UNIVERSITY OF CENTRAL OKLAHOMA
NATURAL HISTORY MUSEUM
(UCONHM)

DEPARTMENT OF
Biology
UNIVERSITY OF
CENTRAL OKLAHOMA

TISSUE PRESERVATION & PREPARATION POLICIES & GUIDELINES

(Revised May 2010
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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 has been paraphrased from several other excellent Collection Management Policy Manuals. The following museum loan policies were examined when preparing this operation guide: 1) the Museum of Southwestern Biology located at the University of New Mexico in Albuquerque, New Mexico (http://www.msb.unm.edu/mammals/loans.html), 2) the Museum of Vertebrate Zoology at Berkley located at the University of Californian-Berkley (http://mvz.berkeley.edu/Access_Loans.html), 3) the Natural Science Research Laboratory at the Museum of Texas Tech University in Lubbock, Texas (http://www.nsrl.ttu.edu), and 4) the OSU Collection of Vertebrates at Oklahoma State University in Stillwater, Oklahoma (contact Karen.McBee@okstate.edu).

A. Purpose of Manual The UCONHM tissue section policy manual outlines the policies and guidelines for the acquisition of specimens, curating, maintenance, loaning, deaccessioning, preparation, and use by the research community of materials in the tissue 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 tissue 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 tissue 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 the 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 tissue section personnel will read and follow the policies and guidelines. The policy manual will be updated as needed and will be approved by the Tissue 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 Tissue Collection The tissue section of the UCONHM officially recognized acronym by the American Society of Mammalogists (1997) is UCOCV, which stands for University of Central Oklahoma Collection of Vertebrates.

II. SCOPE AND TYPES OF SPECIMENS IN THE TISSUE SECTION The tissue section of the UCONHM contains tissue samples from original research in Oklahoma and the United States by professors and students at UCO. The tissue section serves the scientific community and the public through its research and access to holdings and associated records. It also is charged with proper maintenance of the specimens for long-term conservation and preservation of scientific data. Approximately 1,600 accessioned tissue samples from 860 voucher specimens, largely mammals, are in the UCONHM. The collection contains primarily specimens from Oklahoma with fewer specimens from elsewhere including Kansas and Texas. It is primarily a research collection and a historical documentation of genetic diversity from the time period they were collected. The tissues may be made available for use by the scientific community. The tissue section of the UCONHM is moving toward maintaining two types of collections (frozen and lysis buffer/ethanol) that are managed and conserved. These two collections will be curated as a single entity and both will be managed according to professional museum standards. They include frozen tissues, and tissues stored in lysis buffer and ethanol.

A. Frozen Tissue Collection The frozen tissue collection will contain specimens collected and preserved in cryotubes without the use of lysis buffer or ethanol as a preservative. These specimens will be frozen at the time of collection (either in liquid nitrogen or a -20°C freezer) These tissues ultimately will be stored at -60°C to -80°C. These tissues will have voucher specimens associated with them that have been accessioned into the correct subsection of the museum (e.g., mammals). These tissues will be tagged with a UCOK number (indicating that it is a tissue) and will be accessioned as part of the tissue section.

B. Lysis Buffer/Ethanol Collection The lysis buffer/ethanol tissue collection will contain specimens collected and preserved using lysis buffer or ethanol as a preservative. These tissues ultimately will be stored at 4°C. These tissues will have voucher specimens associated with them that have been accessioned into the correct subsection of the museum (e.g., mammals). These tissues will be labeled with a UCOK number (indicating that it is a tissue) and will be accessioned as part of the tissue section.

III. PERSONNEL OF THE TISSUE SECTION OF THE UCONHM

A. Curators: The tissue section of the UCONHM is under the direction of professional curators who are faculty members in the Biology Department of UCO. Currently Dr. Michelle Haynie and Dr. Greg Wilson curate the tissue collection. They are responsible for the collection of specimens, the tissue 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 tissue 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 TISSUE SECTION OF THE UCONHM

It is expected that the tissue Curators, the Collection Manager, staff and volunteers perform all duties associated with the tissue collection in an ethical manner according to the policies and standards established by the UCONHM, the university administration and the scientific community. The tissue section personnel will make every effort to abide by the procedures outlined by the International Council of Museums, Natural Science Collections Alliance, and the 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 tissue collection.

Ethical Guidelines All individuals associated with the tissue collection will:

- maintain the integrity of all tissue samples because they are irreplaceable.
- avoid actions that are in conflict with responsibilities or cause personnel to favor other interests over those of the tissue section of the UCONHM.
- have as prime responsibilities the conservation of tissue samples and to make specimens available for research.
- act ethically and legally in the acquisition and the disposing of tissues.
- not condone the illegal, unethical, and destructive activities with respect to the tissue collection.
- use the most acceptable preservation, conservation and management methods.
- accept tissue samples and associated voucher data that 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.
- deny access to users that fail to follow the policies outlined in this manual or if they misrepresent their research and the UCONHM tissue collections.
- clearly identify and mark (or make inaccessible) those specimens that might be unsafe for students, workers, volunteers and researchers because they are hazardous (e.g., contain known viral agents that have not been sterilized during the preparation process).
- adhere to the University of Central Oklahoma's guidelines pertaining to equal opportunity employment practices of staff.

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

A. Request to Visit the UCONHM Tissue Collection All requests should be made in writing or via e-mail to the Curators or the Collection Manager (currently: mhaynie@uco.edu, gwilson@uco.edu, and lloucks@uco.edu.). Visitor access is preferred from Monday through Friday, between 8:00 and 17:00.

B. Denial of Access The tissue 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 tissue collection in a manner which does not conform to the tissue 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 samples
- a history of misuse of tissue samples at the UCONHM or at other museums
- falsification of credentials, criminal activity, or disruptive conduct

VI. GUIDELINES FOR USE OF THE TISSUE COLLECTION AT UCO The use of the tissue section will proceed mostly through the loan of materials (see section X below). Visitors will not be allowed to take samples of the tissues during a visit to the museum, but will instead be required to fill out a loan form. However, visitors may tour the tissue collection and inquire about available materials. Prior to the tour, consult with the Collection Manager or Curators about the following procedures:

- sign the guest register
- first time visitors of the tissue collection should receive instructions on the organization specimens
- if errors are noted, please notify the Collection Manager or Curators
- familiarize yourself with all safety policies before requesting tissues

VII. ORGANIZATION OF TISSUE COLLECTION The frozen tissue collection is located in room 252 of the Science Lab of the University of Central Oklahoma. Lysis buffer/ethanol samples currently are stored in the laboratory of the collector. These samples eventually will be accessioned into a common 4°C refrigerator.

A. Arrangement of Frozen Tissues The tissues will be organized by UCOK number, not by taxonomic categories. Tissues will be stored in cryotubes and the cryotubes will be stored in 81-tube cardboard boxes. Multiple tissues from the same voucher specimen will be placed in individually labeled tubes by tissue, receive the same UCOK number, and stored in the same box. Boxes will be inserted into freezer racks. Associated with each tissue in the database will be the following information: freezer shelf number, rack number, box number, UCOK number.

B. Arrangement of Lysis Buffer/Ethanol Tissues The tissues will be organized by UCOK number, not by taxonomic categories. Tissues will be stored in 1.5 ml tubes and tubes will be stored in 81-tube cardboard boxes. Multiple tissues from the same voucher specimen will be placed in individually labeled tubes by tissue, receive the same UCOK number, and stored in the same box. Boxes will be inserted into racks. Associated with each tissue in the database will be the following information: refrigerator shelf number, rack number, box number, UCOK number.

VIII. DEPOSITION AND ACCESSIONING OF TISSUE SAMPLES INTO THE UCONHM TISSUE COLLECTION The tissue section of the UCONHM acquires tissue samples from research projects conducted by faculty and students at UCO, other researchers, transfer of specimens from other collections, and other field activities. Collection Manager and the Curators make all decisions on what will be accessioned into the tissue collection.

A. Delivery of Materials to the UCONHM Tissue Collection The Tissue Curator and Collection Manager should be notified in advance when to expect tissue samples. They should be informed about the quantity of material (number of tubes) and format (frozen, stored in liquid preservative) so that staff will be available to process the incoming specimens. Information regarding a voucher specimen (skin, skeleton, etc.) and materials associated with that voucher specimen (a copy of permits, reports and field notes) should be provided when the tissue samples are delivered to the museum so that the tissue can be cross-referenced to the voucher. Information regarding the type of tissue (e.g., liver, muscle), taxonomic identification of the specimen, collector of the sample, and the date of collection should be written on the tissue tube.

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

- The tissue samples are within the scope of the tissue section of the UCONHM and are consistent with all policies and guidelines.
- The tissue samples are collected or acquired ethically and legally according to any laws and regulations of the international, federal, and state agencies (Oklahoma Department of Wildlife Conservation) which protect vertebrates. Copies of documentation such as collecting permits, import, and export documents, animal use committees, etc., should be retained (as needed) in the appropriate vertebrate section of the UCONHM accession files.
- The tissue samples are prepared, labeled, and contained properly.
- The tissue section of the UCONHM can properly provide for the storage, protection, and conservation of the tissue samples according to professional standards.
- The required reports for tissue 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 tissue samples are free and clear in title of ownership, with no preconditions or terms that limit the tissue section of the UCONHM in its preservation or retention of the specimens or associated data.
- All tissue samples acquired can be given a UCONHM tissue section accession number (UCOK), properly archived, and then made accessible.

C. Ownership of Tissue Samples All tissue samples deposited into the tissue section of the UCONHM and curated at the expense of the University become the property of the University Central Oklahoma and the State of Oklahoma.

D. Cataloging/Accessioning of Tissue Samples into the UCONHM

1. Official Catalog Each specimen in the tissue collection of the UCONHM will be catalogued into the official tissue section catalog (a hard copy ledger) of the UCONHM. This catalog will be kept in a fireproof safe in room 165 of the Science Lab Building. 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 hand written. A copy of the catalog form is provided in section XX below. Specimen data from the official catalog is 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 XII below).

2. Assigning Specimen Numbers Each set of tissue samples will have its own unique accession number and entry information in the catalog.
The unique accession numbers:

- ensure that the tissues and their associated information can be accessed on the collection's database.
- ensure that separate tissue (e.g., liver, muscle) and the voucher specimen can be efficiently and reliably linked and preserved together.
- ensure that UCONHM tissue samples can be described or referenced in publications.
- ensure that the tissue samples can be located and used by researchers, staff, etc.

3. Entering Specimen Data into the Catalog

- Data on the specimen tube 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 hard copy accession catalog of the tissue section of the UCONHM by hand in a clear and legible fashion in either archival permanent ink or pencil. Cross-reference the information with the data from the appropriate vertebrate catalog (e.g., mammals)
- Each specimen is assigned the next available sequential number in the catalog. This will result in the tissue samples having a unique, permanent, catalog number. All tissues collected from the same specimen (liver, muscle, lung, etc.) 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 full name
    - collector's field number
    - collection date
    - species name
    - sex and any reproductive information included on the field tag
    - locality in full
    - geographical coordinates if available
    - any additional comments included by the collector on the field tag
    - whether the specimen is a skin and skull, skull only, partial skeleton, or fluid specimen
    - specific tissues preserved and the tissue identification number (UCOK#)
    - how the tissue is preserved (frozen, lysis buffer, or ethanol)
- 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 tissue 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 Tissue Samples and Voucher 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 the voucher material. 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 specimen from which the tissue was collected. This also includes information that reflects processes and transactions related to the voucher specimen, e.g., accessioning,

cataloging, loans, sampling, analysis, and treatment. Maintenance of documentation in the correct section of the UCONHM follows recommendations by professional societies such as the Society of American Archivists (Deiss 1984; Ritzenthaler 1983) and American Institute for Conservation of Historic and Artistic Works (Kushel 1980).

IX. DISPOSAL/DEACCESSIONING OF TISSUE SAMPLES Tissue samples 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 tissue section of the UCONHM. The tissue Curators assume final responsibility for disposal/deaccessions of any specimens or associated materials.

A. Reasons for Disposing or Deaccessioning Tissue Samples Tissue samples may, after careful consideration and discussion of the tissue Curators and the Collection Manager, be disposed of or deaccessioned because of the following reasons:

- The tissue samples no longer fit the scope of the UCONHM tissue section or have deteriorated beyond use or restoration.
- The material cannot be properly curated.
- The sample represents a serious health or safety hazard.
- It is part of a justified and appropriate trade, exchange, or transfer to another museum that will provide proper conservation standards to maintain the specimens or items.

B. Acceptable Processes for Disposal/Deaccessioning of Tissue Samples:

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

2. Transfers These are arranged written agreements between the UCONHM and another museum or institution that a vertebrate section of the UCONHM will transfer ownership of selected specimens and/or associated materials (including tissues) that no longer serve a purpose to the specified 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). Specimens and/or associated materials (including tissues) will only be transferred to institutions that can insure that the basic standards of curation will be provided. The transfers will be approved by the tissue Curators and Collection Manager of the UCONHM and they must be approved by the University.

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

4. Discarding Tissue Samples Natural disasters and consumptive or destructive sampling might lead to the destruction of cataloged tissue samples. The tissue Curators after consultation with the Collection Manager may decide which specimens no longer have scientific or public value. However, any original documentation associated with the voucher specimens will always be retained by the tissue section as well as the correct vertebrate section of the UCONHM. Tissues from type series (holotypes, topotype, etc.) and rare or unusual specimens will never be discarded, regardless of condition.

C. Record Keeping A record of the circumstances and/or the conditions under which tissue samples are deaccessioned and disposed will be retained as part of the permanent record of the tissue section of the UCONHM. All the original documentation of deaccessioned specimens (including voucher information) will be retained by the tissue 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, the personnel involved in making the decision, and the date of deaccessioning.

X. APPRASIAL OF DONATIONS

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

XI. TISSUE LOAN POLICY The loan of tissue samples in the UCONHM is at the discretion of the tissue Curators after consulting with the Collection Manager. Any tissue samples or data that are loaned should be noted in both the hard copy catalog and the computer database. Unlike traditional specimens, tissue samples are eventually depleted with use. Therefore, UCONHM tissue Curators have developed the following guidelines to ensure that destructive sampling does not exhaust these limited resources. The following guidelines were developed to follow the policies instituted by tissue collections maintained at other institutions. The goal of the tissue section is to allow access to this valuable resource while preserving the collection for future use. The tissue section of the UCONHM will provide limited loans of tissues to qualified researchers at recognized institutions. The loan is intended to supplement research performed by the user and as such, the user must agree to abide by certain conditions. Request for tissues located in the UCONHM is an explicit acknowledgment that the researcher supports legitimate scientific collecting, and that he/she values the time and effort that goes into collecting, preparing, and maintaining museum collections. In exchange for loaning tissue samples, we may ask researchers to provide verbal or written support of scientific collecting and our collections.

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

- There is sufficient scientific merit to justify the destructive sampling of the tissue.
- 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.
- Foreign loans are made only to international entities that have dependable mail service. Western Hemisphere loans are mailed out only to institutions in the U.S. 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.
- Individuals requesting tissues will be responsible for ensuring the legal eligibility of the loan and may be asked to provide copies of permits if applicable. See section D (under the "Tissue Loan Policy") below for information regarding permits.
- The cost of shipping will be charged to the individual requesting the loan.
- The normal length of a tissue loan will be one year. An extension of the loan may be requested prior to the return date of loaned material and an extension will be made only at the discretion of the tissue Curators and Collection Manager.
- Whether or not loan requests are honored will be contingent on previous care provided to the UCONHM specimens.
- Tissues from rare organisms and type specimens, as well as tissues that are nearly depleted, will be loaned at the discretion of the tissue Curators and Collection Manager.
- Use of tissues for other studies not outlined in the original loan require prior, written approval from the tissue Curators or Collection Manager.

- Tissues or materials extracted from those tissues (DNA, RNA, etc.) shall not be transferred to other researchers or institutions without prior written approval from the tissue Curators or Collection Manager.
- The UCONHM is not responsible for verifying the identification of tissue samples or voucher specimens. The Curators and Collection Manager have made every effort to correctly identify all specimens and associated information in the UCONHM. However, errors due exist and it ultimately is the responsibility of the borrower to confirm correct identification of specimens prior to publication. Please inform the tissue Curators and Collection Manager of any errors detected.
- Any publication resulting from the loan of tissues must acknowledge "UCONHM" as the source of the tissues and must include the UCOK number. Additionally, if voucher specimens exist for the tissue, the voucher numbers also must be included in the publication (even if that material was not accessioned at the time it was loaned to a researcher). Two copies of each publication must be provided to the UCONHM.
- All sequence data resulting from the use of tissues loaned from the UCONHM must be registered in GenBank (http://www.ncbi.nlm.nih.gov/) or a comparable database with unrestricted access to the scientific community. GenBank or other database numbers must be provided to the UCONHM.
- If materials loaned from the UCONHM are to be used for profit or patent applications, the UCONHM and the University of Central Oklahoma must be informed and negotiations must occur before the loan of tissues occurs.
- Upon receipt of the loan, the researcher agrees to follow the conditions stated in section E below.
- Any unused tissue and/or DNA must be returned to the UCONHM tissue section upon completion of the study (see section F under the "Tissue Loan Policy" below).

B. How to Request a Tissue Loan The UCONHM will make limited loans of tissues to qualified researchers at recognized institutions. All tissue requests must be made in writing. Letters of request should be written on institutional letterhead and addressed to the tissue Curators. If a student researcher requests tissues, the letter must be co-signed by a faculty advisor. Information regarding materials contained within the tissue section at the UCONHM and be made by e-mail or querying our database (see section XII below). Requests need to contain the following information:

- objectives of the project
- potential scientific merit of the project
- feasibility and timeframe for the project
- availability of materials from other sources (including collection efforts performed by the requester)
- methods of analysis
- qualifications of the researcher(s) performing the work
- nature of the material requested (taxon, number of samples, UCOK numbers, and collection location of samples)
- desired method of transport (frozen, ethanol, etc.) and information regarding payment of shipping costs (FedEx account, etc.)
- an indication that they have read and agreed to the loan conditions listed in section A of the "Tissue Loan Policy"

C. Review of Requests Requests will be reviewed by the tissue Curators and Collection Manager on a case-by-case basis according to the following criteria:

- the nature of the request, including whether it duplicates previous research or interferes with on-going research at UCO
- the amount of material available in the museum
- the amount of material requested is justified

- rarity and replaceablity of materials
- the availability of material from other sources (including wild populations) and efforts by the researcher(s) to obtain such materials
- demonstrated ability of the researcher(s) to complete the work in a professional and timely manner
- assurance that the researcher(s) has met the legal requirements associated with receiving materials

D. Permits Loan shipments will be 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". Copies of all requisite permits must accompany requests for tissues. The borrower is responsible for ensuring legal eligibility for receiving loaned materials. The following guidelines regarding permits will be followed.

- Copies of all requisite permits must accompany requests for tissues. For foreign researchers, this includes a copy of any import permit required by the foreign government. If no permit is needed, the researcher must state such in writing at the time that the tissue request is submitted.
- Requests from foreign researchers for tissues of species regulated by the U.S. Fish and Wildlife Service (e.g., CITES-species, endangered species, marine mammals, migratory birds) will not be processed without the proper U.S. export permits; species listed only under CITES may be exported under a Certificate of Scientific Exchange if the receiving institution possesses such a certificate.
- Requests from U.S. researchers for tissues of species regulated by the U.S. Department of Agriculture must be accompanied by a copy of a USDA transport permit issued to the recipient or his/her institution.
- 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 materials requested in the loan are listed on CITES Appendices I, II, or III, the loan requestor must provide their institution CITES Exemption Permit Number.

E. Loan Receipts and Conditions It is the responsibility of the borrower to immediately report specimen damage and/or discrepancies in the invoice. A loan invoice (see section XX below) will be included with the tissues. The borrower must immediately sign and return this form to the museum (keeping a copy for their records). Upon receipt of the loan, the following terms are in effect (these are in addition to the conditions stated in section A under the “Tissue Loan Policy” above):

- Loans are made to the requesting institution with the understanding that the UCONHM may recall any item for any purpose if it desires. The researcher(s) will be provided with 30 days notice prior to the recall.
- Frozen tissues must be maintained between -20°C and -80°C until used.

F. Return or Exchange of Material Upon completion of the project, the researcher must return all unused tissue and/or DNA to the UCONHM tissue section. Failure to do so will result in future loans being denied. It is the responsibility of the borrower to pay for shipping of materials to the museum. Additionally, the tissue Curators or Collection Manager may request materials in exchange for those received from the UCONHM collections. These may include voucher specimens for permanent accession into the appropriate section of the UCONHM or exchanges of loans of tissues from other institutions. If an exchange is to occur, shipping costs may be waived. Tissues or voucher specimens that are to be deposited in the UCONHM should:

- be well labeled.
- contain complete data (including collection date, collection locality, reproductive information, etc.) if available.
- have copies of associated collecting permits or other relevant documentation.

G. Shipping Tissues The museum has a standard moratorium on shipping loans during the month of December. Great care should be taken in packing specimens for shipment. The following guidelines will be used:

- Frozen tissue: Use a minimum of 10lbs of dry ice for overnight shipments. Tissues should be double bagged in plastic to prevent leakage and placed inside a protective box inside the cooler.
- Alcohol preserved tissues: Ship in a secure container at room temperature (following current regulations for the shipment of hazardous materials).
- Lysis buffer preserved tissues: Ship in a secure container at room temperature (following current regulations for the shipment of hazardous materials).
- DNA: Ship in a secure container at room temperature or in a secure cooler on ice.
- Place a copy of the loan invoice (see section XX below) in an envelope and attach to the outside of the shipping container. Insure the loan and shipment for the maximum amount allowable.
- A return shipping label should be included inside the shipping container.
- Proof of delivery documentation should be obtained from the postal service or other shipping carrier.
- A loan 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.

H. Documentation of Loans Each tissue loan has a unique number associated with it and its documentation. The loan numbers will be consecutive and listed in a UCONHM Tissue Section Loan notebook. The Loan notebook also will 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 including:

- loan request letter
- who requested 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 (specimen catalog number, sex, tissue type)
- the company used to ship the loan and tracking numbers

I. Curation of Loan Material Returning to the UCONHM Upon receipt of returned loan material, tissue section staff should examine its condition and document what material (tissue, DNA) was returned. The returned material will then be reaccessioned into the proper freezer or refrigerator.

XII. COMPUTER DATABASE OF THE TISSUE 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 tissue 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 and 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 and 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 tissue collection online. Windows based "Excel" and "Access" spreadsheet programs from Microsoft®, are compatible with the "SPECIFY" software. SPECIFY has geo-referencing capabilities but it has not been implemented for tissues at this time. The UCONHM webpage will be the entry point for data queries.

Guidelines for use of SPECIFY:

- Users accessing the tissue records in SPECIFY and who fail to comply with the guidelines may be denied access.
- If a for-profit organization opts to use the tissue 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 tissue 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 tissue section of the UCONHM may restrict access to certain data fields, including specific localities of threatened or endangered organisms.
- Data related to ongoing research of faculty, students, or staff may have restricted access until the information is published.
- All users of any information acquired through the UCONHM SPECIFY database must acknowledge the correct section of the UCONHM as the source of specimen data, and must provide copies of publications, reports, or projects.

XIII. PREVENTATIVE CONSERVATION OF TISSUE SAMPLES IN THE UCONHM

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

- Storage containers, trays, tags, vials, jars, etc. should be of archival quality.
- The temperature in the refrigerators and freezers should be kept at appropriate levels.
- Only individuals approved by the tissue curators and the Collection Manager should have access to the collection and the collection should be in a secure room.
- Extra sampling precautions should be used for the protection, care, and conservation of type, holotype, and other irreplaceable tissue samples.

XIV. EMERGENCY MANAGEMENT OF THE TISSUE SECTION OF THE UCONHM

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

- The Curators and Collection Manager of the tissue 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 tissue 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 tissue collection.
- The tissue 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 tissue section of the UCONHM, an updated list of prioritized contacts (names, addresses, and phone/fax numbers) will be maintained next to the freezer 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 and ventilation to the tissue section of the UCONHM facilities.
● The tissue 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 tissue section of the UCONHM properties should be established. All personnel will work together to protect the tissue 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
- Prolonged electrical outages

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

The tissue 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 tissue samples in the collection. It is the goal of the tissue 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 tissue 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 tissue section of the UCONHM. The tissue 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 Tissue 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 tissue collection areas to determine potential or actual safety, health, or environmental hazards. Hazardous materials that could occur in a tissue area and in the specimens include biological (e.g., viruses, parasites), chemical (fixatives – alcohol, preservatives – lysis buffer), walkway obstructions, and fire hazards. Most hazardous materials have established permissible levels and can be easily monitored by safety inspectors. All the personnel working in the tissue 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 Tissue Areas of the UCONHM The tissue 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 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 tissue personnel with the necessary personal protective equipment and provide and/or make provisions for any necessary required training.

E. Hazardous Waste Disposal in the Tissue Section of the UCONHM A hazardous material is by definition any material that 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 and viruses. 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 tissue 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 tissue Curators and Collection Manager and the staff share the responsibility of ensuring compliance with all environmental health and safety policies. The tissue 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 tissue Curator of potentially harmful agents and unsafe conditions.

2. Storage of Hazardous Materials All hazardous materials used or associated with the tissue section of the UCONHM must be stored in approved (UCO health and Environmental Office) storage containers that 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 tissue 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 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 tissue 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 tissue 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 tissue 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 tissue 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 tissue 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 (including tissues) 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 TISSUE SAMPLES FOR THE UCONHM

A. Permits Prior to collecting vertebrate specimens, state authorities should be contacted in order to make sure the proper permits are acquired to make a scientific collection of the organism under study. In Oklahoma, this will be the Oklahoma Department of Wildlife Conservation (http://www.wildlifedepartment.com/contactus.htm; ODWC PO Box 53465, 1801 N Lincoln, OKC, OK 73152). In addition, if associated with an educational institution, the research should be cleared with an animal care and use committee. If the organism is a federally protected species, then special permits will be required and the U.S. 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. Voucher Specimens When available, a voucher specimen associated with the collected tissue sample(s) should be accessioned into the appropriate section of the museum. A voucher specimen is usually a whole animal that is preserved (skin, skull, skeleton, or fluid specimen) and retained in a museum as a permanent reference. It is best to prepare voucher specimens as soon as possible after collection to avoid deterioration, slippage of skin, freezer burn, etc. Some large species in certain regions (e.g., deer, bear) are readily identified and/or well represented in museum collections and can be documented through photographs or shed materials (e.g., hair, feathers, scales). See manuals for each section of the UCONHM (e.g., mammals) for instructions on the preparation of voucher specimens.

1. Traditional Museum Skin and Skeletal Specimens A traditional way of preparing a vertebrate specimen for long-term storage in the UCONHM is as a study or museum skin and skull. In this process, the organs, musculature, and most of the skeleton of the specimen are removed, and the body cavity is filled with cotton. This method leaves the outer skin and some portions of the skeleton. The objective is to maintain the original shape and size of the specimen. In some cases, when the specimen is not suitable for preparation as a study or museum specimen, the specimen might be prepared in a different manner, such as a skeleton or a fluid specimen.

2. Wet or Fluid Specimens Fluid preserved specimens provide more potential research material (e.g. musculature, organs, and other soft tissues) than tradition skin and skulls. Therefore, it is recommended that, in addition to the traditional skin preps, whole fluid-preserved specimens be made in conjunction with the skin and skull. 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 of the hair often fades and DNA extraction from formalin-fixed tissues is difficult.

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

4. Shed Materials Shed materials (hair, feathers, scales, etc.) can be saved from individual specimens and saved as a voucher. These materials should be distinguishable to the species under study.

C. Collecting Tissue Samples Traditional voucher preparations from 30 specimens of a species per locality are recommended. If more specimens are collected, then they can be preserved as alcoholic fluid specimens, skulls, or full skeletons once tissue samples have been removed. Tissues may be left in alcoholic specimens as long as those specimens are not first fixed using formalin.

1. UCOK Data Sheet The UCOK data sheet is the link among all tissue preparations and preserved voucher materials from an individual. Without a properly completed UCOK sheet, a sample quickly loses its scientific value. An example of the data sheet is provided in section XX below. These data sheets will be provided by the Collection Manager and should be filled out at the time the tissue is collected.

- UCOK sheets are numbered in sequential order for the UCONHM Tissue Collection.
- One UCOK number and one UCOK sheet are assigned to each individual specimen collected. Each separate tube of tissue collected from the same individual receives the same UCOK number and are referenced on the same UCOK sheet.
- All embryos taken from a female are considered separate individuals and given separate UCOK numbers. Each embryo should be stored in a separate tube from the mother (and separate tubes from other embryos). Their relationship to the maternal sample should be noted on their UCOK sheet.
- UCOK sheets should be completely filled out and the data from the UCOK sheets should be entered into the tissue collection database as soon as possible.
- The pens used to fill out UCOK sheets should be of archival quality.

2. Information Entered on UCOK Sheet:

- UCOK Number (provided by the Collection Manager or tissue Curators)
- Scientific name of the animal (Class and species)
- Collection information:
    - Country, state, county (e.g., USA: Oklahoma: Logan)
    - Specific locality: the most precise description of the site where the specimen was collected (e.g., 1.5 mi N, 2 mi W Seiling)
    - UTM coordinates or latitude/longitude data used to relate specimen data to geographic databases. Lat/Long format should be: degrees-minutes-seconds. Label longitudes with E(ast) or W(est) and latitudes with N(orth) or S(outh).
    - Collector and/or preparer name (if the name of the collector and preparer are different, both need to be included)
    - Collection date/preparation date (both should be included if they are different); dates should be in this format: 3 November 1946
- Museum Preparation:
    - Indicate what is accessioned into the museum as a voucher specimen for the tissue (skin, skull, etc.).
    - Indicate which museum collection is housing the voucher (e.g., mammals, birds) and the museum number associated with the voucher

(also indicate the personal preparation number of the individual that prepared the voucher specimen)

- Reproductive information: Indicate whether the sampled specimen is male or female and record as detailed information as possible about the reproductive condition of the specimen (Example for mammals: size of testes, number and size of embryos and which horn of the uterus they are in, condition of mammary tissues, lactating, post-lactating, non-scrotal, scrotal, etc.)
- Age information: Record as detailed information as possible regarding the age of the specimen (Example for mammals: pup, juvenile, sub-adult, adult)
- Tissues:
    - Indicate the number of tubes of each tissue being preserved. For example, if heart and kidney were stored together in one tube, write "1" next to "heart/kidney"
    - In the "Other" section of the UCOK sheet, list associated materials that were preserved: stomach samples, feces, ear clippings, etc.
    - Indicate the method used to preserve each tissue.
- Record any additional information in the "comments" section. This may include cross-reference UCOK numbers for embryos, additional collection information (such as trap number), or any other information the collector deems relevant that does not fit into the categories listed above.

3. Preserving Frozen Tissues Tissues collected in the laboratory with access to a freezer or in the field with access to a liquid nitrogen tank will be accessioned as part of the frozen tissue collection. This is the preferable method for preserving tissues. Preserving tissues without access to freezers or liquid nitrogen is discussed below (in section 4 of "Collecting Tissue Samples"). Frozen tissues are to be stored in cryotubes (provided by tissue Curators or the Collection Manager). Upon collection of the tissue, these tubes are to be immediately placed in an ultracold freezer or in liquid nitrogen. The following protocols are to be implemented when collecting tissues for the frozen tissue collection:

- The cryotubes must be labeled with a Sharpie permanent marker prior to cooling. If the tubes are not labeled before cooling, it might be necessary to rewarm the cryotubes in order to write on them. DO NOT write on the top of the tube. Record the following information on the side of the tube:
    - species name
    - preparer/Collector initials and number
    - preparation/collection date
    - tissue type
- The standard tissues saved are heart, kidney, liver, muscle, lung, and spleen. However, additional tissues can be collected. Each tissue type should be stored in an individual tube (with the exception of heart and kidney, which may be stored in the same tube). For small species, entire organs can be stored in one cryotube. For larger animals, a sample of the organ is taken and placed in a cryotube.
- Fill each tube no more than 2/3 of the way full to allow for expansion of the tissue during freezing. Adding more tissue may cause the cap to rupture during the freezing process, potentially ruining the sample.
- Tissue specimens should be kept as clean as possible, but are not necessarily sterile. However, it is imperative that cross contamination between individuals be avoided. All instruments and work surfaces should be cleaned after each individual specimen is sampled. A 10% solution of chlorine bleach works well to clean instruments. However, bleach

destroys DNA so the instruments should be wiped dry, rinsed in clean water, and then wiped until dry with a clean tissue paper prior to extracting tissues. Alcohol preserves DNA and therefore should not be used to clean instruments.

- Accessioning frozen tissues into the collection:
  - Prior to accessioning the tissue sample, museum staff (tissue section Curators, the Collection Manager, or other tissue section staff) must ensure that the UCOK data sheet has been properly filled out.
  - Cryotubes will be tagged with a permanent label added by museum staff that contains: UCOK number, species name, and tissue type.
  - The UCOK number and tissue type will be written on the cryotube lid.
  - Data will be entered into SPECIFY.
  - The tube will be placed in the correct locality in the freezer and box number, rack number, and shelf number within the freezer will be indicted on the UCOK data sheet.

4. Preserving Lysis Buffer/Ethanol Tissues Tissue samples for DNA analysis can be preserved in lysis buffer or ethyl alcohol. This method is valuable when access to a freezer or liquid nitrogen tank is not a viable option. Lysis buffer or ethanol preserved tissues will be stored in 1.5 ml tubes. Tissues preserved in this manner may be stored at room temperature. However, as part of the tissue collection of the UCONHM, these tissues will be accessioned and stored at 4°C. The following protocols are to be implemented when collecting tissues for the lysis buffer/ethanol tissue collection:

- The 1.5 ml tube should be labeled with a Sharpie permanent marker. Be careful when labeling the tube because alcohol will dissolve the ink. For this reason, record the following information at least twice on the side of each tissue tube:
  - species name
  - preparer/collector initials and number
  - preparation/collection date
  - tissue type
  - record the preparer/collector initials and number, and the tissue type, on the top of each tube
- The standard tissues saved are liver, muscle, and blood. However, additional tissues can be collected. Each tissue type should be stored in an individual tube.
- The sampled tissue should be no more than 0.3 g (about the size of a small green pea). Adding too much tissue will result in DNA degradation, as the preservative cannot adequately penetrate the tissue. Using scissors or a scalpel, cut or nick the tissue several times. This will increase the preservative penetration into the tissue.
- Place the tissue sample in 1 ml of lysis buffer or 95% ethanol. The recipe for lysis buffer is provided below. Cap the tube tightly and gently agitate it so that the tissue sample is floating free.
- Tissue specimens should be kept as clean as possible, but are not necessarily sterile. However, it is imperative that cross contamination between individuals be avoided. All instruments and work surfaces should be cleaned after each individual specimen is sampled. A 10% solution of chlorine bleach works well to clean instruments. However, bleach destroys DNA so the instruments should be wiped dry, rinsed in clean water, and then wiped until dry with a clean tissue paper prior to extracting tissues. Alcohol preserves DNA and therefore should not be used to clean instruments.

- Accessioning tissues into the collection:
    - Prior to accessioning the tissue sample, museum staff (tissue section Curators, the Collection Manager, or other tissue section staff) must ensure that the UCOK data sheet has been properly filled out.
    - Tube sides and lids will be tagged with a permanent label added by museum staff that contains: UCOK number, species name, and tissue type. The label and ink must be alcohol proof.
    - Data will be entered into SPECIFY.
- The tube will be placed in the correct locality in the refrigerator and box number, rack number, and shelf number within the refrigerator will be indicted on the UCOK data sheet.

5. **Recipe for Lysis Buffer** This recipe follows that provided by Longmire et al. (1997). To make 1 liter of lysis buffer add:
    - 50 ml of 2M Tris-HCl (pH 8.0)
    - 200 ml of 0.5M EDTA (pH 8.0)
    - 2 ml of 5M NaCl
    - 25 ml of 20% SDS (w/v)
    - the remainder of the volume double-distilled water

XVII. EXPENSES ASSOCIATED WITH CURATING THE TISSUE SECTION OF THE UCONHM At first glance, it may appear that the expenses associated with curating a tissue collection might be relatively inexpensive. Inventory personnel might collect the tissue samples and deliver them to a museum to handle. However, when carefully considered in detail, it is apparent that the costs of collecting tissue samples are just a fraction of the total financial picture. The cost of a tissue sampling includes not only the cost of collecting a specimen in the field, but also 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 a tissue collection.

XVIII. SUPPLIERS OF TISSUE CURATORIAL EQUIPMENT IN THE UNITED STATES

Specifications	Company	Address	Telephone	E-mail	Web page
Cryotubes	Life Science Products	5989 Iris Parkway PO Box 1150 Frederick, CO 80530	(800) 245-5774 (303) 450-9442	sales@e-lspi.com	www.e-lspi.com/
1.5 ml tubes	Fisher Scientific	2000 Park Lane Dr. Pittsburgh, PA 15275	(800) 766-7000	None provided	www.fishersci.com
Labels	USA Scientific	PO Box 3565 Ocala, FL 34478-3565	(800) 522-8477 (352) 237-6288	infoline@usascientific.com	www.usascientific.com
Freezer boxes	Fisher Scientific	2000 Park Lane Dr. Pittsburgh, PA 15275	(800) 766-7000	None provided	www.fishersci.com
Freezer racks	Fisher Scientific	2000 Park Lane Dr. Pittsburgh, PA 15275	(800) 766-7000	None provided	www.fishersci.com
Ultracold freezers	Scimetrics Inc.	19407 Park Row #102 Houston, TX 77084	(800) 231-2065	scimetrics@scimetricsinc.com	www.scimetricsinc.com/
Refrigerators	Fisher Scientific	2000 Park Lane Dr. Pittsburgh, PA 15275	(800) 766-7000	None provided	www.fishersci.com
Ethanol	Sigma Aldrich	3050 Spruce St. St. Louis, MO 63103	(800) 325-3010	None provided	http://www.sigmaaldrich.com/united-states.html
Lysis buffer reagents	Sigma Aldrich	3050 Spruce St. St. Louis, MO 63103	(800) 325-3010	None provided	http://www.sigmaaldrich.com/united-states.html

XIX. LITERATURE CITED

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Kushel, D. 1980. *Photodocumentation for conservation: procedural guidelines and photographic concepts and techniques*. American Institute for Conservation, Washington, D.C.

Longmire, J.L., M. Maltbie, and R.J. Baker. 1997. Use of "lysis buffer" in DNA isolation and its implication for museum collections. Occasional Papers, Museum of Texas Tech University. 163:1-3.

Ritzenthaler, M.L. G.J. Munoff, and M.S. Long. 1983. *Archives and manuscripts: administration of photographic collections*. Society of American Archivists, Chicago.

XX: COPIES OF FORMS

A. Tissue UCOK Form

UCOK#

Class _____

Species _____

Collection Information:

Country _____ **State** _____ **County** _____

Specific Locality _____

UTM or Lat/Long _____

Elevation _____

Collector _____ **Collection Date** _____

Museum Preparation:

Voucher: ____**Skin** ____**Skull** ____**Post-cranial Skeleton**

____**Alcoholic** ____**Other**_____

Museum Collection _____ **Catalog Number**_____

Reproductive Information:

____**Male** ____**Female** **Reproductive Condition** _____

Comments:

Age Information:

Tissues:

____**Heart/Kidney**	____**Lung**	____**Reproductive Organs**
____**Heart**	____**Spleen**	____**Entire Specimen**
____**Kidney**	____**Brain**	____**Other**_____
____**Liver**	____**Blood**	
____**Muscle**	____**Embryo**	

____**Frozen** ____**Lysis Buffer** ____**Alcohol** ____**Other**_____

Comments: _____

_____

_____

_____

_____

Please fill out form completely.

B. Tissue Loan Form

University of Central Oklahoma Natural History Museum Tissue Section Page ___ of ___
Biology Department, Howell Hall
100 N. University Drive
Edmond, Oklahoma 73034
(405) 974-5911

Outgoing Loan Contract

Borrowing Institution:
_____
_____
_____
_____
Contact _____
Telephone _____
Email _____

OUTGOING LOAN # ☐
Duration of loan
From _____
To _____
Purpose of loan _____
Approved by _____
Date_____
Shipping _____
Total insurance value $ _____

Total # of objects/specimens

Description of loan Check for Attachment ☐

Catalog Accession Number	Object/specimen Description	Insurance Value

Borrower, please read outgoing loan conditions on the reverse of this contract and sign to agree to the conditions. Return the signed Registrar copy in the envelope provided and keep the Borrower copy for your records.

Borrower signature: _____ Title _____ Date _____
Title: _____ Date:_____

Objects/specimens returned to the tissue section of the UCONHM
Signature_____ Title:_____ .Date _____