intellectual control will result in improved long-term preservation of the collection. Once completed, the project will increase access to and understanding of the collection for scientists, students, and scholars.

Attached are the following components excerpted from the original application.

- Narrative
- Schedule of Completion

When preparing an application for the next deadline, be sure to follow the instructions in the current Notice of Funding Opportunity for the grant program and project category to which you are applying.

1. Project Justification

Overview and Need

The University of Alabama Museums, Department of Museum Research and Collections (DMRC) is tasked with preserving and documenting Natural History and Archaeological collections for the University of Alabama. One of the strengths and active parts of the collection and the UA Museums (ALMNH) is the entomological collection, which includes over 300,000 specimens, more than 30% of which are cataloged. ALMNH has a long history of entomological collections dating to the 1920s. Among our more important current holdings are three valuable historical collections of Lepidoptera and Coleoptera from Henry P. Löding, Ralph and Ottilie Chermock, and J. Manson Valentine. Important recent acquisitions include Odonata (John Abbott), aquatic insects (G. Milton Ward), and a large global-scale collection of longhorn beetles and saturniid moths (Howard Grisham). Now with new leadership within the museums and new staffing in the natural history area, the University of Alabama is poised to reinvigorate natural history collections and to greatly enlarge its contribution to natural history research in the southeast and elsewhere. This goal of the UA Museums is integral to the current strategic plan (2017) in which natural history collections play a major role.

With recent IMLS funding (IGSM-245869-OMS-20), ALMNH completed the rehousing, digitization and cataloging of 18,500 specimens in the Chermock Butterfly Collection. With this valuable collection now more safely preserved, and available on-line, ALMNH's highest priority for the entomological collections is to re-house, photograph, and digitize our **Löding Beetle Collection**. This valuable pinned collection has been accessed multiple times in recent years by authors of books and papers on beetles of the southeastern U.S. As a result, it has already provided a wealth of data for the beetle fauna of Alabama, the southeast, and more broadly, the US. We have devoted much of our limited resources to this collection, but request funding from the *Inspire! Grants for Small Museums* program of IMLS to complete the project.

Background

The ALMNH entomology collections date to the early 1900s, starting with Herbert H. Smith, Museum Curator. ALMNH mounted numerous summer collecting expeditions in Alabama and the southeastern US between 1920-50. Significant growth of our holdings increased when we received the large donation of Coleoptera from Henry P. Löding in 1931. The holdings of Lepidoptera also increased substantially when J. Manson Valentine and R. L. Chermock were curators (1949 to 1966). After a period without a permanent, active insect curator, the museum has further increased its holdings through a donation of 23,000 vials and specimens of aquatic insects by the current curator, Dr. Milton Ward, and 50,000 specimens (mostly Odonata) from Dr. John Abbott.

In 2020, ALMNH recently received a donation of 13,000 curated and identified specimens of longhorn beetles and saturniid moths, almost entirely from outside North America, from Howard Grisham. Overall, our insect holdings include pinned, papered, and alcohol preserved collections of terrestrial and aquatic insects primarily from the southeastern and western US, with additional holdings from Canada, Central and South America, the Caribbean, Africa, and Asia. At present, the capacity of ALMNH to house pinned specimens is limited to 11 Cornell Cabinets holding 505 Cornell drawers. Because of the rapid growth of the collection, the Department of Museum Research and Collections is investing in an additional 12 cabinets that will hold 480 drawers of pinned material and 64 drawers of enveloped material. These new cabinets will hold material that is currently properly housed in drawers, but not secured in easily accessible cabinets.

The Löding Beetle Collection

Henry Löding (Fig.1) was an avid amateur entomologist and collector of insects throughout Alabama. The collection he donated to the ALMNH contained specimens from at least 44 states, northern Mexico and Canada. Born in Kolding, Denmark, in 1869, H. P. Löding immigrated to the US in 1894 at age 25. He disembarked from a merchant vessel at the port of Mobile, AL, a city where he prospered and ultimately lived for the rest of his life, becoming a naturalized US citizen in 1906. He was employed as a banana plantation manager for United Fruit Company in Nicaragua for a time and then became a florist in Mobile (Löding's Flowers). He was awarded an Honorary Doctor of Science degree by the University of Alabama in 1932, was an Honorary Curator of Entomology for ALMNH, and eventually a member of the ALMNH Board of Advisors.

Löding donated his beetle collection to the ALMNH in 1931. Specimens were housed in hundreds of Schmitt boxes (Fig. 2) that contained representatives of most families of North American Coleoptera recognized at the time. Collection locations are well documented, and most specimens contain taxonomic identifications based on the 1920 publication by Charles W. Leng, *Catalogue of the Coleoptera of North America*. Given their age, the specimens are in very good condition. There is little or no insect damage. However, some specimen pins have corroded, and others are rather fragile. In addition, the glue holding specimens on the points has aged to the extent that specimens can be easily dislodged if not handled carefully. Archives at ALMNH revealed that Löding corresponded frequently with well-known academic entomologists of his era, and the Löding Collection is well known within the southeastern US. The Geological Survey of Alabama posthumously published Löding's *Catalogue of the Beetles of Alabama* in 1945. To date, only approximately 15,000 of ~50,000 Löding specimens have been transferred to Cornell drawers and ~8,500 of these have been catalogued. Loans of specimens from the collection are often requested and filled when possible. In recent years, Löding specimens have been loaned to (or examined by) Brian Holt (southeastern tiger beetles), Blaine Mathison (southeastern click beetles), Brian Holt and Terry Schieffer (southeastern longhorn beetles), and the Museum has provided information about our holdings to others.



Figure 1. Henry Peder Löding, ca. 1930.

Our goals for the Löding Collection are:

- 1) Stabilize, protect, and organize Löding specimens by acquiring additional storage cabinets/drawers/pinning trays, and transfer pinned specimens still in Schmitt boxes to new Cornell drawers.
- 2) Image all 50,000 specimens and the associated labels.
- 3) Transcribe verbatim label data.
- 4) Place the imagery and label data in Arctos Collections Management software (https://arctos.database.museum/alnmh_es). Arctos data are distributed to global platforms like GBIF (<https://www.gbif.org>) and IDigBio (<https://www.idigbio.org>) insuring that the data are available to the broadest international community possible.

Why focus on the Löding Beetle Collection now?

The Department of Museum Research and Collections at the University of Alabama Museums is undergoing revitalization. New staff hires, increased investment in collections, and expanded research programs facilitate new data acquisition and accessibility for researchers and the public. In the entomological collections, there is an urgent need to stabilize scientifically important, older collections before they deteriorate beyond research use and also digitize information for on-line accessibility. The Löding Collection is the highest priority in this category for the following specific reasons:

1. The Löding Beetle Collection has seminal scientific and historical importance.

The Löding Collection is a taxonomically extensive assemblage beetle families. While some collections of comparable size may focus on individual sub-groups of beetles, or specifically on agricultural pest species, the Löding Collection contains 70% of known North American beetle families. The age and duration of the collection (1895 to mid-1930s) also add to its scientific value. Such historical beetle collections provide a window into the presence and distribution of beetle fauna at a time when the landscape was far less developed than is now the case. In essence, the Löding Collection represents a look into the past to give perspective to those interested in distributional and biodiversity changes over time.

The focus on Alabama beetle fauna in the Löding Collection fills a knowledge gap regarding beetle biodiversity and distribution data in the US. The collection's broad geographical coverage across Alabama adds to

its value from a biodiversity perspective. Alabama with its high beetle biodiversity is receiving increasing attention as evidenced by recent publications by Beaton et al. (2021), Mathison (2021), Holt (2013), Schiefer (1998) and Schiefer and Newell (2010), who used specimens from the Löding Collection to document range extensions, distributions, and biodiversity for Alabama longhorn beetles, tiger beetles, and click beetles. The above publications included data from only a small fraction of our holdings. Thus, we believe that many additional insights regarding distributions and biodiversity patterns will emerge as more of the collection becomes accessible and is examined.

2. Research relevance requires on-line access.

The full scientific value of the Löding Collection has not been realized because of a lack of physical and on-line accessibility. Even without on-line availability, social media and directed outreach efforts towards researchers have brought awareness of the importance of the Löding Collection to potential users. The publications cited above attest to the potential interest in the Löding Collection by the Coleoptera research community. We believe that once our collection reaches a wider audience through on-line access, interest will grow further. The last two decades have seen an almost unimaginable increase in avocational entomology, which has, in turn, directed professional researchers to amass large datasets addressing biodiversity. There is a tremendous opportunity for substantive research on this collection once the data have been digitized.

Who and what will benefit from this project?

The substantial value of the Löding Collection for research was discussed above. By properly housing, stabilizing, and digitizing this collection, it will demonstrably increase its potential for research. Once more widely visible and accessible to potential researchers, the collection will certainly see an increase in local, national, and international activity. Specific groups that will benefit from the rehousing and digitization of the Löding Collection include UA museum and university faculty, staff and students, non-UA researchers and students, and the general public. These collection improvements will allow specimen accessibility for teaching, research, and outreach.

Natural history collections usage within the UA Museums has increased substantially over the past 6 years. Courses that include research involving the collection are: entomology, invertebrate zoology, paleontology, plant biology, naturalist outreach, nature photography, and a new Museum Studies certification program that uses collections on a regular basis. Making this part of the entomology collection more accessible will benefit UA courses and students. The general public will also greatly benefit from continued improvement of UA Museum collections in entomology. Public community interest in the Museum's annual 'Bugfest' day has greatly expanded over the past few years with over 1800 attendees at this free event in 2022, mostly families with children. Hands-on activities as well as displays of insects drew enthusiastic responses. Digital access to these specimens will mean children can continue their entomological interests at home. Since Alabama has a strong amateur entomology community, digital accessibility will also aid this group in identifying their own insect finds, which will contribute to the entomological knowledge of the state.

One of the exciting, future uses of the Löding and other UA Museum collections is in K-12 classrooms. Once organized and digitized with global, on-line access, these collections can be incorporated into science lessons worldwide. Use of on-line educational tools is especially valuable for schools that are underfunded or do not have access to on-site, physical resources necessary for adequate science education. Alabama, where many of the Löding specimens were collected, has a pressing need for such tools, especially in its rural classrooms that also require improvement in broadband and internet technology. Recent recommendations from a UA education center (O'Brien et al. 2022) urged funding to improve internet technology in rural counties, and in 2022, Alabama Governor Kay Ivey announced an award of \$82.45 million to help make broadband service available throughout Alabama, noting specific needs in rural counties. The recognition of the need for on-line infrastructure and the appropriation of funds to make this possible bodes well for the success of such efforts. Eventual on-line access of the Löding Collection will make this resource a valuable aid in rural science education in Alabama and elsewhere. Bringing Museum collections into the classroom virtually is a feasible approach to improve science education and will increase knowledge about Alabama's rich entomological resources to young students.

How will the project advance the University of Alabama Museums mission?

The project addresses both the mission of the University of Alabama Museums and the Department of Museum Research and Collections, which is to *broaden the knowledge of natural sciences and cultural heritage*

through collections and quality programs of research, instruction and service. By rehousing and digitizing the historically significant Löding Beetle Collection, we will be able to broaden the knowledge of researchers, students, and the public. It will enhance research and instruction within our university system and the greater scientific community.

This project also fits with the mission of the Department of Museum Research and Collections, which is to *employ current professional museum standards to care for and manage our unique cultural and scientific heritage, preserving it for future generations, while facilitating collections-based research and learning for greater public understanding of the region in which we live.* This project will use modern museum standards to preserve an important and historically significant collection for both research and a greater public understanding of entomology in Alabama, the southeastern US, and the United States as a whole. Students and researchers will be able to search and visualize the specimens in our collections without having to travel to the museum. The general public will have a new resource to learn about Alabama's rich beetle fauna as well as the US.

2. Project Activities and Work Plan

About 70% (35,000 specimens) of the Löding Collection remains in 209 of Löding's original Schmitt boxes (Fig. 2). These are the specimens that will be re-housed. Most Schmitt boxes have specimens identified, with one identification label typically associated with 5-9 specimens per taxon. Specimens and taxonomic labels for each taxon will be carefully removed from the Schmitt box and placed in individual pinning trays. The collection contains specimens with a wide variety of sizes, so specimen transfer rates are expected to vary. Transfer of larger beetles will move rapidly, but we do have a greater number of small specimens, many of which are on points. Great care will be needed with specimens on points, as most specimens are over 100 years old. Work on small specimens will move more slowly, particularly when re-gluing of specimens back onto points becomes necessary. We anticipate that transfers can be accomplished in ~6 months.



Figure 2. Schmitt box S-010-2015 contains ground beetles, a typical example of the 209 boxes to be processed during this proposed project.

With our recent experience re-housing and digitization of over 18,500 specimens in the Chermock Butterfly Collection, we have developed a very focused and well thought out work plan for re-housing and digitizing our collections. We will apply that plan to the Löding Collection. All Schmitt boxes now have identification labels, and Cornell drawers/pinning trays will have object tracking codes. The transfer of specimens from each Schmitt box will keep currently identified groups together in separate pinning trays, and the transfers will be documented using photographs of specimen boxes/drawers and by digitally capturing notes taken by those making the transfers. This process was developed and used extensively during the recently completed Chermock Butterfly project and can be easily adapted to the Löding Beetle project. This process has proven valuable as part of quality control protocols.

We are proposing a two-prong approach in order to achieve our goal of having this valuable collection and its associated data posted online as soon as possible. We are asking for IMLS to fund cabinets and drawers while the Department of Museum Research and Collection's (DMRC) is committed to investing resources needed to do the imaging and data capturing of the collection. We will begin January 2023 imaging the 15k specimens that have already been re-housed. The label data on these specimens has also already been captured. We anticipate an average of 5 minutes/specimen for imaging; or ~1,250 hours needed to complete this task. Our goal is to have these re-housed specimens imaged, cataloged and posted online in Arctos, by January of 2024 using student employees funded by the DMRC.

This will set us up nicely, so that if this proposal is funded, we can purchase cabinets and drawers in the fall of 2023, and begin rehousing the 35,000 specimens still housed in Schmidt boxes starting in early 2024. We anticipate the rehousing process to take on average 1 hour/Schmidt box for a total of 209 hours. This task should be completed by the end of the spring of 2024 in time for the hiring of students (funded by DMRC) to commence in the summer of 2024 with imaging and cataloging. We will then continue with the imaging and cataloging of the

newly rehoused specimens. We anticipate having the Löding collection imaged and cataloged by the end of 2026.

Resources Needed for the Project

The greatest challenge to accomplishing our goals is the need for additional Cornell cabinets, drawers and unit pinning trays. We propose to use all direct costs associated with this IMLS funding to purchase these needs. These items are archival quality and will bring the collection up to the professional standards they deserve. Based on counts of recently transferred specimens, an average of ~190 specimens can be re-housed in each Cornell drawer. Consequently, to complete the re-housing of ~35,000 specimens we will need to purchase 4 cabinets, ~192 Cornell drawers and ~4,000 pinning trays of various sizes.

With access to Cornell drawers and cabinets to house them, we propose to utilize ALMNH funds for curatorial staff, undergraduate students and volunteers to accomplish the transfers. We have an excellent record for hiring undergraduate students using museum resources and attracting volunteers, so we firmly believe that ALMNH can provide the necessary labor. Project Director Abbott and Key Personnel, Insect Curator Ward, will be responsible for overseeing the staff, students, and volunteers.

This project will use space, facilities and equipment now in the DMRC. The new Cornell cabinets and drawers will be located in floor space currently occupied by existing cabinets holding Schmitt boxes. The department currently owns a Nikon D7100 and two Canon 7D Mark II camera bodies, each with a 50mm macro lens. Two imaging stations have been set up in a dedicated space within the department that includes both Mac and pc computers, professional copy stands and two Ortech Photo-e-Box Plus.

Tracking progress: Based on our recent experience with transferring 18,500 butterflies, we believe that our goal for this proposed project is quite achievable within 14 weeks (spring semester of 2024) by committing 20 man hours/week to the rehousing. As we did with the Chermock Butterfly Collection activity, detailed transfer protocols will be written for students, staff, and volunteers to follow. We will track progress on-line and produce daily/weekly metrics toward completion of the re-housing phase. Once the transfers are complete, we will begin cataloguing and imaging specimens funded by the DMRC.

Sharing project results: All captured data for Löding specimens will conform to DarwinCore standards and will be uploaded to our Arctos collections management platform. In Arctos, the data will automatically be shared with different data gathering portals such as iDigBio and GBIF.

3. Project Results

The primary results of this project will be: 1) the rehousing of a scientifically and historically significant beetle collection at The University of Alabama, bringing it up to modern standards, 2) training undergraduate students in proper modern curatorial techniques. The herein proposed activity is a necessary first step to make these data available to a wide audience. Following the rehousing, the DMRC is committed to the resources needed for imaging and cataloging the specimens.

Collections Stewardship and Public Access

This proposed project perfectly supports the goals of *Collection Stewardship* and *Public Access* outlined in the Inspire! Program. When re-housing of the Löding Beetle Collection is complete, we will have increased accessibility to the specimens, and when our long-term goal for digitization is complete, this historically and scientifically significant beetle collection will be conserved and shared with a national and international community. Accomplishing the re-housing and digitization will affect numerous stakeholders, including researchers, on and off campus, undergraduate student employees who will learn modern digitization and collections management techniques, and ultimately an international public community of incalculable size that will have access to this collection through Arctos, GBIF and iDigBio. The general public will also benefit in having this collection available for viewing in public exhibits and outreach events.

Measuring Success

We will measure the success of our project by reaching our proposed target of completely rehousing the Löding Collection within the time proposed and, when long-term goals are completed, announcing on-line access for the collection. The metrics we measure will track our progress toward completion of the goals and also alert us when procedures need to be altered should our progress lag behind expectations.

Schedule of Completion

TASK	SPRING 2023	SUMMER 2023	FALL 2023	SPRING 2024	SUMMER 2024	FALL 2024
IMAGING & CATALOGING ALREADY REHOUSED LÖDING SPECIMENS*						
PURCHASE/RECEIVE CORNELL CABINETS, DRAWERS, PINNING TRAYS						
REHOUSE SPECIMENS FROM SCHMIDT BOXES INTO DRAWERS						
BEGIN SPECIMEN IMAGING AND CATALOGING*						

*Staffing provided by the Department of Museum Research and Collections.