

UNIVERSITY OF CENTRAL OKLAHOMA

NATURAL HISTORY MUSEUM

(UCONHM)



DEPARTMENT OF
Biology
UNIVERSITY OF
CENTRAL OKLAHOMA

**INVERTEBRATE SPECIMEN PRESERVATION & PREPARATION POLICIES &
GUIDELINES**

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I. INTRODUCTION Much of what is contained below in the University of Central Oklahoma Natural History Museum (UCONHM) Standard Operating Procedures and Specimen Preparation Guidelines have been paraphrased from several other excellent Collection Management Policy Manuals.

A. Purpose of Manual The UCONHM Invertebrate section policy manual outlines the policies and guidelines for the acquisition of specimens, curating, maintenance, loaning, deaccessioning, preparation, and use by the research, teaching, and public communities of materials in the Invertebrate collection. It sets forth guidelines for the use of the collections and outlines the ethical and legal responsibilities of the museum personnel with respect to the collection. The Invertebrate section of the UCONHM recognizes its role as part of the University of Central Oklahoma (UCO) and will maintain a policy that reflects current University and State of Oklahoma codes as they pertain to Invertebrate collections. The guidelines and policies in this document will adhere as closely as possible to those listed for the Natural Science Collections Alliance, International Council of Museums, and American Association of Museums. This UCONHM policy manual applies to all Curators, Collection Manager, staff, students, researchers, visiting researchers, volunteers, and the public. It is expected that all Invertebrate section personnel will read and follow the policies and guidelines. The policy manual will be updated as needed and will be approved by the Invertebrate Curators, the Collection Manager, the Chairperson of the Biology Department and the Dean of the College of Mathematics and Science.

B. Official Acronym of the UCONHM Invertebrate Collection. The Invertebrate section of the UCONHM officially recognized acronym which stands for University of Central Oklahoma Natural History Museum.

II. SCOPE AND TYPES OF SPECIMENS IN THE INVERTEBRATE SECTION The Invertebrate section of the UCONHM contains Invertebrate specimens and associated materials from original research and collecting trips by professors and students at UCO, from donations, and from transfer of specimens from other museums. The Invertebrate section serves the scientific community and the public through its research, teaching, and access to holdings and associated records. It is also charged with proper maintenance of the specimens for long-term conservation and preservation of scientific data. Approximately 200,000 accessioned Invertebrate specimens are in the UCONHM. The collection contains primarily specimens from Oklahoma, Texas, and the Caribbean region, with fewer specimens from elsewhere. It serves as both a teaching and research collection, and a historical documentation of Invertebrates from the time period when they were collected. The specimens and associated materials may be made available for use by the scientific community, for use in exhibits and for teaching. The Invertebrate section of the UCONHM is moving toward maintaining two types of collections (teaching and research) that are managed and conserved. These two collections will ultimately be curated as separate entities but both will be managed according to professional museum standards. They include both dry and fluid-preserved specimens.

A. Teaching Collection The teaching collection will contain representative specimens that can be used in classrooms and for public demonstrations. These specimens might not have full documentation associated with them. These specimens will be tagged with the acronym TC (teaching collection) and can be accessioned as part of the main Invertebrate museum section.

B. Research Collection The research collections contain Invertebrate specimens, objects and associated materials that are in good condition, unique, and well-documented. This collection will be managed and conserved in a manner that will insure its preservation as historic data and for use by researchers.

III. PERSONNEL OF THE INVERTEBRATE SECTION OF THE UCONHM

A. Curators: The Invertebrate section of the UCONHM is under the direction of professional curators who are faculty members in the Biology Department of UCO. Currently Dr. John Barthell and Dr. Wayne Lord manage all associated materials in the terrestrial insect section of the collection. Dr. David Bass manages all associated materials in the Invertebrate and aquatic insect

sections of the collection. Dr. Bass also manages the Caribbean Invertebrate Section. These curators are responsible for the collection of specimens, the Invertebrate division policies, specimen preparation guidelines, the conservation practices and assisting the Collection Manager (currently Ms. Lynda Loucks) in securing of funds and developing the annual budget for museum operations.

B. Collection Manager: The Collection Manager (currently Ms. Lynda Loucks) works closely with the curators and supervises student workers in the management and maintenance of the Invertebrate collection, loan activities, access to specimens and databases. The Collection Manager attends meetings and workshops, as needed, to remain current on curation practices.

C. Nonprofessional Staff: The nonprofessional curatorial staff consists of graduate and undergraduate students, high school interns, and volunteers. They receive training directly from the Collection Manager or from the Curators.

IV. CODE OF ETHICS OF THE INVERTEBRATE SECTION OF THE UCONHM It is expected that the Invertebrate Curators, the Collection Manager, staff and volunteers perform all duties associated with the Invertebrate collection in an ethical manner according to the policies and standards established by the UCONHM, the university administration and the Invertebrate scientific community. The Invertebrate section personnel will make every effort to abide by the procedures outlined by the International Council of Museums, Natural Science Collections Alliance, and American Association of Museums. However, any new or traditional curatorial practices and materials listed by any other organization external to UCONHM will be evaluated before they are implemented in the Invertebrate collection.

A. Ethical Guidelines All individuals associated with the Invertebrate collection will:

- maintain the integrity of all Invertebrate specimens because they are irreplaceable
- avoid actions that are in conflict with responsibilities or cause personnel to favor other interests over those of the Invertebrate section of the UCONHM
- have as prime responsibilities the conservation of Invertebrate specimens and associated materials in the public trust and to make specimens available for research, teaching and exhibits
- act ethically and legally in the acquisition and the disposing of Invertebrate materials.
- not condone the illegal, unethical, and destructive activities with respect to the Invertebrate collection
- use the most acceptable preservation, conservation and management methods
- accept Invertebrate specimens and associated data which improve the scientific and educational value of the collection and preserve important scientific data.
- use prudent judgment about the dissemination of information that may jeopardize sensitive or protected species, or unpublished research
- will deny access to users that fail to follow the policies outlined in this manual or if they misrepresent their research and the UCONHM Invertebrate collections
- clearly identify and mark (or make inaccessible) those specimens that might be unsafe for students, workers, volunteers and researchers because they are hazardous, or have become so through preparation or fumigation
- adhere to the University of Central Oklahoma's guidelines pertaining to equal opportunity employment practices of staff.

V. ACCESS TO THE INVERTEBRATE SECTION OF THE UCONHM Access to use the Invertebrate collection for research, educational, or other purposes will be through the approval of the Invertebrate section Curators and/or the Collection Manager. Businesses, organizations, and individuals desiring to use the Invertebrate collections for commercial purposes or profit will be granted permission and access at the discretion of the Invertebrate section Curators. For profit entities might be charged a fee or a percentage of the profits which will be deposited into an Invertebrate section discretionary fund account with the university.

A. Request to visit the UCONHM Invertebrate Collection All requests should be made in writing or via e-mail to the Curators or the Collection Manager (currently: dbass@uco.edu, jbarthell@uco.edu, wlord1@uco.edu, and loucks@uco.edu.) Visitor access is preferred from Monday through Friday, between 8:00 and 17:00.

B. Denial of Access. The Invertebrate Curators and the Collection Manager have the right to deny access to individuals or representatives of organizations or businesses that plan to use or who are found using the Invertebrate collection in a manner which does not conform to the Invertebrate collection policies of the UCONHM.

Denial reasons might include these and other reasons:

- excessive costs to the UCONHM in terms of staff involvement
- compromised security of the collections and facilities
- unauthorized destructive sampling of specimens
- a history of misuse of Invertebrate specimens at the UCONHM or at other museums
- falsification of credentials, criminal activity, or disruptive conduct.

C. Tours. Tours of the Invertebrate collection for the public or educational groups may be provided by the Curators, Collection Manager, or appropriate staff. If possible, please contact them at least 1-2 weeks in advance.

D. Use of Invertebrate Teaching Materials. Use of the Invertebrate teaching collection will be with the approval of the Invertebrate Curators or the Collection Manager.

VI. GUIDELINES FOR USE OF THE COLLECTION AT UCO Consult with the Collection Manager or Curators about the following procedures before proceeding into the collection and accessing any materials:

- sign the guest register
- first time users of the Invertebrate collection and associated materials should receive instructions on the organization and handling of specimens
- open cases carefully and slide all drawers slowly so not as to disturb arrangement of specimens
- handle the specimens as little as possible
- handle each specimen carefully so as to not break off any extremities
- after the use of a specimen, make sure that it is returned to the exact place in the drawer and case from which it came and close the case doors
- do not leave specimens out overnight
- keep all specimens out of sunlight
- when examining materials of more than one specimen, open only one specimen box or container at a time to avoid confusing specimens
- do not add any remarks to the tags or alter them in any fashion
- if errors are noted, please notify the Collection Manager or Curators
- insure your safety by washing hands after handling specimens
- familiarize yourself with all safety policies before commencing your study.

VII. ORGANIZATION OF COLLECTION The Invertebrate specimens are located in rooms 257 and 259 of the Science Lab of the University of Central Oklahoma.

A. Arrangement of Cases The general arrangement and sequence of the specimen cases in the Invertebrate collection follows the phylogenetic order. In some situations because of the size of the specimens, a group/specimen might be located out of sequence.

B. Arrangement of Dry Specimens in Drawers Specimens generally are arranged in numerical sequence.

C. Arrangement of Fluid Specimens Jars of specimens are arranged in phylogenetic order but in some situations because of the size of the specimen container, a jar might be located out of sequence.

VIII. DEPOSITION AND ACCESSIONING OF INVERTEBRATE SPECIMENS AND ASSOCIATED MATERIALS INTO THE UCONHM INVERTEBRATE COLLECTION

The Invertebrate section of the UCONHM acquires Invertebrate specimens and associated materials from research projects conducted by faculty and students at UCO, other researchers, donations, transfer of specimens from other collections, exchanges, and other field activities. All decisions on what will be accessioned into the Invertebrate collection are made by Collection Manager and the Curators.

A. Delivery of Materials to the UCONHM Invertebrate Museum The Invertebrate Curator and Collection Manager should be notified in advance when to expect a collection of Invertebrates and associated materials. They should be informed about the quantity of specimens and the kind of preservative in which the specimen is being shipped so that staff will be available to process the incoming specimens. A copy of permits, reports, and field notes associated with the Invertebrate specimens should be provided when the Invertebrate specimens are delivered to the museum.

B. Criteria for Material To Be Cataloged/Accessioned Into The UCONHM Invertebrate Collection All Invertebrate material to be officially accepted, deposited and cataloged into the UCONHM Invertebrate collections must meet these standards:

- the Invertebrate specimens and associated materials are within the scope of the Invertebrate section of the UCONHM and are consistent with all policies and guidelines
- the Invertebrate specimens and associated materials are collected or acquired ethically and legally according to any laws and regulations of the international, federal, and state agencies which protect Invertebrates. Copies of documentation such as collecting permits, import, and export documents, animal use committees, etc., should be retained (as needed) in the Invertebrate section of the UCONHM accession files.
- prepared, labeled and contained properly
- the Invertebrate section of the UCONHM can properly provide for the storage, protection, and conservation of the Invertebrate specimens and associated materials according to professional standards
- the required reports for Invertebrate gift acquisitions to the University of Central Oklahoma follow the university requirements. Some gifts to the UCONHM might require University or Board of Regents approval
- the Invertebrate specimens and associated materials are free and clear in title of ownership, with no preconditions or terms that limit the Invertebrate section of the UCONHM in its preservation or retention of the specimens or associated data
- all Invertebrate specimens and associated material acquired can be given a UCONHM Invertebrate section accession number, properly archived and then made accessible
- library type materials that are considered rare or valuable and associated with Invertebrates.

C. Ownership of Invertebrate Specimens and Associated Materials All Invertebrate materials deposited into the Invertebrate section of the UCONHM and curated at the expense of the University become the property of the University Central Oklahoma and State of Oklahoma.

D. Cataloging/Accessioning of Invertebrate Material into the UCONHM

1. Official Catalog Each specimen and associated materials in the Invertebrate collection of the UCONHM will be catalogued into the official Invertebrate section catalog of the UCONHM. Access to, use of, and adding data to the catalog will only be by permission of the Collection Manager or the Curators. The entries into the catalog are in Microsoft Excel. Specimen data from the official catalog is also entered into a computer database (SPECIFY) which is located on the UCO mainframe computer in the Information and Technology Center and is accessible (see section of this manual related to the Computer Database).

2. Assigning Specimen Numbers Each Invertebrate specimen will have its own unique accession number and entry information in the catalog.

The unique accession numbers:

- ensure that the Invertebrate specimen and its associated information can be accessed on the collection's database
- ensure that UCONHM Invertebrate specimens and their associated materials can be described or referenced in publications
- ensure that the Invertebrate specimens can be located and used by researchers, staff, etc.

3. Entering Specimen Data into the Catalog

- Data on the specimen tags or other associated materials should be checked carefully for spelling errors and lack of information prior to being entered into the accession catalog.
- Write the specimen data into the Excel accession catalog of the Invertebrate section of the UCONHM.
- Each specimen is assigned the next available sequential number in the catalog. This will result in the specimen or associated materials having a unique, permanent, catalog number. All items from a single specimen will be assigned the same number and those components present will be recorded in the proper column of the catalog.
- Each entry line in the main catalog should contain the following information:
 - collector's name
 - collection date
 - phylum, class, order, family, genus, and species names
 - locality in full
 - geographical coordinates if available
 - any additional comments
- When cataloging a large accession, all specimens of a taxon from a common locality should be entered into the main catalog as close together as possible.
- Data from the main Invertebrate catalog will be input into the computer database SPECIFY as soon as possible.
- Errors produced during the cataloging or data entry process can easily lead to erroneous information being published in the literature. Attention to detail is paramount.

4. Original Field Notes and Data Associated with Invertebrate Specimens All original field catalogs of collectors (if available) should be deposited permanently in the fireproof safe in room 165 in the Science Lab Building. Documents are a part of what is considered to be "other associated materials." They can include any information recorded using any of a variety of media such as paper, photographic, electronic, X-ray, MRI, CTs, sound recordings, video, etc., related to the research, identification, condition, and/or history of a Invertebrate specimen. This also includes information that reflects processes and transactions related to the Invertebrate specimen, e.g., accessioning, cataloging, loans, sampling, analysis, and treatment. Maintenance of documentation in the Invertebrate section of the UCONHM follows recommendations by professional societies such as the Society of American Archivists (Deiss 1984; Ritzenhaler 1983) and American Institute for Conservation of Historic and Artistic Works (Kushel 1980).

IX. DISPOSAL/DEACCESSIONING OF INVERTEBRATE SPECIMENS AND ASSOCIATED MATERIALS Invertebrate specimens and associated materials are disposed of or deaccessioned only for sound scientific and curatorial reasons. The disposal must follow written guidelines, and each deaccessioned item must be thoroughly documented in writing. All disposals will be done in an ethical

manner, and any compensation received will be used only for the Invertebrate section of the UCONHM. The Invertebrate Curators assume final responsibility for disposal/deaccessions of any specimens or associated materials.

A. Reasons For Disposal Or Deaccessioning Invertebrate Materials Invertebrate specimens and associated items may after careful consideration and discussion of the Invertebrate Curators and the Collection Manager be disposed of or deaccessioned because of the following reasons:

- the specimens or items no longer fit the Invertebrate section of the UCONHM's scope or have deteriorated beyond use or restoration.
- the material is excessively duplicated in the collection and/or cannot be properly curated
- the specimen or items represent a serious health or safety hazard
- it is part of a justified and appropriate trade, exchange or transfer to another museum which will provide proper conservation standards to maintain the specimens or items

B. Acceptable Processes For Disposal/deaccessioning of Specimens and Associated Materials:

1. Trades or Exchanges These are written agreements between the Invertebrate section of the UCONHM and other entities such as a museum to trade or exchange Invertebrate specimens and/or associated materials and to mutually relinquish their respective curatorship over those items. No exchanges are made with individuals but between the institutions involved. The trade or exchange will be approved by the Invertebrate Curators and Collection Manager of the UCONHM and the university.

2. Transfers These are arranged written agreements between the Invertebrate section of the UCONHM and another museum or institution that the Invertebrate section of the UCONHM will transfer ownership of selected Invertebrate specimens and/or associated materials that no longer serve a purpose to the Invertebrate section of the UCONHM (or require more accessibility to the wider scientific community or the specimens or materials cannot be curated in the proper manner). Invertebrate specimens and/or associated materials will only be transferred to institutions which have and can insure that the basic standards of curation will be provided. The transfers must be approved by the Invertebrate Curators and Collection Manager of the UCONHM and they may be approved by the University.

3. Institutional Sharing This arrangement is made by the Invertebrate section of the UCONHM in order to share an important series of Invertebrate specimens or associated information with another institution in order to increase accessibility of those materials (e.g. dividing a series of unique Invertebrates among several institutions). The sharing agreement will be approved by the Invertebrate Curators and Collection Manager of the UCONHM and the University.

4. Discarding Invertebrate specimens and associated materials Natural disasters, museum pests, and consumptive or destructive sampling might lead to the destruction of cataloged Invertebrate specimens or associated materials. The Invertebrate Curators after consultation with the Collection Manager may decide which Invertebrate specimens no longer have scientific, teaching, or public value. However, any original documentation associated with the discarded specimens or materials will always be retained by the Invertebrate section of the UCONHM. Type series (holotypes, topotype, etc.) and rare or unusual materials will never be discarded, regardless of condition. Any documents which are no longer relevant to the Invertebrate section of the UCONHM will be transferred to the University of Central Oklahoma Library archives after approval by the Invertebrate Curators and the Collection Manager.

5. Sales Any sale of gift items or other material with no scientific, teaching or public value for enhancement of the existing collections are subject to the policies of the University and the resulting funds will go toward maintaining the Invertebrate collections.

C. Record Keeping A record of the circumstances and/or the conditions under which Invertebrate specimens and associated materials are deaccessioned and disposed will be retained as part of the permanent record of the Invertebrate section of the UCONHM. All the original documentation of deaccessioned specimens or materials will be retained by the Invertebrate section of the UCONHM.

D. Catalog Numbers of Deaccessioned Specimens The original main catalog numbers assigned to deaccessioned or disposed of specimens will not be reassigned to other or new items. However, the main catalog entries are amended to indicate the disposal/deaccessioned status of the specimens and associated materials, the personnel involved in making the decision and the date of deaccessioning.

X. APPRAISAL OF INVERTEBRATE DONATIONS

The monetary value of any Invertebrate specimen or associated materials donated to the UCONHM will not be assessed by Invertebrate Curators or the Collection Manager. It is outside the scope of their expertise.

XI. LOANS

The loan of Invertebrate specimens and associated materials in the UCONHM is at the discretion of the Invertebrate Curators after consulting with the Collection Manager. Any Invertebrate specimens or associated materials or data that are loaned should be noted in both the hard copy catalog and the computer data base.

A. Loan Conditions The Invertebrate section of the UCONHM will loan materials under the following conditions.

- Types, rare, or one of a kind Invertebrate specimens are usually not loaned.
- Loans of original field catalogs, journals and species accounts, correspondence, photographs, slides, etc. are not granted. However, if funds are provided for the copy of these materials, then a copy of the material will be provided.
- A loan request may be denied or limited because of the fragile nature of a specimen, the rarity, or uniqueness of the specimen(s) as well as the size or number of specimens being requested.
- CITES-listed material will not be loaned to institutions that do not hold a CITES Exemption Permit. For details of species listed on the CITES Appendices, visit the CITES website at <http://www.cites.org/>. If any of the Invertebrate materials requested in the loan are listed on CITES Appendices I, II, or III, the loan requestor must provide their institution's CITES Exemption Permit Number.
- Loan shipments are made in accordance with the Lacey Act of 1903 and the United States Department of Interior regulations concerning "import, export, and interstate transportation of wildlife".
- Loans of Invertebrate specimens or associated materials for use in exhibits must comply with the Invertebrate section of the UCONHM loan policy as it relates to the storage, security, and proper environmental conditions. Before any of the Invertebrate materials to be used in the exhibit are displayed, the specimens or material must be correctly identified to species (if possible) and the UCONHM Invertebrate section must be acknowledged on the exhibit. All specimen tags and other identification information are to remain with the loaned specimens at all times.
- Any UCONHM Invertebrate section materials or data that have not been published and are the result of research activities (i.e. data sheets, tissue samples, food habit remains, field catalogs, journals and species accounts) may be copied and/or the original loaned after a reasonable length of time, with written permission by the original researcher or if they were a graduate student by their graduate advisor. Researchers must cite the Invertebrate section of the UCONHM and any relevant catalog accession numbers (if available) in published reports even if that material was not accessioned at the time it was loaned to a researcher.

- Teaching collection specimens and associated materials might under special conditions be loaned if they are returned prior to the material being needed in a class.
- Occasionally Invertebrate specimens may loaned for longer than normal periods of time (6 months) for use in identifying taxa in certain research projects.
- Any UCONHM Invertebrate specimens cited in published works must be identified by their catalog numbers and standard institutional code. Two copies of any resulting published work should be sent to the museum after the research has been published.
- Foreign loans are made only to international entities that have dependable mail service. Western Hemisphere loans are mailed out only to institutions in the US and Canada. In the Eastern Hemisphere loans will only be mailed to England, western European countries, Japan, and Australia. International loans might require that the U.S. Fish & Wildlife Service Form 3-177 or other forms be completed and validated prior to mailing the material.
- All loans will be made to an institution, rather than to individuals; and in all cases a permanent member of the institution must accept responsibility for the loan.
- For most loan requests, specimens and/or associated materials will be loaned only for a period of six months. An extension of the loan may be requested prior to the return date of loaned material.
- Whether or not future loan requests are honored will be contingent on previous care provided to the UCONHM Invertebrate specimens.

B. Borrowing Invertebrate Specimens and Associated Materials from the UCONHM

The Invertebrate section of the UCOMNH makes loans of catalogued material from its collections to faculty, curators, permanent research staff, and occasionally to students under the direction of a faculty advisor at scientifically recognized institutions and under the conditions listed in the previous section.

- The Invertebrate Curators in consultation with Collection Manager approves all outgoing loans after receiving a fully completed request.
- Loan requests and extension of a loan should be made in writing to the Invertebrate Curators at the UCONHM.
- The Loan request should include the following information:
 - should be on the borrower's home institutional letterhead.
 - the scientific merit and purpose of the research
 - evidence of the investigator's competence conducting the study
 - the exact amount and identity of the material required
 - why Invertebrate museum specimen material is preferred over other sources
 - evidence that the borrowed specimens will be properly cared for during the loan period
 - that the loan institution has the proper facilities to care for the Invertebrate specimens and associated materials.
- In a loan made to a student (undergraduate or graduate), the student's faculty advisor will be responsible for the loan and making the loan request.
- The cost of shipping (depending on the amount of material and the destination) which includes packaging materials might be charged to the individual requesting the loan.

C. Incoming Loans To The Invertebrate Section Of The UCONHM After consultation with the Invertebrate Curators and the Collection Manager and a UCO researcher or student making a loan request from another institution, the Invertebrate section of the UCONHM will accept incoming loans pursuant to arrangements made with the other scientists or scientific institution making the loan. All incoming loans will be maintained as a composite lot (not separated) and curated in a professional manner.

D. Invertebrate Tissue Loans – Including Invasive or Destructive Sampling Invasive or destructive sampling would involve such things as asking for tissues from sampling preserved

specimens for genetic studies, dissection of fluid specimens for anatomical studies, sectioning of tissue, splatter coating of specimens for SEM studies, or otherwise altering a UCONHM Invertebrate specimen. Some of these samples will be associated with voucher specimens in the Invertebrate section of the UCONHM. Unlike traditional museum specimens, such invasive samples could eventually deplete the unit being sampled. Therefore, requests for tissues or other similar analyses are evaluated more stringently than other requests, and some requests for destructive samples might be denied. The Invertebrate Curators and the Collection Manager will consider destructive sampling loan requests.

1. Guidelines Governing Invasive or Destructive Sampling Certain guidelines and conditions govern whether an invasive or destructive sampling request will be honored to ensure the sampling does not exhaust the limited resources. The goal of having these guidelines is to preserve the value and usefulness of the Invertebrate collections for present and future use.

These include:

- the taxon is well represented in the UCONHM Invertebrate collection
- there is sufficient scientific merit to justify destruction of the material
- the material is not available in another institution
- in general, rare material or specimens that represent extinct or endangered species will not have invasive or destructive sampling done on them
- Requests for samples of the UCONHM Invertebrate tissues or specimens is an acknowledgment that the researcher supports legitimate scientific collecting, and that they understand and value the time and expense that goes into preparing and maintaining Invertebrate museum collections. In exchange for providing the samples, the UCONHM Invertebrate section requires that the researcher provide a letter in support of scientific field collecting and of the value of the UCONHM Invertebrate collection.
- Invasive or destructive sampling is usually undertaken by researchers experienced in the sampling technique being used. However, it may be done by students, but the request for tissues must be made by the student's advisor, who will confirm that the student has the expertise to conduct work. The advisor should provide an assurance that the results of the study will be published.

2. Written request for invasive or destructive sampling of Invertebrate specimens

- Requests for invasive or destructive sampling of any UCONHM Invertebrate collections should be made in writing to the Invertebrate Curators.
- All loan requests should be on the borrower's home institutional letterhead.
- For each tissue or destructive sample request the investigator must include the following information:
 - the scientific merit and purpose of the research
 - why Invertebrate museum specimen material is preferred over other sources
 - compelling reasons why the project cannot be completed without the use of museum specimens.
 - that the proposed research will generate usable information
 - evidence that the research question being addressed is historical and therefore requires the use of museum specimens or tissues, or that the Invertebrate taxa being examined cannot be sampled in the field.
 - the destructive or invasive samples are to supplement research materials obtained from other sources and they are not to replace primary data collection efforts such as field sampling of extant taxa.

- evidence of the investigator's competence with the sampling and analysis method (e.g., PCR amplification and DNA sequencing from museum tissues)
- why the chosen sampling method is the least destructive method
- the exact amount and identity of the material required
- why the use of UCONHM Invertebrate specimens (as opposed to that from other institutions) is needed. Include evidence that contact has been made with other institutions about specimen samples.
- that any residual products resulting from the consumptive sampling (e.g., parasites, DNA strands, gut contents, karyotype test slides, left over or unused tissues, etc.) are to be returned to the Invertebrate section of the UCONHM.

3. Additional Requirements Of Tissue Sample Loans

- Any UCONHM Invertebrate specimen tissues cited in published works must be identified by their catalog numbers and museum acronym.
- Two copies of any resulting published work should be sent to the museum after the research has been published.
- If the original Invertebrate specimen is altered by the sampling protocol, the researcher must return to the UCONHM Invertebrate section the specimen in its altered form, documented and ready for accession. For example, alcohol-preserved specimens which have been made into histological sections should be returned with documentation of the size (i.e., body mass) of the original, and with details on techniques used for decalcification, mounting, staining, and section thickness of the slides. For DNA studies, the researcher should make all sequences amplified from UCONHM Invertebrate material publicly available (via EMBL, GenBank, or equivalent web-accessible sources).
- The cost of shipping (depending on the amount of material, whether it is considered a biohazard and requires special handling, and the destination, and packing materials) might be charged to the individual requesting the loan.

E. Casting of Invertebrate Specimens Or Associated Materials Casting of Invertebrate specimens should be arranged through the Invertebrate Curators and Collection Manager of the UCONHM. One cast should be returned to the UCONHM Invertebrate section. All specimens from which casts are taken shall be cleaned and properly controlled for pest before being placed back into the collection.

F. Loan Of Documents In The Invertebrate Section Of The UCONHM Documents in the Invertebrate section of the UCONHM are available for noncommercial uses such as research and exhibits. All requests to use or borrow documents in the Invertebrate section of the UCONHM must be approved by the Invertebrate Curators and the Collection Manager.

1. Guidelines Governing The Loan Of Documents

- Loans of original documents associated with Invertebrate specimens in the UCONHM (field notes, correspondence, etc.) are not allowed. Copies can be loaned.
- Reproduction of documents in Invertebrate section of the UCONHM is not allowed without the consent of the Invertebrate Curators and the Collection Manager. Methods of document reproduction must not damage any originals.
- Public display or publication of documents or copies must acknowledge the Invertebrate section of the UCONHM as the source.
- Two copies of any published papers which cite the loaned Invertebrate section documents must be provided to the Invertebrate section of the UCONHM.
- Documents and other associated materials related to specimens in the Invertebrate section of the UCONHM and that are no longer actively used might

possibly be archived in the UCO library. The UCO Library should be contacted about borrowing those documents. However, those documents are subject to the same guidelines as documents still in current use.

2. Written Request For Loan Of Documents

- Loan requests of any UCONHM Invertebrate collections documents should be made in writing to the Invertebrate Curators.
- The Loan request should include the following information:
 - should be on the borrower's home institutional letterhead
 - the scientific merit and purpose of the research
 - evidence of the investigator's competence conducting the study
 - the exact amount and identity of the document material required
 - evidence that the borrowed documents will be properly cared for during the loan period
 - that the loan institution has the proper facilities to care for the documents.
- In a loan made to a student (undergraduate or graduate), the student's faculty advisor will be responsible for the loan and making the loan request.
- The cost of shipping (depending on the amount of material and the destination) which includes packaging materials might be charged to the individual requesting the loan.

G. Packaging of Loan Specimens to be Mailed All specimens being shipped from the Invertebrate section of the UCONHM must be correctly packaged to insure their safe arrival and that they are not damaged during possible rough mailing or shipping conditions. This may involve attention to such details as dropping of containers, dust, humidity, temperature, and packing containers used.

- Substantial wooden boxes, crates or reinforced cardboard boxes that will not easily crush should be used for the shipping of Invertebrate specimens and associated materials
- A return shipping label and a copy of the documentation associated with the loan should be included inside the shipping container
- Proof of delivery documentation should be obtained from the postal service or other shipping carrier
- A loan return form should be included and the borrower should return it as soon as the loan is in their possession. It should clearly document the condition of the arriving materials. It should contain instructions on how and when the borrower should return the loan and instructions detailing how to package the material for its return and how to store the specimens while they are in possession of the borrower.

1. Dry Specimens

- a loan form should be completed and placed in the loan notebook which should be stored in the fireproof safe in room 165 in the Science Lab Building
- a loan slip should be installed in the collection drawer where the specimen and materials were removed and it should indicate where the material was loaned
- cotton should be carefully placed around the specimen(s) in the collection containers
- each container will be wrapped in tissue paper
- all the specimen should be placed in a box within the shipping container, cushioned with cotton
- all medium and large-sized specimen(s) should be wrapped in tissue paper, placed in a plastic bag, and then placed back into that specimen's original box (or for some in which the packing material forces the use of a second or third box - each should be clearly labeled)

- larger specimens may require more packing material to prevent damaging during rough handling.

2. Fluid-preserved Specimens

- a loan form should be completed and placed in the loan notebook which should be stored in the fireproof safe in room 165 in the Science Lab Building
- a loan slip should be installed in the collection near where the specimen and materials were removed and it should indicate where the material was loaned
- the specimens are placed in a plastic bag, sealed and then placed in a second sealed bag.
- use packing material liberally between the bags and inside of the wooden box.
- federal postage and shipping regulations apply to the shipping of many chemicals such as formalin, ethanol and isopropanol and special shipping arrangements must be made with companies capable of safely handling hazardous specimens or associated materials. Consult the local postal service or the carrier you will use for information regarding how these materials should be packed and labeled. Specimens have to be shipped in adequately padded containers to prevent damage to the specimens and leakage of preservative during normal handling.

H. Documentation of Loans Each Invertebrate loan has a unique number associated with it and its documentation. The loan numbers will be consecutive and listed in a UCONHM Invertebrate Section Loan notebook. The Loan notebook will also contain a description of the loan. One copy of the loan invoice is kept in the Loan notebook and contains a complete description of the loan

- loan request letter
- who was the loan to and who approved the loan
- start date and due date for return of loan
- who packed the loan material
- what is contained in the loan and in each container the loan was shipped
- the loan description will include specimen main catalog number and prep type for each specimen loaned
- each specimen should be carefully examined for any damage or missing parts and those should be listed on the loan description form
- the company used to ship the loan and tracking numbers
- a copy of the loan will be packed with the specimens and is to be signed by the borrower upon receipt of the loan, returned, and placed in the Open Loan file section of the Invertebrate section Loan notebook. The borrower should examine each specimen upon receipt of the loan and note, in detail, any changes in condition. The loan material will be examined upon its return.

I. Curation of Loan Material Returning to the UCONHM Upon receipt of loan material, Invertebrate section staff should examine its condition.

- any differences compared to when it was originally shipped to the borrower and what was reported by the borrower on its arrival to them. Any changes or damages should be noted on the loan forms in the loan notebook.
- all dry specimens and associated materials should be inspected for pests and they should be placed into the super cold freezer for at least a week prior to being reinstalled in the main collection.
- all fluid-preserved specimens and associated materials should be inspected and topped off before returning them to the main collection.

XII. COMPUTER DATABASE OF THE INVERTEBRATE SECTION OF THE UCONHM

Dr. Chris Butler (cbutler11@uco.edu) is responsible for the implementation and maintenance of Specify (a software database network interface application) which is the Invertebrate section computer collection management tool. The following description of Specify is paraphrased from the Specify Software Project

(2006; www.specifysoftware.org) of the Biodiversity Research Center, University of Kansas. Specify can manage specimen data, descriptions of collecting locations, and information about collections loans, exchanges, etc. There is no charge for using Specify (and its web and DiGIR interfaces; 2001) which avoids maintenance expenses. This data management system has a comprehensive data model and a customizable interface designed for accurate data entry. Its user interface is customizable. Specify supports 'Express Search' full-text indexing and searching. Site administrators (UCO IT) can configure the search engine to index data & fields of interest which are then maintained automatically. Web users have rapid, full-text search access. Specify supports structured database queries against all fields in the database. Specify taxon dictionary is compatible with the Integrated Taxonomic Information System (ITIS) format. ITIS taxonomic trees can be imported and customized. Specify includes a report designer for creating custom print outputs for specimen labels, etc. Training & oversight of data entry personnel by the Collections Manager and Curators help insure accurate specimen data entry.

By maintaining the database server through UCO IT, expansion is not an issue. Dr. Chris Butler provides oversight and maintenance of the database and Specify. We intend to use Specify's web-publishing tools to allow visitors to the UCONHM website to search the Invertebrate collection online. Windows based "Excel" and "Access" spreadsheet programs from Microsoft®, are compatible with the "Specify" software. Specify has georeferencing capabilities but it has not been implemented for Invertebrates at this time. The UCONHM webpage will be the entry point for data queries.

Guidelines for use of Specify:

- Users accessing the Invertebrate records in Specify and who fail to comply with the guidelines may be denied access.
- If a for-profit organization opts to use the Invertebrate data records in Specify, special clearance must be obtained from the Curators. A fee may be charged to users of the collection information for profit.
- The Invertebrate section of the UCONHM strives to maintain accurate data in its computer database. However, users who access the database must be aware that specimen-based databases are continually updated as species nomenclatural changes occur. Both specimen examination and verification of identification remain the responsibility of the researcher accessing the data.
- The Invertebrate section of the UCONHM may restrict access to certain data fields, including specific localities of threatened or endangered Invertebrates.
- Data related to current research or ongoing research of faculty, students or staff may have restricted access until the information is published.
- All users of any Invertebrate information acquired through the UCONHM Specify database must acknowledge the Invertebrate section of the UCONHM as the source of specimen data, and must provide copies of publications, reports, or projects.

XIII. INTEGRATED PEST MANAGEMENT AND PREVENTATIVE CONSERVATION OF INVERTEBRATE SPECIMENS IN THE UCONHM

The care and conservation of the Invertebrate specimens and associated materials are the responsibility of all Curators, Collection Manager, curatorial staff, and visitors. All of the Invertebrate staff should be aware of and adhere to the conservation practices that meet professional standards for the care and maintenance of the Invertebrate specimens and associated materials.

1) Items such as food, drink, living plants, animals, and other organisms and unprocessed biological material should not be allowed in the Invertebrate collection storage areas.

- An Integrated Pest Management plan should be in place and applied on a regular schedule.
- Storage containers, trays, paper, tags, vials, jars, etc. should be of archival quality.
- The air temperature and humidity in the collection rooms should be kept at appropriate levels.
- Only individuals approved by the Invertebrate curators and the Collection Manager should have access to the collection and the collection should be in a secure room.
- Extra preservation precautions should be used for the protection, care, and conservation of Invertebrate type, holotype, etc. specimens, first records of and other irreplaceable specimens.

A. Pest Management in the Invertebrate Section of the UCONHM

- The Invertebrate section of the UCONHM staff should strive on a continuous basis and in a collective manner to prevent insect pests and other destructive organisms from damaging the Invertebrate collection items or associated materials.
- Food, unpreserved plant and animal materials, and other high-risk materials should be restricted to designated rooms of the Invertebrate section of the UCONHM. Under no circumstances are such materials permitted in or near where collections are maintained.
- An integrated pest management program (IPM) should be maintained at all times throughout the Invertebrate section of the UCONHM. Included in this plan are good housekeeping, clean work habits, surveillance, and documentation.
- If an infestation is noted, responsible safe and effective pest management actions should be implemented as quickly as possible. These should be (if possible) non-chemical or inert chemical control methods before toxic (hazardous to humans) compounds are applied. All infestations and treatments should be documented and maintained as a permanent record.
- Any toxic chemicals used should be in compliance with federal and state regulations. Precautions will be taken to protect human health and safety, to avoid environmental pollution, and preserve the integrity of the Invertebrate specimens and associated materials in the UCONHM.
- The Collection Manager is responsible for implementing effective and safe mechanisms to address the pest management in the Invertebrate section of the UCONHM and the Invertebrate Curators are responsible for overseeing the process. As part of this process, written procedures should be available to support the pest management policy.
- Periodic freezing of specimens is the safest method of preventing infestations of insect pests like dermestid beetles. If possible, trays that hold the specimens should be frozen as well. Items should be put in a sealed plastic bag (extra large zip-lock) bag and placed in the ultracold freezer for a period of about 2-5 days at a temperature of -40 degrees or colder. Specimens should be dry so no crystallization occurs. Incoming specimens (including loans) should be frozen to kill any pests in shipping materials. Periodic fumigation should be done around cabinets and in the collection rooms. If possible, compounds that are safe for staff to work around will be used. Such things as diatomaceous earth, boric acid, and juvenile hormone analogs can help control insect pests.
- Randomly placed sticky traps are used as indicators of possible pest problems in the Invertebrate section of the UCONHM.
- Another serious problem, especially in moist, warm climates, is mold that can grow on specimens. Once a specimen has become moldy, it is difficult to restore it. If only a small amount of mold is present on a specimen, they it might be possible to removed carefully with forceps or with a fine brush. The specimen then should be dried in a warm oven. Keeping the collection room's environment dry (low humidity) will help prevent mold.

XIV. EMERGENCY MANAGEMENT OF THE INVERTEBRATE SECTION OF THE UCONHM

The health and safety of each individual associated with the Invertebrate section of the UCONHM is paramount to all other issues.

- The Curators and Collection Manager of the Invertebrate section of the UCONHM in conjunction with the UCO Safety and Environment Office are responsible for writing and implementing the emergency management plan of the Invertebrate section of the UCONHM. This plan will promote preparedness and responsiveness to emergency situations.
- Museum personnel will respond quickly to emergency situations in order to reduce the risk of damage or disruption of the Invertebrate collection.
- The Invertebrate section should mark all emergency equipment and recovery supplies so they can be easily located.
- Employee and volunteer training should be provided to familiarize individuals with emergency procedures and equipment.

- For assistance in an emergency situation in the Invertebrate section of the UCONHM, an updated list of prioritized contacts (names, addresses, and phone/fax numbers) will be maintained in the Invertebrate museum area and they will be posted in places that are readily available and easily visible.
- The permanent, full-time staff should become familiar with the procedures for stopping and starting electrical power, ventilation, and water to the Invertebrate section of the UCONHM facilities.
- The Invertebrate section of the UCONHM will have mapped floor plans with routes of exit clearly marked and posted to facilitate evacuation during an emergency situation.
- During a community-wide emergency, stabilization and the basic security of the Invertebrate section of the UCONHM properties should be established. All personnel will work together to protect the Invertebrate collection.

Standard procedures should be outlined to handle the following possible disasters:

- Flooding from broken water lines, fire sprinkler systems, and other water sources
- Fire
- Smoke

XV. HEALTH AND SAFETY CONCERNS IN THE INVERTEBRATE SECTION OF THE UCONHM

The Invertebrate section of the UCONHM along with the University of Central Oklahoma is required to provide a safe and healthful environment for staff, volunteers, and visitors, as well as minimizing risks to the Invertebrate specimens and associated materials in the collection. It is the goal of the Invertebrate section of the UCONHM to conduct all activities in a safe manner by recognition, evaluation, and reduction or elimination of all health and safety risks.

A. Authority and Responsibilities The Invertebrate section of the UCONHM will coordinate its safety efforts with the University Safety and Environment Office. Through this coordination, compliance with Federal, State and local laws and regulations should be met. This will be a shared effort of all involved with the Invertebrate section of the UCONHM workers and visitors. The Invertebrate section Curators and the Collection Manager are ultimately responsible for implementation, compliance and orientation of staff with all environmental health and safety policies. It is the staff, volunteers and visitors responsibility to observe and follow all policies; wear personal protective equipment that has been provided; use all equipment in a safe manner; and report any accident or unsafe or unhealthful condition.

B. Safety Inspections of the Invertebrate Section of the UCONHM The University of Central Oklahoma Safety and Environmental Office should be contacted on a regular schedule to conduct a safety inspection of the Invertebrate collection areas to determine potential or actual safety, health, or environmental hazards. Hazardous materials that could occur in a Invertebrate area and in the Invertebrate specimens include biological (e.g., blood, tissues), chemical (fixatives - formalin and alcohol, preservatives and pesticides - arsenic and paradichlorobenze, etc.), walkway obstructions, fire hazards and storage cabinets. Most hazardous materials have established permissible levels and can be easily monitored by safety inspectors. All the personnel working in the Invertebrate areas of the UCONHM need to be made aware of the actual and potential sources of hazardous materials in the collections and prep areas, as well as historical and current treatments of specimens.

C. Hazard Elimination or Control in the Invertebrate Areas of the UCONHM The Invertebrate section of the UCONHM will contain and utilize various types of safety equipment, supplies and practices to maintain the well being of its employees and visitors. The University of Central Oklahoma Safety and Environmental Office will assist in compiling a list of safety equipment. Examples include the following:

- First aid kits and emergency eyewash stations
- Fire detectors, fire alarms, fire extinguishers and room sprinkler systems

- Sharps and biohazard containers
- Fume hoods
- Protective clothing: gloves, goggles, respirators with high-efficiency particulate air and/or organic chemical cartridges.

D. Safety Training: The University Safety and Environmental office will determine what training is necessary for museum personnel. The University of Central Oklahoma shall provide the Invertebrate personnel with the necessary personal protective equipment and provide and/or make provisions for any necessary required training.

E. Hazardous Waste Disposal in the Invertebrate Section of the UCONHM A hazardous material is by definition any material which is particularly reactive, explosive, flammable, poisonous, corrosive, oxidizing, irritating, or otherwise harmful and is likely to cause injury or death to persons exposed to them or they might be destructive of property. When these materials are no longer useable, they become hazardous wastes. Hazardous wastes might also be biological (biohazardous) and include infectious wastes such as bacteria, viruses, and bodily fluids. Refer to the University of Central Oklahoma's Safety and Environment Office's information regarding hazardous waste management guidelines for additional information.

1. Authority and Responsibilities The University of Central Oklahoma has delegated authority regarding the safe storage, use and disposal of hazardous wastes to the Office of Safety and Environment. However, the university and the Invertebrate section of the UCONHM must provide a safe environment for its staff, volunteers, and visitors. The College of Mathematics and Science, the Biology Department and ultimately the Invertebrate Curators and Collection Manager and the staff share the responsibility of ensuring compliance with all environmental health and safety policies. The Invertebrate Curators and the Collection Managers must inform employees of all harmful agents associated with the work environment, as well as how to protect themselves. Employees are responsible in notifying the Collection Manager and Invertebrate Curator of potentially harmful agent and unsafe conditions.

2. Storage of Hazardous Materials All hazardous materials used or associated with the Invertebrate section of the UCONHM must be stored in approved (UCO health and Environmental Office) storage containers which meet OSHA (Occupational Health and Safety Administration) requirements, and they must be accompanied with Material Safety Data Sheets (MSDS). Small quantities used on a regular basis may be stored in a metal cabinet in other areas provided that the container and cabinet are labeled appropriately.

3. Material Safety Data Sheets (MSDS) are required for any hazardous chemical stored in the Invertebrate section of the UCONHM at the University of Central Oklahoma and shall be clearly posted where the hazardous material is used or stored. The MSDS is "required reading" for all employees or volunteers working at that worksite prior to initial use of the material.

4. Chemical Inventory List A list of all hazardous (and potentially hazardous) chemicals shall be completed by the Invertebrate section of the UCONHM and updated annually or as needed. The list should contain at least the following information: name of chemical, amount, and storage site. A copy of the list should be stored in at least two different sites and should be made available to the proper university offices. The Invertebrate section of the UCONHM should minimize the quantity of hazardous chemicals and should evaluate on an annual basis the need to retain such chemicals. The update of the inventory is the responsibility of the Collection Manager.

5. Container Labeling All hazardous or potentially hazardous materials shall be stored in its original container with the original warning label listing the chemical name, hazardous ingredients, hazard warnings, and the manufacturer's name and address. Transfer of chemical products from one container to another is permissible provided that the new container is properly labeled and meets OSHA and NFPA (National Fire Protection Act)

standards. Proper transfer protocols of flammable liquids should be followed (both containers are grounded and bonded together with a bonding wire).

6. Training Each Invertebrate Curator, the Collection Manager, other staff and volunteers must be informed of all hazardous chemicals in the work areas at the time of initial assignments, and whenever new hazards are introduced into the work areas. Minimum training shall include a review of the UCONHM Invertebrate section guidelines on hazardous materials, review of the MSDS sheets and other guidelines required by the university.

7. Disposal of Hazardous Chemicals Information related to the safe disposal of each type of hazardous material in the Invertebrate section of the UCONHM should be listed on the appropriate MSDS. Hazardous wastes should not be disposed of down the drain or in the trash unless approved by the UCO Safety and Environmental office.

F. Disposal of Biohazardous Wastes All biohazardous wastes and materials should be sealed in an autoclavable "biohazard bag" and autoclaved. The UCO Safety and Environmental office should be contacted regarding the proper way to dispose of animal wastes on the university property. The material is stored in a "waste freezer" if it cannot be processed immediately.

XVI. GUIDELINES FOR THE PREPARATION OF INVERTEBRATE SPECIEMENS FOR THE UCONHM

A. Permits Prior to collecting Invertebrate specimens, appropriate authorities should be contacted in order to make sure the proper permits are acquired to make a scientific collection of Invertebrates. In Oklahoma, this will be the Oklahoma Department of Wildlife Conservation (<https://www.wildlifedepartment.com>); ODWC PO Box 53465, 1801 N Lincoln, OKC, OK 73152). In addition, if associated with an educational institution, the research may need to be cleared with an animal use committee. If the Invertebrate is a federally protected species then special permits will be required and the US Fish and Wildlife should be contacted for the proper permits. In some cases, a researcher might have to obtain special permits and permission to collect in certain areas (State Parks, certain Wildlife Management or Refuge areas, private land, etc.).

B. Approved Methods of Collecting and Euthanizing Invertebrates. Before collecting Invertebrates in the field, researchers should familiarize themselves with methods of collecting, holding, and euthanizing Invertebrates.

C. Unprepared Invertebrate Material.

D. Storing Invertebrate Specimens in the Field. As soon as a Invertebrate specimen has been collected in the field and euthanized it should be properly prepared or stored to prevent deterioration. Each specimen should be placed in a vial, jar, or sealed individually in a plastic bag with a field tag noting:

- collector
- location
- date.
- The specimens should be preserved in the field using 10% formalin or 70-95% ethanol - depending on the sampling methods and species being collected.

E. Data to be Recording in the Field with Each Specimen

1. Field Data Researchers must make sure that all specimens preserved in the Invertebrate section of the UCONHM be accompanied by the proper location information, collection information and natural history notes. Without this information the specimens are of less value. These data should be recorded in a sturdy weather proof field notebook (labeled with collectors name, collection date, and location) in the field as soon as possible after the Invertebrate has been taken. Upon accession to the Invertebrate section of the UCONHM the field data sections should be stored as archive material in a fireproof safe (in room 165 of the Science Lab Building).

2. Data to be Recorded from and Preserved with Each Specimen

A completely filled out (collector's name, collection date, location) of each specimen.

3. Specimen Tags for Dry and Fluid Specimens

b. Tag for Dry Specimen 100% rag bond paper

- attached by cotton through opening so it does not damage specimen or placed in container with specimen
- should contain the following information
 - name (phylum, class, etc.)
 - collection location and date
 - collector

c. Tags for Preserved Specimen 100% rag bond paper

- placed inside vial or jar containing specimen
- should contain the following information
 - name (phylum, class, etc.)
 - collection location and date
 - collector

F. Voucher Specimens Once a specimen has been legally collected and euthanized using a humane method, then it can be prepared as a voucher specimen. A voucher specimen is usually a whole animal that is preserved and retained in a museum as a permanent reference. It is best to prepare Invertebrate specimens as soon after collection to avoid deterioration.

1. Photographs (see instructions for use of individual field cameras) Photographs will be archived in the same fashions as field catalogs and other associated Invertebrate materials

2. Wet or Fluid Specimens Fluid preserved Invertebrate specimens provide more potential research material (e.g. musculature, organs, and other soft tissues) than dry specimens. Therefore it is recommended that in addition to dry specimen. This usually involves the 'fixing' or initial preserving of the specimen in 10% formalin or 80-90% ethanol (depending upon research project), and then storing the specimen in a jar of ethanol. This preserves a complete specimen with all of the internal and external anatomical structures, intact. However, the color often fades.

a. Museum Fluid Preparation Method

- All wet specimens should be stored in 70% ethanol, except gelatinous specimen, which are stored in 10% formalin
- Tag should be 100% rag bond paper
- The tags used should be printed with home institution identifying material
- The tags should be completed using a pen having indelible ink or a pencil should be used
- The following information will be placed on each tag (also see example below)
 - Collector's name
 - Locality information
 - Date of Collection (use the following format 3 November 1946) - do not use a numerical format (3-12-46) because of the possibility of confusing the month and day as well as specimens having been collected in 1846 and 1946)

b. Field Containers for Fluid Storage of Invertebrate Specimens Plastic containers with tight sealing lids and appropriate gaskets are best because of the possibility of breakage of glass containers. Do not use metal containers which might corrode and stain Invertebrate specimens. Preservatives should fill as much of the container as possible so that there is no air pockets. During transport the

preservatives might slosh around and damage delicate specimens. Do not overfill the containers with too many specimens in the container because this will distort the animals shape and possibly crush delicate structures.

c. Cataloging and Storing Fluid Invertebrate Specimens

When the fluid fixed specimens arrive at the museum, they should be carefully and safely processed because they might contain hazardous materials (e.g. formalin).

- formalin or ethanol used as the original fixative should be decanted off.
- the specimens preserved using formalin are washed in fresh water
- the water with the formalin wash might be considered hazardous (check with your safety office about how to dispose of the wash water and fixatives)
- Invertebrate specimens should be stored in air-tight jars (glass jars, covered by a polyethylene lid) which contain 70% ethyl alcohol
- jars should not be overfilled with specimens because it could damage/squash soft tissues.
- jars should contain only one species and only specimens from one locality in one collection
- each jar should be labeled (use a standardized label for all jars) with the following information:
 - UCONHM number
 - name (phylum, class, etc.)
 - collection location and date
 - collector
- oversize Invertebrate specimens can be stored in polycarbonate pails
- jars should be kept in the dark and not exposed to artificial or sunlight because the specimens will fade.
- black paper can be placed over glass cabinet doors to eliminate light
- jars should be checked on a regular schedule to ensure that the specimens remain below the level of the alcohol

d. How to Preserve Tissue Samples in Ethanol for DNA Analysis

Invertebrate tissue samples for DNA analysis can be preserved in ethyl alcohol.

- Tissue samples (about 0.3 g = about the size of a small green pea) can be preserved in ethyl alcohol. Using scissors or a scalpel cut or nick it several times. This will increase the alcohol penetration into the tissue.
- Place the nicked sample in a cryotube and add 95% ethanol to the fill line of the tube. Cap tightly and gently agitate it so that the tissue sample is floating free.
- After 24 hours, replace the original alcohol with fresh alcohol. Recap the tube tightly to prevent the alcohol from evaporating.
- Be careful when labeling each cryotube. If possible, do not use a Sharpie because alcohol will dissolve the ink. It is best to place all samples from one individual Invertebrate into a separate storage container and label that with an alcohol-proof label (pencil or Uniball Deluxe pen) Also attach a waterproof label with ID information (in pencil or Uniball Deluxe pen) to each tube.

XVII. EXPENSES ASSOCIATED WITH CURATING THE INVERTEBRATE SECTION OF THE UCONHM At first glance, it may appear that the expenses associated with curating an Invertebrate collection might be relatively inexpensive. Inventory personnel might collect the Invertebrate specimens and associated materials and deliver them to a museum to handle. However, when carefully considered in detail, it is apparent that the costs of collecting Invertebrate specimens are just a fraction of the total

financial picture. The cost of an Invertebrate collection includes not only the cost of collecting a Invertebrate specimen in the field, but the costs associated with curation: preparing, storing, and maintaining the collection as well as the staff. All such components must be considered when preparing a museum budget for an Invertebrate collection.

A good Source for Vendors of museum supplies can be located at:

Society for the Preservation of Natural History Collections web site

<http://140.247.98.87/?q=resources/vendors.html#vendors>

XVIII. LITERATURE CITED

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