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PROCEDURES FOR THE
HERPETOLOGICAL LABORATORY
MUSEUM OF VERTEBRATE ZOOLOGY
THE UNIVERSITY OF CALIFORNIA, BERKELEY

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REGULATIONS FOR USE OF SPECIMENS

Museum specimens are research materials and permanent evidence of various kinds of records and published reports. Accordingly, they require constant care and protection. This obligation, in turn, requires that the following rules be observed by all persons having access to the collections of this research museum.

- 1) The only persons free to use or show the collections without making previous arrangements with the Director or Curators of the collections concerned, are the faculty of the Museum, Principal or Senior Museum Scientists, and the current curatorial staff (not teaching assistants, research assistants, employees in non-curatorial areas, or graduate students in general).
- 2) Inasmuch as we have no exhibits or other facilities for display of specimens to the general public, inquiries should be directed to the Lawrence Hall of Science, the Oakland Museum, or the California Academy of Sciences.
- 3) Special visitors to the collections who are unacquainted with its arrangement or who lack professional interest in vertebrate animals should always be guided by a member of the curatorial staff.
- 4) Investigators from other departments and institutions should submit formal written requests to the Curator in charge before visiting. Investigators with long-term on-going projects may have an identifying card put on file at the front desk.
- 5) Investigators unfamiliar with curatorial procedures should be instructed in the use of the collection by a member of the curatorial staff.
- 6) For specimens removed from their places in the collection for an extended period, blue withdrawal slips should be filled out and left in the place of the specimen or series of specimens withdrawn. Placement of withdrawal slips is the responsibility of the curatorial staff. At least one blue slip should be left in each tray from which skins or skeletal material are taken and each jar of fluid-preserved material from which specimens are removed.
- 7) Except in the case of class use, specimens are removed from the collection only for the research use of competent investigators.
- 8) NO SMOKING OR EATING AROUND THE COLLECTIONS OR SPECIMENS.

POLICY ON USE OF THE COLLECTIONS IN THE MUSEUM

The collections of the Museum of Vertebrate Zoology are available to all qualified (as judged by the Curators and Curatorial Associates) investigators for noncommercial and nondestructive uses.

CLASS USE

Specimens ordinarily are unavailable for teaching or class use, but may be used in Zool. 107, or IDS 170 and for senior (Zool. 163, 164, 165) and graduate courses of limited enrollment, subject to the following regulations. The regulations are to be brought to the attention of teaching assistants by the faculty instructor.

The instructor should keep a list approved by the curators to ensure that the same specimens are used by the students year after year. Such specimens, although to be protected from damage and loss with extreme care and not to be considered replaceable, are, in effect, considered impaired for full research use by curators and investigators.

Museum specimens used in practical examinations in class must be protected with extra care against loss or damage.

Specimens on approved lists or those used in lecture which are removed from the Museum should be covered by blue withdrawal slips.

Specimens checked out for use should not be left out in the laboratory beyond class hours, and if not due for immediate return to the Museum, should be housed in closed specimen cases in the laboratory. Fluid-preserved specimens must be promptly replaced in specimen jars with adequate fluid.

Specimens are to be returned to the collection by the curatorial staff.

NO SMOKING OR EATING AROUND THE SPECIMENS.

Curators and instructors are responsible for observance of these rules. Teaching assistants and graduate students should be instructed in the observance of the rules by the curatorial staff.

INSTRUCTIONS TO USERS OF COLLECTION

Investigators will be provided with a brief orientation tour, space in which to work, the specimens he or she wishes to examine, or an explanation of the location of those specimens in the Museum. The visitor will be informed of the rules for use of the specimens and will receive an explanation as to the proper order of the specimens in the Museum. The following general instruction will alert the visitor to the procedures followed here:

1) Specimens are to be picked up only by the body, and only one at a time. Do not pick up specimens by legs, tails, or other protruding appendages. Do not pick up specimens by their labels. Make sure fluid-preserved specimens are kept moistened with alcohol at all times.

2) Slide trays of dried skins and skeletal material in and out of cases gently to avoid jarring or cracking bones.

3) Investigators should note that the specimens are arranged in a special order, which should be restored when the investigator has completed his/her examinations. Aid in restoring proper order can be obtained from the curatorial staff. Please report apparent misidentifications, errors, or incorrect order to the curatorial staff.

4) Skeleton cases should not be left standing open. They should be opened only for removal or replacement of specimens. Please report cases inadvertently left open to the curatorial staff for fumigation.

5) Specimens preserved in alcohol should be examined on enamel or plastic trays obtained from the curatorial staff. Specimens should be kept moist at all times by wetting them with the solution in which they are stored. Care should be taken to return these specimens to the jars from whence they came and to return the jars to the proper spot in the alcoholic collection. Jars should be topped with alcohol and lids screwed on tightly before replacing them on shelves. Check to be sure a lid liner is in place.

6) Specimens from the frozen collection may be obtained through the supervisor of the biochemical lab after permission has been granted by the Curator.

7) No material of any sort should be installed in the collections unless approved by the Curator and until properly curated (identified, labeled, catalogued, etc.). Please report any discrepancies to the curatorial staff.

8) Please report any malfunctions of the physical plant (lightbulbs blown, leaky sprinkler head, broken windows, faulty latches, loose gaskets, etc.) to the curatorial staff.

9) Please also report any signs of insects in a skeleton case.

10) NO SMOKING OR EATING AROUND SPECIMENS.

OUTLINE OF PROCEDURE FOR HANDLING NEWLY ACQUIRED SPECIMENS

- 1) Preparation and preservation of incoming specimens (see pp. 21-26).
1a) Begin FLOWCHART FOR ACQUISITION. Blank flowcharts are kept in Herp Dept. filing cabinet (p. 5a)
- 2) Obtain all pertinent field catalogue pages. A photocopy can be placed with the specimens. It should not be assumed that field tags contain all necessary information.
Obtain copy of all pertinent PERMITS for collection. Keep field tags. Permits with specimens until receipt card.
- 3) Rinse any formalin-preserved specimens (except tadpoles and eggs) with water and place in alcohol if not already done.
- 4) Check specimens against the field catalogue to determine whether or not any specimens or parts thereof are missing. Make sure that all specimens are identified. Identify any that are not!
- 5) Begin an accession card (see pp. 6-8).
- 6) Count the exact number of specimens to be catalogued and obtain that number of preprinted specimen tags from the Curatorial Associate.
- 7) Arrange specimens (by species and locality) in one or more jars and place them on a work shelf. Label the shelf front with the accession number.
- 8) Catalogue the specimens (see pp. 9-12). As each catalogue card is completed, tie the corresponding catalogue tags onto the specimens. For specimens in each field series add a lead tag to the **first** specimen if one is not already present. Write the MVZ numbers on the back of this tag (see pp. 13-14).
- 9) Double check all data to be sure that catalogue numbers and field numbers are correct and that nothing is missing.
- 10) Notify Curatorial Associate that specimen data are ready for entry into computerized data banks.
- 11) In the case of skeletal material, once dried (see pp. 19, 24), add up the total number of each specimen type to go to preparation and list this total with the accession number on a slip of paper to be kept with the specimens. A copy of this list is placed in the Senior Museum Scientist's mailbox with the case and tray number where the specimens are located. Place only a skull tag with the collector's number and catalogue number on the specimens until they have been cleaned.
- 12) After material is cleaned, number bones using quill pen and permanent black ink (see p. 19). Attach preprinted tag with catalogue number.
- 13) Label box tops for skeletal specimens (see p. 16).
- 14) Record inclusive departmental catalogue numbers on the accession card and, if the total accession has been catalogued, draw a line across the top left corner of the accession card.
- 15) Enter specimen data into the computer, then check data back against the specimens.
- 16) Install specimens (see p. 13), filing departmental catalogue cards as you go.
- 17) Fill out donor index card (see p. 17).
- 18) Record accn no. & cat. no. on permit cover sheet & file in Herp Dept. filing cabinet (see p. 12a)
- 19) File accession card.

Flowchart for Newly Acquired Specimens at MVZ

Before Accessioning

Fumigate Specimens (if applicable) _____
Acquire: Field Catalogue (or copy) _____ Relevant Permit(s) _____
Double Check Count of Specimens against Field Catalogue _____
Identify Specimens (if necessary) _____

Accessioning and Cataloguing

Accn. No. _____ Cat. Nos. _____
Complete Donor Index Card _____
On Accn. Card Write: Inclusive Cat. Nos. _____ "Donor Indexed" _____
Draw Black Line _____
Complete Permit Cover Sheet and File _____

After Cataloguing

Skins

Write: Skin Tags (if necessary) _____
Species ID on Tags _____
Cat. Nos. on Both Sides of Tags _____
Nonstandard Prep on Tags (if applicable) _____

Install

Skeletal Material

Write: Cat. Nos. on Skull Tags (Pencil & Ink) _____
and/or Data Tags (Ink Only) _____
Prepare Box and/or Vial Labels _____ (Computerized for B & M)
Label Box Lids _____
List Number and Nature of Material for Preparator _____
Reassociate Skulls & Skins (if applicable) _____
Number Bones _____ Put In Boxes/Vials _____

Install

Wet Specimens

Write: Alcoholic/Lead Tags (if necessary) _____
Cat. Nos. on Tags _____
Species ID on Tags (B & M) _____
Attach Alcoholic and/or Pre-Numbered Tags _____
Prepare Jar Labels _____

Install

Other

Eggs & Nests: Make Labels _____ Box Specimens _____
Labels In/On Boxes _____ File Data Slips _____
Sound Tapes: Catalogue _____ Cross-Reference _____
Chromosomes: Label Slides _____
Prepare Envelope(s) _____

Install

Computerization

Enter Data _____ Tax format _____ Mark Cat. Cards & Log Book _____

Accession Complete →▶ ↻ → -- >> ▶ →▶ ↻ → -- >> ▶

Accession Catalogue

The Accession Catalogue serves the Museum as a whole and the Accession Card Catalogue File is located against the west wall of the Museum on the first floor. The cards are in numerical sequence by accession numbers. Each single lot of specimens received and accepted by the Museum is assigned an accession number, and the data concerning that group of specimens are recorded on the Accession Card. A lot of specimens may include mammals, birds, and herps, or it may be composed of a single vertebrate class. The act of accessioning acknowledges acceptance of the specimens by the Museum and responsibility for their proper care and disposition thereafter. *No specimens are accessioned without proper documentation*

1) Specimens received from field trips or donors, by exchange or purchase, or from other sources, and designated to be catalogued by the Curators, are recorded in the Accession Catalogue as soon as possible. An accession is to be entered only on a numbered blank card obtained from the Accession Catalogue. The Accession Card is filled out as completely as possible at the time the material arrives. All specimens of one common lot or group (e.g., all specimens from a particular field trip or all specimens collected in conjunction with a completed field project) receive a single accession number.

2) It is important that the person accepting a donation to the Museum refer the donor to a curator or to a member of the curatorial staff. If this is not possible, the MVZ intermediary should obtain the following information:

- a) name and address ^{of the donor}
- b) name and address ^{of the collector}
- c) place and date of collection
- d) copy of field catalogue and notes, if available
- ~~e)~~ ^{f)} any other pertinent information *& phone number*
>e) copy of all relevant permits, where appropriate

3) Accessioning of a specimen or group of specimens all belonging to a single group (all herps, for example) is the responsibility of the appropriate curator and such assistants as the Curator designates to complete the job.

4) Mixed accessions, composed of specimens belonging to two or more vertebrate groups, are the responsibility of the curator in whose division the majority of the specimens are to be catalogued (e.g., 75 reptiles, 4 birds, 1 mammal are the responsibility of the Herp Curator).

5) If, in some unusual case, the specimens need to be prepared (cleaned) BEFORE they are catalogued, the accession number must accompany them to the preparatory lab. Only standard Museum skull tags with properly written Department Catalogue numbers (see p. 19) accompany the specimens to the preparatory lab.

6) A line across the upper left corner of the accession card indicates that cataloguing has been completed by all divisions concerned. "Donor Indexed" written in the lower left corner indicates the completion of the Donor Index Card (p. 17).

The Accession Card

Step by Step

UNIVERSITY OF CALIFORNIA
MUSEUM OF VERTEBRATE ZOOLOGY

ACCESSION CATALOG

ACC'N No. 12790 DATE REC'D. 25 Sep¹⁹88

NATURE OF MATERIAL 1 Thamnophis + 1 Ophisaurus

REC'D FROM J. Pearson HOW OBTAINED gift

ADDRESS MUZ

CORRESPONDENCE — FIELD NOTES —

COLLECTOR O.P. WHEN COLLECTED —

LOCALITY —

REMARKS —

DATE OF ENTRY 30 Sep 88 ENTERED BY D.A. Gould

donor indexed

CAT. NOS. { MAMMALS
BIRDS
REPT., AMPH. 211930-211932
EGGS, NESTS

Take the next numbered blank card in the sequence. Put an "out" card in its place and be sure the next card in the file is numbered.

- 1) Acc'n No.: Do not take a blank card and fill in the next number until you have ascertained that no one has already taken that number.
- 2) Date Rec'd: The date on which the specimens arrived at or were accepted by the Museum.
- 3) Nature of Material: List in as complete detail as possible how many specimens of what kind of animal, what kind of specimens, and total number of specimens in the entire accession. A single lot of specimens should be treated as a single accession to avoid splitting accessions. When only a few specimens of a single kind are involved, the genus or full name of the accessioned specimen(s) may be entered as well. The nature of each specimen may be referred to as alcoholic, skeleton, dry skin and skeleton, larvae, etc. When an accession consists of more than one kind of preparation, give the number of each type, e.g., 50 Batrachoseps and 3 snake skeletons = 53 herps. If genera and species are few, list generic and/or specific names.
- 4) Rec'd From: Usually this will be the collector, but occasionally it will be the name of an outside donor.

5) How Obtained: Usually one of the following: "MVZ Staff", "MVZ Field Trip", "Gift", or "Purchased."

6) Address: Enter full address of collector, donor or other. Staff and/or students = MVZ.

(complete address & phone number.)

7) Correspondence: This will apply only occasionally. If there is none, indicate none.

8) Field Notes: Original field notes of MVZ staff (including students) should be given to the Museum at the same time as the specimens. Copies of the field notes can be photocopied for the collector. Photocopies of field notes should be obtained from non-MVZ donors when possible, and, upon completion of cataloguing should be given to the Museum Illustrator for binding.

9) Collector: All collectors of the specimens should be included here. Where people other than the donor have collected, these names should be cross-referenced. List first initials and last names.

10) When Collected: Inclusive dates of the field trip(s) on which the specimens in the lot were collected. If collection dates cover a long, continuous period, enter first and last dates; if they cover scattered dates within one year, enter the months of that year; if dates are scattered over several years, enter years only.

11) Locality: List general localities. When collecting has been done all in one state, list the counties after the name of the state. Otherwise, list the states and/or the provinces following the name of the country.

12) Remarks: *On remaining lines* Include any peculiarities or particulars about the specimens, any notes of historical value, and any comments about condition, etc. which would not be included in the category of "Nature of Material." Specimens received but not to be catalogued owing to incomplete data, etc., should be noted.

13) Cat. Nos.: Inclusive catalogue numbers of specimens after they have been catalogued. Check with all departments involved in the accession and when all the specimens of the lot are catalogued, draw a line across the upper left corner of the Accession Card.

14) Date of Entry: The date on which the accession card is made out.

15) Entered By: The first initials and last name of the accessioner.

16) Do not remove completed accession cards from the file. Recently filled-out cards should be filed promptly.

17) Place a photocopy of the accession card or a sheet of paper bearing accession number, name of person from whom specimens were received and date of receipt with the specimens as an aid to later curatorial work. Tape a slip of paper to each jar in the accession indicating the accession number, the number of jars in the accession and the name of the major collector.

18) Donor index accession (p17)

> First line should read:

"coll. under personal name"

OR

"accession by"

(list curatorial work have curator initials)

FUMIGATION

Paradichlorobenzene (PDB) is used to fumigate the collection on a continual basis. A metal tray full of PDB crystals is placed in the top tray of bottom cases and in the bottom tray of top cases. Metal trays should be filled with PDB twice a year at six-month intervals by the curatorial staff.

Newly-arrived specimens, newly-arrived loans, and returned loans should be fumigated promptly (the following Friday evening unless the situation requires immediate attention) with carbon bisulfide. Specimens and packing materials should be included in the fumigation treatment. A metal tray, filled with carbon bisulfide is placed in the top tray of the Mammal Department fumigation case. Because carbon bisulfide is explosive, flammable, and toxic (if inhaled in sufficient quantities or if in contact with skin), great precautions must be taken to prevent accidents. Gloves and masks are available for use when fumigating. No smoking or electrical appliances are to be allowed near the transfer or application of the fumigant. Supplies of carbon bisulfide are to be kept in the fur room. Conspicuously label the fumigation case with a card indicating that fumigation is in progress. The date of fumigation and the name of the person responsible should be noted on the card. Each fumigated case should not be opened for at least 4 days after placement of carbon bisulfide. Only curatorial staff members are to do the actual fumigation.

Any indication of insects in any case should be reported immediately to a member of the curatorial staff. Every infested case is to be fumigated with carbon bisulfide on the same day that the infestation is detected. The procedure is the same as that described for the Department fumigation case. Clearly mark cases being fumigated with cards bearing the appropriate information.

CATALOGUING SPECIMENS

General Notes

1) Do not catalogue until you have the Curator's permission to do so. When possible, all specimens from one accession should be catalogued together. Refer to the accession card and to the collector's field notes to ascertain the number of specimens that should be present. Make sure that any and all skeletons or larvae are included.

2) Before cataloguing begins, specimens must be identified by either the collector or a curator. Refer to collector's field notes for species identification.

3) Salamanders are catalogued first, followed in order by anurans, turtles, lizards, and snakes. ^{Eggs} Individuals of the same species and of the same genus and family are catalogued together. It is useful to arrange specimens so that adjacent individuals repeat as much data as possible. A hierarchical arrangement is best.

4) All parts derived from one specimen will bear the same catalogue number. Alcoholic specimens may have separate skin and skeletal parts. These parts should be cross-referenced on catalogue cards. Make sure that the MVZ Departmental number is written on all specimen parts, as only one part will receive a prenumbered tag.

5) A group of very small reptiles or amphibians or their larvae or eggs from a single locality and collected on a single date may be given a single Department, i.e., catalogue number. The Curator will make the decision in such cases.

Catalog specimens in ~~the orders~~ ^{the orders} mentioned above - then families alphabetically within the order, genus alphabetically within family, + species alphabetically within genus (individuals of the same species should then be ordered by locality). If localities are identical, order by Coll. No.

- 3) cont.
- 1) Caecilians (Gymnophiona)
 - 2) Salamanders (Caudata)
 - 3) frogs (Anurans)
 - 4) turtles (Testudines)
 - 5) Crocs (Crocodylia)
 - 6) Lizards (Lacertilia)
 - 7) Snakes (Serpentes)
- Amphisbaenids →

ACC'N No. 18057 DATE OF ENTRY 10 February 1944 ENTERED BY W. B. F. J.

GENERAL LOCALITY California: Del Norte Co., Mexico: Guadalupe

DEPT. No.	ORIG. No.	NAME	DATE	COLLECTOR	EXACT LOCALITY
220810	S-1102	1000 20113			
220814	S-1102	Bud			
220815					
220816	91-235				
220817					
220818					
220819					
220820					
220821					
220822					

SAMPLE

Triturus rivularis Sample Card Order: *Caudata*
 Family: *Salamandridae*

Twitty, V., *Copeia*, 1935 (2): 73-76

Holotype: MVZ 18131

Locality: Gibson Cr., about one mile west of Ukiah, Mendocino Co., California. V.C. Twitty (coll.) 22 Feb, 1935

Comments:
Triturus rivularis = *Taricha rivularis*

Completing Catalogue Cards

Departmental Catalogue Card

DEPT. No.	ORIG. No.	NAME	DATE	COLLECTOR	EXACT LOCALITY
195601	59675	<i>Bolitoglossa subpalmata</i> ^{JUV.} ♀	6 March 1985	D.B. Wake, N. Staub, G. Roth, E. Persohn	① 23.5 Km S El Empalme Jct. Hwy 2, 2930' m. elev.
195602	59676	" "	"	"	"
195603	59677	" "	"	"	"
195604	59716	<i>Ensatina eschscholtzii</i>	13 April 1985	S.S. Sweet	② Alamo-Little mountain Mutau Creek divide, 2.1-2.4 air mi WNW
195605	59717	" "	"	"	McDonald Peak, 6500-6700 ft. elev.
195606	59718	" "	"	"	"
195607	59719	" "	"	"	"
195608	59720	" "	"	"	"
195609	59724	" "	31 March 1985	D.B. Wake, et al	③ 0.2 mi NE Road to Democrat Beach, Kern River Canyon
195610	59725	" "	"	"	"

- 1) Begin cataloguing each accession with a new Departmental Catalogue card. Use Higgins Eternal Ink in all cataloguing procedures except where indicated.
- 2) At top, after accession number and date, enter your (cataloguer's) last name, first and middle initials.
- 3) Under "General Locality", indicate the states (U.S.) with the counties in which specimens were collected and the countries (foreign) with the states, provinces, departments, etc. in which specimens were collected. Under "Exact Locality" record specific locality given on specimen label. If several general localities are involved on one card, list them in order of first appearance on card and use superscript numbers to link them to the appropriate exact localities.
- 4) Ascertain the number with which cataloguing should begin and count the exact number of specimens to be catalogued. Pre-numbered catalogue tags are kept in the locked cabinet. Numbers that are removed are recorded in the 3-ring notebook that is also kept there.
- 5) When cataloguing an accession of 10 or more specimens, enter 10 numbers in the far left column of one card. Then proceed to fill out the rest of that card before numbering subsequent cards. If more than one card is used in cataloguing the accession, number the sequence of cards with small numbers in the upper right corner of each card.

6) For each specimen, copy the data from field notes onto the Departmental Catalogue card. Print in small, neat letters.

a) Dept. No.: If the specimen differs from the standard preparation (alcoholic), the difference(s) should be marked above the Departmental Catalogue number. Alternative or additional preparations include: "skeleton", "cleared and stained", "formalin", "larvae", "dried skin and partial skel.", "MVZFC___." These additional preparations should be listed as they become catalogued, and not until then. Holotypes, paratypes, and other specimens of special importance are also indicated this way. In addition, a red circle is drawn around the Departmental number of type specimens. *actually, a red square* No lines should be skipped when entering specimen data. All cards, except the last one, must have 10 entries.

b) Orig. No.: This is the collector's number. If there is more than one collector's number on a tag, the person whose field number appears on the label and in whose catalogue the specimen is listed should be written in here. If two people have each given a number to the specimen, put the collector's number without parentheses and the non-collector's number above it in parentheses. Include the collector's initials above the number if more than one collector is involved.

c) Name: Enter exactly as in notes in pencil. For partially identified specimens, allow space for later entry of specific name. The taxonomic rank and spelling of these names is to follow the current checklist of North American amphibians and reptiles.

d) Date is entered as month, day, year. Month should be abbreviated to three letters. The full year should be written out. Date may also be entered as Fall, Winter, Spring, Summer if appropriate.

e) Collector: This is written as the person's first two initials and last name. List all collectors if there is more than one.

f) Exact Locality: Specific locality, followed by elevation, if indicated. (See locality instructions, p. 10). Ditto marks are permissible only if the entire locality remains the same from one specimen to the next. Distances under one mile or one kilometer are preceded by a zero, e.g., 0.6 km.

Corrections made to department catalogue cards are to be made in pencil. A straight line is ruled through the error and the corrected entry pencilled in. This correction is followed by the initials of the person making the correction and the date (month/day/year).

Following the last catalogue number of an accession, write "END OF ACCESSION" beneath the last entry and make a series of short diagonal lines to delete the unused spaces at the bottom of the card. Be sure to record catalogue numbers on the accession card. *through the series of card.*

Final Steps

- 1) Examine cards to check for possible errors in numbers.
- 2) Tie prenumbered Department Catalogue tags on specimens and examine specimen labels (both sides) to check for errors in transfer of numbers or number sequence.

3) Check total between cards and specimens.

4) After cataloguing of a given accession is completed and checked, enter the inclusive numbers on the Accession Card. If cataloguing of all specimens in this accession is completed, draw a diagonal line across upper left corner of Accession Card.

4a) On Permit Coversheet, enter accn. no. & inclusive catalog numbers. (see p. 12a)

5) If all specimens were not catalogued, enter collector's number and disposition of specimen on Accession Card. For example, "exchange collection", "discarded", "destroyed" or "lost", etc.

6) File Departmental Catalogue cards.

7) Fill out Donor Index card (see p. 17) and write "Donor Indexed" in the lower left corner of the Accession Card.

7a) Check that Permit info. is recorded on Accession Card

8) File Accession Card.

8a) File Permit with coversheet stapled in Dept. Catalogue.

9) Install specimens (see p. 18).

10) Once skeletal specimens have been returned from the Senior Museum Scientist, they can be numbered, boxed and installed (pp. 16, 18-19).

11) Note: A specimen from the main collection, given to or exchanged with other institutions, should have a line drawn through its appearance in the Departmental Catalogue, together with the notation "Given to ----" plus the date and the initials of the transferrer. Any specimen discarded or destroyed should be so marked, as above, and specimens which are designated types should be so marked in red ink, together with the citation of the publication in which the original description appears.

PROTOCOL FOR CATALOGUING TISSUES IN THE MVZ COLLECTION

Information on the presence of tissues, their method of preservation, the number of vials per specimen, and/or the tissue type should be indicated in the collector's field catalog. Specimens with numbers assigned in the lab (e.g., S-numbers) should have a tag with that number on them; such tissues may also have an associated field number.

Tissues should be catalogued at the same time as their voucher specimen (e.g., skin, skeleton, alcoholic, etc.), and with the same MVZ catalog number. "Unvouchered" tissues (i.e., those without a specimen or with a specimen in another institution) should also be assigned MVZ catalog numbers. Cataloguing should not begin until field notes and permits have been obtained for all material in the accession, and until all associated tissues have been inventoried. **DO NOT REOPEN THE MVZ CATALOG UNTIL ALL SPECIMENS AND TISSUES HAVE BEEN CATALOGUED FOR A GIVEN ACCESSION.**

1. **Inventory the specimens and tissues against the field or lab catalog.**
 - a. Make a xerox copy of the catalog for use in inventorying and annotating.
 - b. Find out the storage location of tissues from the collector(s). Tissues may be frozen (-80°C) and/or stored in ethanol or buffer.
 - c. *For frozen tissues*, get 2-3 slabs of dry ice from the container in Room 4188; the amount will depend on the number of tissue samples and the length of time that you plan to work at a given session. Log the amount taken on the clipboard near the container (indicate "curatorial" use).
 - d. Inventory frozen tissues in Room 4123A; ethanol or buffer-preserved tissues may be inventoried there or in the curatorial work area of the Museum. Boxes with frozen tissues should be placed on 1-2 slabs of dry ice; for larger boxes, also put ice on top of the tissues.
 - e. Check the number on each vial against the field or lab catalog and verify the species identification on the tube. Annotate the xeroxed copy of the catalog as necessary with information on the preservation method(s), number of vials, and/or tissue type(s). If the tissue type is not indicated in the catalog or on the vial, obtain this information from the collector(s). Standard tissues and their respective abbreviations are: L = liver; K = kidney; H = heart; M = muscle. Other tissue types may include spleen, intestine, lung, testes, toe clips, tail tips, scale clips, etc.

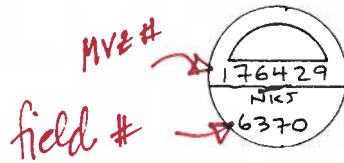
2. **Accession the specimens/tissues and assign individual MVZ numbers**

- a. Fill out the accession and catalog card(s) as described in the Curatorial Manual for herps, birds, and mammals, respectively. Integrate specimens with tissues, specimens without tissues, and "unvouchered" tissues in phylogenetic order.
- b. For specimens with tissues, mark the presence of tissues above the MVZ number on the catalog cards (in permanent ink). The default "+ tissue" indicates frozen tissue only. Note other tissues as follows: "+ tissue in ETOH," "+ tissue in DMSO/EDTA," "+ tissue (frozen + ETOH)," etc.
- c. Tissues without a voucher in MVZ should be indicated as "tissue only." Information on the disposition of the voucher, including the number of the specimen if catalogued in another institution, should be noted in #4H pencil on the catalog card when the information is available. Examples: "Voucher discarded" or "Voucher sent on permanent loan (# XXXX) to Mus. de Zool. USP, Brazil (# XXXXXX)."

3. **Label tissues with the MVZ number**

- a. Make a xerox copy of the catalog cards for use in labelling. Three cards will fit on a page at 90% reduction (placed flush left against the edge of the copy machine).
- b. Using a VWR extra-fine tip lab marker, label the appropriately colored insert with the MVZ number and the collector's initials and field number (or other unique identifier, e.g., S-number) as follows:

put dots for tissues 1, 2, etc.



herps = green insert
birds = white insert
mammals = yellow insert

Inserts are located in a labelled drawer in Room 4123A. Be sure to keep frozen tissues on dry ice (see 1c and 1d above).

- c. With a yellow marker, highlight the MVZ number of specimens with tissues on the xeroxed copy of the catalog cards.
- d. Once labelling is complete, double-check the specimens highlighted on the xeroxed cards against the xeroxed field or lab catalog to ensure that all tissues are accounted for.

- tie tags on ~~left~~ ^{right} leg, ~~left~~ ^{right} below knee
- If very small, tie tag around waist, knot on stomach
- snakes, tie tag tightly behind neck.

TYPES OF SPECIMEN TAGS

A variety of tags is used for cataloguing amphibians and reptiles.

Each and every specimen receives a small, rectangular, preprinted catalogue tag that is tied to a hind limb of fluid-preserved specimens (or through the anterior part of the belly in legless forms) or around the skull or skeleton or through the skin of dried material (where it cannot slip off). The tag is tied diagonally across the pelvis in small salamanders (in front of one hind leg and behind the other). These uniquely numbered tags are obtained by signing them out from the Curatorial Associate. Do not take numbered tags that appear to be unclaimed in the Herp Lab. These may be for other accessions.

Individual specimens, as well as lots or series of specimens, also receive a data tag called a "lead tag." There are three different kinds: a) one for fluid-preserved specimens, b) one for dried specimens, and c) one for specimens where the tag is made out by someone other than the collector.

a) Use only official MVZ alcohol-tolerant tags for fluid-preserved specimens. These are made of heavy, fluid-resistant paper and differ from tags used for dried specimens in lacking a dashed line on the data side of the tag and in being of heavier weight paper stock. To ensure that ink will penetrate well, soak labels overnight in 70% alcohol and then allow them to dry. All tags should be written in Higgins Eternal Ink.



ethanol

b) Tags for dried specimens differ from those for fluid-preserved specimens by being made of lighter-weight paper stock and by having a dashed line on the back of the tag which runs perpendicular to the long axis.

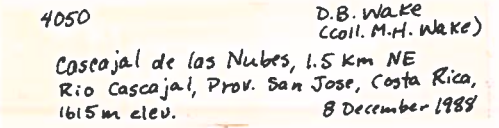
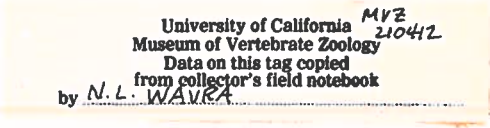


non-ethanol (dry)

c) Sometimes it is necessary for a Curatorial Assistant to write out a specimen tag based on information copied from a collector's catalogue or notes. In this instance use a tag bearing the inscription:

"University of California, Museum of Vertebrate Zoology. Data on this tag copied from collector's field notebook." by _____.

Be certain to enter your name in the place provided.



WRITING SPECIMEN TAGS

Use only Higgins Eternal Ink and do not abbreviate.

Data side: The information on this side of the tag is written in the following manner either by the collector or by the Curatorial Assistant.

Top line: left side -- sex symbol, if known.

right side -- collector's number followed by collector's name.

Occasionally it is necessary for a worker to include in his or her field catalogue specimens collected by someone else. In this case the worker and his or her number precede the name of the collector. Indicate collector as "coll. by."

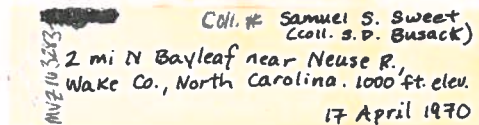
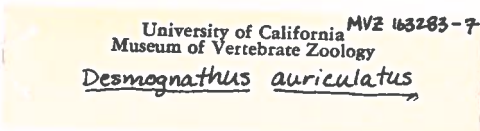
Middle lines: locality, specific to general. Be sure to include county for localities within the U.S.

You may abbreviate state but do not use 2 letter abbreviations ex. not @A but Calif.

Bottom line: left side-- measurements, if taken.

right side -- date (month, day, year). Do not abbreviate.

Left side: The departmental catalogue number, or set of inclusive numbers when a lead tag is used for a series of specimens, should be written perpendicularly to the long axis of the label beneath the string holes. Additional and/or alternative preparations, e.g., skeleton, dried skin, should be written above the catalogue number.



Identification side: This is the side of the tag bearing the MVZ name.

Upper right corner: Write the departmental catalogue number.

Center of label: The proper identification of the specimen, without abbreviation.

Bottom right corner: List any additional or alternative preparations.

Often a series of fluid-preserved specimens is collected by an individual from one locality on a given day. Such specimens are catalogued individually, i.e., each specimen receives its own preprinted catalogue tag. However, only one data tag is made out for the entire series. This is tied to a hind leg of the first specimen in that series, or diagonally across the pelvis of small animals, and is referred to as the lead tag. The inclusive catalogue numbers for that series are written on the lead tag instead of just a single catalogue number. If the series has to be divided into more than one jar, a separate lead tag is placed on the first specimen of the series in each jar.

Because dried specimens are always boxed individually, a separate tag is made out for each specimen.

WRITING JAR LABELS

There are three sizes of jar labels for wet specimens. All labels are written in Higgins Eternal Ink using a broad-tipped pen. Once dry, labels should be rinsed under running water to remove any excess ink and to avoid smearing when placed inside the jar.

Large labels are used in all jars containing specimens preserved in formalin and alcohol. The two smaller sized labels are reserved for cleared and stained specimens.

First line -- genus, species (and subspecies if applicable).

Second line -- leave blank.

Third line -- locality information. If all specimens from one state within the United States or from one foreign country fit into a single gallon jar, then only that state or country is listed on the jar label. If it requires more than one gallon-jar to accommodate all such specimens, then specimens should be placed in jars by counties (within the U.S. state) or by states (within that foreign country).

If more than one gallon jar is needed for any one county or foreign state, put specimens in jars numerically and write the inclusive MVZ catalogue numbers on the bottom line of the jar label.

~~Only 3 one-gallon jars should have MVZ numbers written on them. If more than 3 one-gallon jars are needed for a given county or province, then all specimens are placed in a 5-gallon white, plastic bucket with a label bearing the taxon name and the state and county (or country and province). It is not necessary to write MVZ catalogue numbers on bucket labels unless more than one bucket is needed. An 8 oz. jar should be placed on the shelf where the specimens belong, with a label that says "See bucket on floor" written on the bottom line.~~

Type specimens are to be given jar labels with red borders and a red-bordered specimen label is attached to such specimens. Use carmine India Ink in marking these labels. Such specimens are not installed in the regular collection (see p. 18).

DIPSOSAURUS DORSALIS

MEXICO: BAJA CALIFORNIA SUR

°MVZ 9514-50013

University of California
Museum of Vertebrate Zoology





MVZ 187071-5

THORIUS SCHMIDTI

MEXICO: VERACRUZ

University of California
Museum of Vertebrate Zoology

MAKING TANK LABELS

- All tank labels should be typed on the computer using Word Perfect and printed with the laser printer onto heavy white paper (or "cover" stock).
- Species names should be in bold and in italics but localities should be neither bold nor italic. Countries should be in capital letters while states and provinces should be lower case.
- Use the **Times scalable** font. Species names should be 26 point and localities should be 22 point font size. If you require more than 7 lines (including spaces) change the font size to 22 for the species name and 20 for localities.
- A space on the label indicates a divider in the tank. If there are several species in the tank with no divider leave no spaces on the label.
- If tank is divided vertically, list species in order left to right. 
- If tank is divided horizontally, list species in order top to bottom. 
- If tank is divided diagonally, list species in order top left to bottom right. 
- If tank is divided in 4 sections, list species in order top left to bottom right. 
- Label dimensions are 5" x 3.25"
- If you cannot fit all the information on one label (not even using 22 and 20 point font size) you can use 2 labels. The labels should be placed on the tank one below the other.

SAMPLE TANK LABELS

Masticophis flagellum

California: San Bernardino Co.

Tank divided
into 2 sections.

Masticophis mentovarius

MEXICO: Guerrero

Crotalus scutulatus

MEXICO: Chihuahua

Tank divided
into 3 sections.

Arizona: Cochise Co.

California: San Bernardino Co.

Lampropeltis getula (22 point)
MEXICO: Baja California Sur (20 point)

Tank divided
into 3 sections.

California: San Joaquin Co.

1. MVZ 5574 – 67483

2. MVZ 778695 – 998850

Kinosternon hirtipes (22 point)
MEXICO: Chihuahua (20 point)

Kinosternon integrum

MEXICO: Sinaloa

Kinosternon sonoriense

California

Note that there is no space in the last example, since the species are in the same section of the tank (this tank is divided into 2 sections). Also note that this label only required 7 lines but had to be done in smaller font size.

WRITING BOX-TOP LABELS FOR DRY SPECIMENS

There are several different sizes and styles of box-top labels. Choose the most appropriate for each specimen. All labels should be written in Higgins Eternal Ink with the exception of the scientific name, and all specimen label information should be taken from the collector's field notes.

UNIVERSITY OF CALIFORNIA MUSEUM OF VERTEBRATE ZOOLOGY	
Mus. No. 64217	♂ Orig. No. 424
<i>Rattus norvegicus</i>	
1.3 mi. N, 0.2 mi. W Civic Center, Richmond	
Contra Costa Co., Calif.	
SKELETON ONLY	

UNIVERSITY OF CALIFORNIA MUSEUM OF VERTEBRATE ZOOLOGY	
No. 142747	JHF Orig. No. 498
Woolward, Benton, Oakwood, and Hughes St., Bakersfield, Kern Co., California	
24 Sept. 1996 J.H. Feder	

specimen description

- | | |
|-------------------|---|
| No. | -- MVZ Departmental Catalogue No. |
| Orig. No. | -- Collector's No. followed by collector's initials. |
| 1st line | -- Scientific name, no abbreviations, written in PENCIL. |
| 2nd and 3rd lines | -- Locality, specific to general. Do not abbreviate state. |
| Bottom line | -- Date (day, month, year) in lower left corner. Abbreviate month to three letters. Collector's last name and first two initials in lower right corner. |

Place specimen description, e.g., skeleton only, part. skel., dried skin, etc. in space below bottom line if label does not already indicate this.

Place any additional notes from collector's tag on bottom line of label.

Before gluing label to boxtop with rubber cement, check the drawer into which specimens will be installed in order to determine the orientation of the boxes and the labels on them.

DONOR CARD FILE

This file serves to identify individuals who have donated specimens to the various collections as well as the number of specimens involved. All accessions resulting from an individual's efforts are listed sequentially on one or more cards. These cards are filed alphabetically in the Donor File.

Check the Donor Card File for the individual's name before starting a new card for that person. Fill out a card completely before starting a new card. Enter the Accession number in the first column, the total number or specimens of each kind received by the Museum in the appropriate column. Enter the general locality as it appears on the Accession Card, the collector's (or donor's, etc.) name, the date the specimens were received for accessioning by the Museum, and the way in which we received them. In this last column enter "MVZ staff", "MVZ trip", "Gift", "Purchased", etc.

Cross reference by filling out a Donor card for collectors other than this donor.

When this card is completed, print "Donor Indexed" in the lower left corner of the Accession card.

③

INDEX TO ACCESSIONS

UNIVERSITY OF CALIFORNIA
MUSEUM OF VERTEBRATE ZOOLOGY

FROM Wake, David B.

ACC.	MAMM.	BIRDS	R. & A.	EGGS & N.	GENERAL LOCALITY	COLLECTOR	REC'D	HOW
12229			1		Calif. San Diego Co.	D. B. Wake	¹³ May 1983	gift
12287			8		Costa Rica	D. B. Wake	¹² March 1984	MVZ exp.
12296			174		Calif. Oregon + Washington	D. B. (most) Wake	⁷ May 1984	gift
12422			25		Mexico, Costa Rica	P. B. W. + K. T. Lucas	⁴ Sept. 1985	MVZ trip
12423			63		Costa Rica, Mexico Calif. Los Angeles Co.	D. B. Wake	⁴ Sept 1985	MVZ trip
12431			12			D. B. Wake, J. Ruddle, K. Yaner, S. Sweet	¹⁴ Sept 1985	gift
12465			2		San Diego Co., Calif	D. B. WAKE	⁷ Oct 1985	"
12466			3		San Diego + Los Angeles Cos Calif.	D. B. Wake	⁷ Oct 1985	"
12467			2		Costa Rica	D. B. Wake	⁷ Oct 1985	"
12480			1		Tolome Co., Calif.	D. B. Wake N. Staub	¹⁵ Oct 1985	MVZ trip

INSTALLATION OF SPECIMENS

After all specimens have been catalogued and any skeletal material cleaned and numbered and labels made, specimens may be installed in the collection.

Fluid-preserved specimens

Before specimens are installed, the collection should be checked to determine whether or not an appropriate jar already exists on the shelves to which the newly catalogued specimens may be added. Should the appropriate jar be full of specimens or should there be no jar for the given locality, a new jar should be prepared (p. 16).

Often specimens in small jars can be transferred to larger ones using the same jar label. Specimens are arranged alphabetically by genus and species within orders and * families. Within any given taxon jars are arranged alphabetically by locality, starting with country, then states within countries, then by counties within states for the United States. There are some exceptions, e.g., *Batrachoseps* salamanders.

If all specimens from a given country do not fit into a gallon jar, separate jars must be labeled for each state within that country. If all specimens do not fit into a gallon jar for a U.S. state, then specimens must be divided into jars by county. New jar labels should be made (see p. 15). Subdivision and arrangement of taxa by subspecies is done only in special cases such as in the salamander *Batrachoseps pacificus*. Consult a curator on this matter. Under no circumstances should specimens be crowded into jars.

see also p. 15 - notes on placing specimens in buckets

Eggs or larvae bearing a single catalogue number should be placed together in a screw-cap jar or vial. Each vial is plugged with cheesecloth. These jars, if small in size, can be placed with others in a large museum jar and immersed in 10% formalin. Larvae should not be tied in gauze or cloth sacks as they are likely to become crushed or misshapen. Large museum jars, containing eggs and larvae or any other formalin-stored specimens and labelled "FORMALIN", are placed at the beginning of each species series in the range room for which we have such material. Loose specimens may be kept in these jars.

Stop: specimens at the end of each series.
Type specimens are stored separately. Jar labels will be bordered in red (see p. 15).

Dried Specimens

Skins, skeletons, dried or hollow eggs, etc., are stored in standard museum cases in the Main Gallery of the Museum. The basic hierarchy of their arrangement is:

- Taxonomic order -- alphabetically by genus and species within families and orders.
- Geographic locality -- alphabetically from general to specific to the level of U.S. county or foreign province. Within county or province, specimens are arranged by MVZ catalogue number.

Place any specimen not identified to species at the ^{end} ~~front~~ of the series for that genus. If you install a genus or species previously unrepresented in the collection, retype tray-front, case, front, and/or shelf label.

Cleared and Skinned Specimens

These specimens are prepared similarly to the material in the collection except:

(1) Salamanders are 1 species per jar and not one jar per species (due to space considerations) the fact that we have a jar for each order (1 jar per order)

(2) Only one jar per locality type collection but are distinguished by plate

a red border label w/ name, locality, + MVZ # into an empty jar in the collection

Notes: Hybrid spp.
→ if specimen is a hybrid with hybrid sp. in alphabetical order (ex: *Crotalus mitelli* * vindi) and arrange in collection alphabetically

MVZ Cleared and Stained Collection

The MVZ cleared and stained (C&S) collection is housed in the first alcohol room with the salamanders. This collection is arranged in the same phylogenetic order as the main collection and is curated similarly to the regular collection with the following exceptions:

-There may be more than one jar for the same locality. Jars should not be filled to capacity, because C&S specimens are more fragile than regular specimens.

-Because glycerin will not evaporate, it is not necessary to fill jars to the top. Overfilled jars will leak glycerin which permanently removes paint from shelving.

-All MVZ #'s contained within the jar should be written on the upper right corner of the jar label.

-There are only 4 sizes of glass jars that are to be used for C&S specimens, and all of these sizes are unique to C&S. They are: 2 oz, 4 oz, 8 oz, and 16 oz. They can easily be recognized because they are more short and "squat" than alcohol jars of the same volume.

-All C&S specimens should have "C&S" written in indelible ink over the department # on the catalog card.

-Notify the Curatorial Associate of any newly cleared and stained specimens so that C&S status may be indicated in TAXIR.

-DO NOT take MVZ specimens to be cleared and stained without leaving a blue slip (even though it may not be a formal loan), and DO NOT reinstall them into the C&S collection without notifying both the Curatorial Assistant and the Curatorial Associate.

SA 8/30/75

SPECIAL NOTES ON SKELETONS

Upon completion of catalogue cards, gather any dried but uncleaned skeletons and place them in a specimen tray with the accession number, collector's name, and a list of each type of specimen, e.g., 6 complete frog skeletons. Then notify the Curatorial Associate who will send a note to the Senior Museum Scientist. Each specimen should bear at least a skull tag with the collector's initials and field number on one side and the catalogue number, written in both Higgins Eternal Ink and in pencil, on the other side. Skull tags should be moistened and then dried prior to writing on them to aid their absorption of ink. Tags should be tied loosely but securely around specimens. Excess string should be cut.

Specimens will be returned to a designated work case after cleaning. Nothing is to be removed directly from the preparation room.

NUMBERING BONES

Cleaned skeletal specimens should be numbered one at a time using a quill pen and Higgins Eternal Ink. Make sure that bones are free of grease and bone membrane that prevent ink from penetrating or cause ink to smear. Delicate bones are easily punctured in numbering, so please be cautious in handling and in applying pressure from the pen.

Place the departmental catalogue number on all bones on which it can be legibly written. For smaller skeletons numbers should at least be written on long bones, pelvis and sternum. For large bones, a broad-tipped pen should be used for numbering. Smears and mistakes can be scraped off with a razor blade (gently) once the ink has dried.

C1V1 = C2V2
(95)(10) = () (13.8)

160
3.5 gal
1.75
ETH
10 gal
5 gal

ALCOHOL, FORMALIN, AND SUPPLIES

Alcohol and formalin solutions are to be made up by the Curatorial Assistants and should be mixed up as needed.

Alcohol:

5-gallon drums of 95% ethyl alcohol (ETOH) are kept in a locked, green cabinet outside the herp lab. 70% ETOH is mixed in a 15-gallon carboy -- 3 1/2 gal. water are added to two 5-gallon drums of 95% ETOH.

Keep track of the number of drums used. When only 5 drums remain, ask the Curatorial Associate to order more.

It is illegal to have more than 75 gallons of tax-free alcohol in the Museum, and it must be locked up at all times. The Curatorial Associate has the key.

Formalin:

10% formalin is used to preserve specimens and to store eggs and larvae. It is kept in a 5-gal. carboy in the herp lab. Formalin should be buffered using a small amount of magnesium carbonate -- about 1/2 tbsp per gallon of 10% formalin, enough so that it doesn't all dissolve. Buffer is stored beneath the counter in the herp lab.

~~95% formalin is stored in 5-gal. drums beneath the counter as well.~~ It is diluted to 10% by mixing 1 part formaldehyde with 9 parts water.

Buy 1 Liter bottle of 37% w/v formaldehyde, from Fisher.

Small quantities of glycerin and of isopropyl alcohol are also stored in the herp lab. Requests for these and for all supplies, including soap, paper towels, plastic bags, jars, lids, forceps, etc., should be made to the Curatorial Associate.

10 liters = 2.642 gallons. Thus, add 1.321 Tbsp. or 3.964

PREPARING MUSEUM SPECIMENS

Feeding and Animal Maintenance

All feeding and maintenance of animals is governed by regulations of the Office of Laboratory Animal Care (OLAC) of UC Berkeley and subject to the authority of the Curators-in-charge.

Killing Live Animals

*See next page
for alternatives*

For Reptiles: Inject a concentration of 60 mg/cc nembutal or diabutal into the body cavity, near the heart, in the following amounts. This should not be injected full strength because it causes the animal to kink. 1 numbutal: 3 water or so is a good ratio.

For Amphibians: Immerse amphibians in a 1:4 (or weaker) solution of 20% saturated chloretone solution. Prolonged immersion will cause animals to kink.

Preparation and Preservation of Fluid-Preserved Specimens

Specimens should be preserved immediately after killing. Reptiles and amphibians which have been properly positioned and allowed to harden provide the greatest amounts of information. The extra time and care required is well worth the effort. The equipment required is not elaborate; shallow trays with covers and paper towels. Cover the bottom of the tray with paper towels and soak with formalin, allowing less than an eighth of an inch of liquid free in the bottom of the tray. Place specimens in the manner described below in the tray and cover. Check frequently to be sure paper does not dry out. Place in fixing trays belly down, arms and legs extended (Fig. 1c).

Received: from diana.sfsu.edu (root@diana.sfsu.edu [130.212.10.239]) by socrates.berkeley.edu (8.8.8/8.8.0) with ESMTTP id TAA14268 for <ccicero@socrates.berkeley.edu>; Wed, 10 Mar 1999 19:31:00 -0800 (PST)
Received: from [130.212.231.175] (dhcp231-175.sfsu.edu [130.212.231.175]) by diana.sfsu.edu (8.8.7/8.8.7) with ESMTTP id TAA29972 for <ccicero@socrates.berkeley.edu>; Wed, 10 Mar 1999 19:30:49 -0800 (PST)
Message-Id: <v03007807b30ceb66d36d@[130.212.231.175]>
Mime-Version: 1.0
Content-Type: text/plain; charset="us-ascii"
Date: Wed, 10 Mar 1999 19:44:46 -0800
To: ccicero@socrates.berkeley.edu
From: Chris Feldman <varanus@sfsu.edu>
Subject: Herp Protocol
X-UIDL: 09c09e3dbef292918899efb15c01dcfa

Carla--

I spoke to Jens about the products the CAS are using to euthanize herps. To kill Amphibians they are using, "MS-222", and to kill reptiles they are using, "Buthanasia". I have used both and they are incredibly effective and humane. Jens said he would be glad to talk to you about these products and send you the appropriate information. His direct line is: 1-415-750-7037.

I'm very glad that you have taken intrest in this issue. I hope the MVZ can acquire these products soon.

best regards,
Chris

Chris Feldman
131 Hensill Hall (Spicer Lab)
Department of Biology, San Francisco State University
1600 Holloway Ave
San Francisco, California 94132
(415) 338-2497
<http://userwww.sfsu.edu/~varanus/index.html>

MS-222 - $\frac{1}{4}$ Teaspoon in 20 ml water
can be reused and the solution kept at
room temperature

Yep, it is Clove Oil. It usually comes in about an 8ml bottle. Mix the 8ml of Clove oil with about 35ml of 95% ETOH. This is your stock solution. When you are ready to kill amphibians, get a bucket of water, about 1-2 gallons and dump about half of the stock solution in. You will know fairly quickly if concentration is not strong enough. If the amphibians do not fall into a deep bliss (sleep) in about 4-5 minutes, you need to increase the concentration. This solution should last about a week of heavy killing, longer if you aren't offing a lot of animals. Again, after some time, if the animals don't fall asleep in 4-5 minutes, just add a bit more of the stock solution.

1 gallon = 3.785 L

You can find clove oil in almost any drug store. It is used for relieving sore gums in teething babies. So, check around the tooth brushes. If you see products like Ambesol, or Oral Gel, that is where the Clove oil should be. It is getting kind of difficult to find it around here. I have gone to about 5 drug stores and only found 2 small bottles. Start looking now.... I paid \$4 canadian for an 8 ml bottle.

Subject:

BOUIN'S FIXATIVE

PURPOSE: Used for testes biopsies, also as a mordant for staining procedures.

REAGENTS:

Bouin's Fixative

Saturated picric acid 3000.0 ml
Formaldehyde 1000.0 ml
Glacial acetic acid 200.0 ml

CAUTION: CARCINOGENIC, IRRITANT, TOXIC

SAFETY: Work in a well ventilated area, wear gloves, lab coat and goggles.

Avoid contact and inhalation.

Picric acid can become explosive if allowed to dry out. Toxic through skin exposure.

Formaldehyde: severe eye and skin irritant. Sensitizer by skin and respiratory contact. Toxic by ingestion and inhalation. Target organ effects on respiratory system. Corrosive. Carcinogen.

Label with FORMALDEHYDE WARNING label.

Acetic acid: Target organ effects respiratory system. Corrosive.

FIXATION TIME: Small biopsies fix in 2 to 4 hours, large specimens may remain in fixative up to 3 days.

PROCEDURE:

1. Fixed tissue may be retained in 10% formalin or 70% alcohol.
2. Remove the picric acid from the tissue prior to staining by :
 - a) washing in tap water
 - b) grades of alcohol (50%)
 - c) or 70% alcohol saturated with lithium carbonate.

REFERENCE: Carson,F, Histotechnology: A Self-Instructional Text, pp 19, 1st ED, 1992, ASCP Press

Crookham,J, Dapson,R, Hazardous Chemicals in the Histopathology Laboratory, 2nd ED, 1991, Anatech

Prepared: _____ By: _____

Approved: _____ By: _____

BOUIN'S FIXATIVE

Saturated picric acid 1500.0 ml

Formaldehyde 500.0 ml

Glacial acetic acid 100.0 ml

Mix well, stable for 1 year. Label, initial and date.

CAUTION: CARCINOGENIC CONTAINS FORMALDEHYDE, IRRITANT, TOXIC

SAFETY/PPE: Avoid contact and inhalation. Picric acid becomes explosive when allowed to become dry.

DATE: _____

TECH: _____

EXPIRATION: _____

ALCOHOLIC BOUIN'S / DUBOSCQ-BRAZIL FLUID

PURPOSE: For the fixation of kidney biopsies. Histology prepares the fixative.

REAGENTS:

Stock Alcoholic Bouin's

Solution:

80% alcohol	750.0 ml
Formaldehyde	300.0 ml
Picric acid	5.0 gm

Working Solution:

Stock solution	70.0 ml	14.0 ml
Acetic acid	5.0 ml	1.0ml

Add the acetic acid right before use.

Mix solution well. Solution is stable for 2 years. Initial and date lable.

CAUTION: Carcinogenic, flammable, corrosive.

SAFETY: Wear gloves, goggles and lab coat. Work under hood or well ventilated area. Avoid contact and inhalation.

Picric acid can become explosive if allowed to dry out. Toxic through skin exposure.

Formaldehyde: severe eye and skin irritant. Sensitizer by skin and respiratory contact. Toxic by ingestion and inhalation. Target organ effects on respiratory system. Corrosive. Carcinogen. Label with FORMALDEHYDE WARNING label.

Acetic acid: Target organ effects respiratory system. Corrosive.

FIXATION TIME: 1 to 4 hours.

PROCEDURE:

1. Place fresh tissue specimen in Working Alcoholic Bouin's fixative.
2. After adequate fixation time, transfer tissue to 70% alcohol.

FIXATIVES

ALCOHOLIC BOUIN'S

REFERENCE:

Zamboni, L., Preparation of Pericutaneous Kidney Biopsy for Light Microscopy, Human Path., Vol. III, pp. 127-132, 1972

Clark, G, Staining Procedures, 4th Ed, 1981, pp15, Williams & Wilkins

Crookham, J, Dapson, R, Hazardous Chemicals in the Histopathology Laboratory, 2nd ED, 1991, Anatech

Prepared: _____ By: _____

Approved: _____ By: _____

Downloaded from WebPath: Internet Pathology Laboratory
<http://www-medlib.med.utah.edu/WebPath/webpath.html>

Stock	Alcoholic	Bouin's
Solution:		
80% ETOH		750.0 ml
formaldehyde		300.0 ml
Picric acid		5.0 gm

Mix solution well, stable 1 year.
Initial and date.

Working Solution:

Stock solution	70.0 ml	14.0 ml
Acetic acid	5.0 ml	1.0ml

Add the acetic acid right before use.

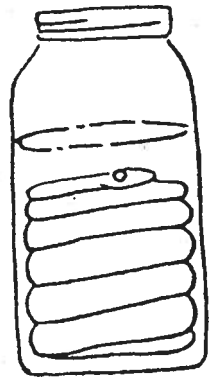
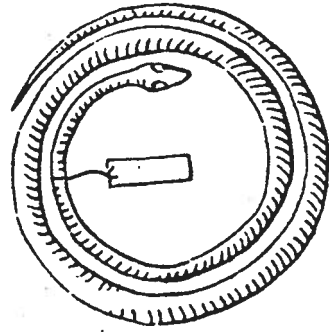
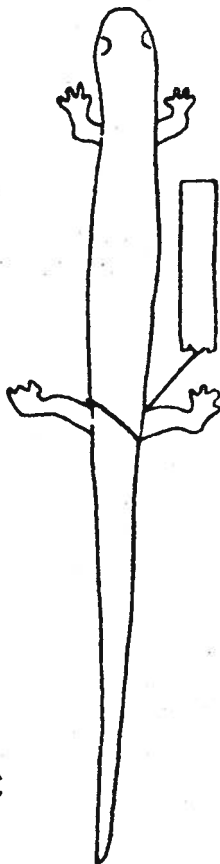
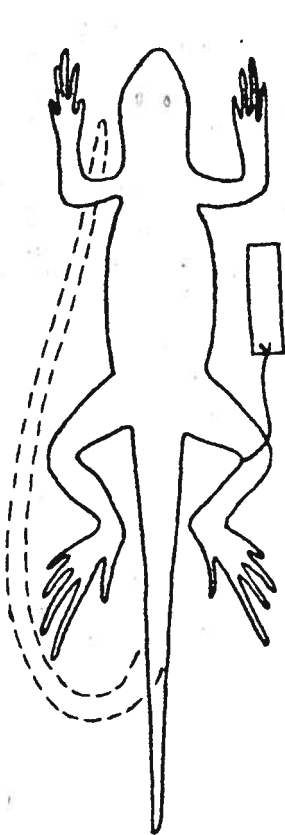
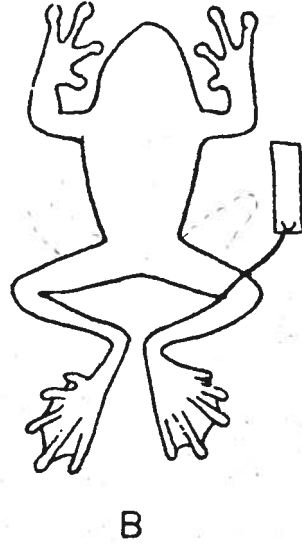
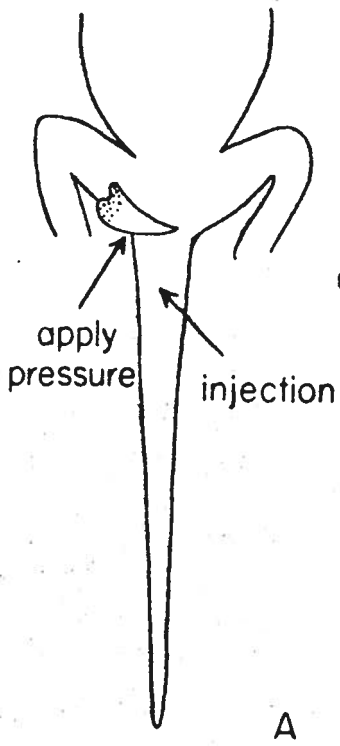
CAUTION: Carcinogenic, contains formaldehyde, flammable, corrosive.

SAFETY & PPE: Wear gloves, goggles and lab coat. Avoid contact and inhalation

Date: _____

Tech: _____

FIGURE I



D

less if its a small species!
3-5 days may be more than enough

1. Salamanders: Fix in 10% neutral buffered formalin. Due to the absorbent skin, no formalin need be injected except in large salamanders, such as an adult Dicamptodon or larger. A salamander tail often will twitch after the animal appears dead. Ten to fifteen minutes after they have been laid out, check to see if the tail is still straight. After hardening for at least one week, but no longer than 10 days, soak the specimen in distilled water (several changes over 24 hours) and place the salamander in 70% ethyl alcohol. Before the animal is placed in the formalin, the specimen label (containing the field number, collector, exact locality, and date of collection), should be tied using a square knot around the posterior portion of the body, leaving the left leg behind the string and the right leg extending in front of the string.
2. Anurans: Fix in 10% neutral buffered formalin. Sufficient formalin should be injected to return the body cavity to its natural shape. All major muscle masses of very large specimens should also be injected. Then harden in same manner as for salamanders. Place belly down in the fixing tray, arms extended and legs bent (Fig. 1b). The fingers and toes should be separated and extended, especially if they are webbed. Place the forearm in a position such that the elbow to the tip of the fourth finger forms a straight line. The specimen label and departmental number tag are tied on the right hind leg, above the knee. Tadpoles are always stored in formalin and are handled in the manner described for salamander larvae.
3. Turtles, tortoises: Fix in 10% neutral buffered formalin. The animal must be injected generously with formalin, using a large syringe. The four legs, head, and tail should be fully extended. The legs and tail should be injected to prevent decomposition. The mouth must be propped open as widely as possible using a cork or stick. The specimen label and department number tag are tied on the right hind leg just above the knee. After at least 48 hours in 10% formalin, the turtle is rinsed in water and placed in 70% alcohol. Where the tail is too narrow for injection, holes should be poked to allow formalin to enter.
4. Lizards: Fix in 10% neutral buffered formalin. Inject the body cavity with formalin until the animal assumes a natural body shape. Where the tail is too narrow for injection, holes should be poked to allow formalin to enter. If no injection equipment is available, slit the belly to the left of the midline, being careful not to cut ribs or sternum. The limbs and tail should be injected when possible or small slits made along the tail at intervals using a sharp blade. Place the lizard in the fixing tray belly down with legs and arms extended (Fig. 1a). If the tail is long, bend it around the side of the body. Limbless lizards which are very large should be coiled like snakes. If possible, one hemipenis of male lizards should be fully everted. This is accomplished by applying pressure just behind the vent and at the same time injecting preservative at the base of the tail (Fig. 1a). In large lizards, alligators, etc., the legs and tail should also be injected. Small lizards, the size of Sceloporus, may be fixed straight, but larger lizards must be fixed in a curved position, to fit into a bottle. Remember to fix specimens in a container of the correct size, usually a quart mason jar, or if necessary because of the size of the specimen, a gallon jar. The specimen label is tied using a square knot, on the right hind leg above the knee.
5. Crocodylians: Fix in 10% neutral buffered formalin and prepare as for a large lizard.
6. Snakes: Fix in 10% neutral buffered formalin. Inject a quantity of preservative at the base of the tail to fully evert one hemipenis and along the length of the specimen to fill out the body shape. If this is not possible, slit the belly to the left of the midline at one-inch intervals. As with lizards, a series of slits to one side of the midline along the tail should be made. Where the tail is too narrow for injection, holes should be poked to allow formalin to enter. Tie the string tightly around the body at a point about 1/3 of the total length back from the head using a square knot. The fixing of snakes should be done belly down in

quart or gallon jars, depending on the size of the snake, with the head up in the bottle and filled with formalin. Tall narrow jars should be avoided for large snakes. Quart or pint sizes are best (Fig. 1d). After fixing for at least 48 hours, rinse for 24-48 hours in distilled water and place in 70% alcohol.

Preparation of Skeletal Specimens:

Do not use formaldehyde in killing specimens that are to be skeletonized by dermestid beetles. Remove the skin including, if possible, that on top of the head and on the tips of the digits. Remove the eyes and viscera, being careful not to damage the skeleton. Tie a "skull tag" loosely around the vertebral column.

The skull tag should contain the following information: the collector's initials and field number and the sex and snout-vent length of the specimen. This information should be written in Higgins Eternal Ink on one side and repeated in pencil on the other.

Carcasses should then be soaked in water to remove blood. Prop open the lower jaw with a stick, wad of cotton, or a piece of folded paper towel. Arrange the carcass so it will fit conveniently into one of the boxes for skeletons. Place the carcass on a paper towel exposed to warm dry air. Rapid drying, e.g., placing the specimen directly under a lamp, will reduce the chances that the specimen will become fly-blown. Put the original specimen label in a safe place for later attachment. If left with the specimen it may be damaged by dermestid larvae.

When a number of skeletons have accumulated, notify the Curatorial Associate. The Senior Museum Scientist will process them through the Museum's dermestid beetle colony. Cleaning of skeletons should be complete enough to rid them of all flesh, but not so severe as to separate tarsal and carpal bones.

When the skeletons are returned, they are catalogued in the same manner as specimens preserved in alcohol, with the exception that all the major bones must be labelled with the department catalog number (p. 19). The departmental number tag is tied to the skeleton. The specimen tag is placed in the skeleton box. It is not attached to the specimen. Skeleton box labels are to be found in the herpetology laboratory (see p. 16).

Preparation of Dried Skins:

After carefully skinning the specimen, soak skin in water for ca. 1/2 hr. Using a blunt razor or pair of forceps, scrape the skin to remove any attached muscle.

For anurans, pat the skin dry, spread it out flat, and glue it to a white mounting card. The departmental catalogue number should be written in the upper right corner of the card. The identification of the specimen, followed by the collector's number and initials, the sex, locality, date of collection, and collector's name should be written in the lower left corner (p. 25).

Mounted skins should be placed in cellophane envelopes and are filed alphabetically by taxon in a cardboard file drawer currently located in the bottom of the last herp skeleton case.

for another method - see review

Dried Pliable Skin Preparation for Herps (and other unfeathered/unfurred specimens)

Preparation from Andy Gluesenkamp (unpublished)

1. Remove all fascia and muscle from the skin.
2. Salt the skin and lay it out to dry inside-up. This takes days to weeks, depending on the size of the specimen. Use LOTS of salt. (There is an open salt bin in the herp lab.)
3. Brush off excess salt and soak the skin in a mixture of 1:1 glycerine/ethanol. This takes a week or more, depending on the size of the specimen. (There is a prepared mixture in the alcohol storage room.)
4. Rinse the skin in ethanol to remove excess glycerine and pat dry with towels.

Snakes, lizards, or large anurans that will not fit on mounting cards should also be soaked in water and scraped. They should then be spread out on paper towels or newspaper until dry. Once dry, peel skin off carefully, removing as much paper as possible. Make sure that each skin has a skull tag or cleared and stained tag tied through an eye hole or nostril with the collector's initials and field number written on it in both Higgins Eternal Ink and in pencil.

MVZ - 137610



MVZ-FC 10041 J.E. Cadle

Canoochee rd., 7.5 mi. W. intersection
w/Hwy 56
Emanuel Co., Georgia
coll. 6 July, 1976

Hyla chrysoscelis

To soften skins, specimens may be soaked in glycerin, beginning with a dilute solution of 50% concentration. After 1-2 weeks the solution can be changed to 75% and then again to 100% concentration. Skins should then be wrapped in absorbent lab mat material for several weeks until glycerin is absorbed out and skins are no longer greasy to the touch. This may take several changes of paper. Skins may then be rolled and stored in a standard museum box. An MVZ skin tag with complete data should be placed with the specimen at that time and an appropriate box label made (see pp. 14, 16).

Preparation of Cleared and Stained Specimens

Use material that has been fixed in 10% formalin if possible. However, alcoholic material may be used if not too old. Remove the skin and viscera in large specimens. Never remove the skin when dealing with small delicate forms. Soak the specimen in distilled water for 24 hours and place in a 2% KOH solution for 12-24 hours. If the specimen is heavily pigmented, add 3% hydrogen peroxide directly to the KOH. In order to increase the clarity of the specimen and to aid in protein breakdown, the specimen may at this point be placed in 200 mL of enzyme buffer and 1/2 teaspoon of trypsin. Allow one day to several months for clearing, depending on size and condition of the specimen. Stain the specimen in 2% KOH plus stain (Alizarin Red-S; 100 cc of 2% KOH to 1 cc of stain). The staining should take about one day, but this is dependent on the size of the specimen and how darkly it is to be stained. After the specimen reaches the desired stain, place it in fresh 2% KOH with a few drops of glycerin to destain and clear it. leave it in this solution until most of the stain is removed. Bring down slowly to 100% glycerin in stages:
[see DBW for instruction in double clearing and staining for amphibians]

<u>Stage</u>	<u>Parts Glycerin</u>	<u>Parts 2% KOH</u>	<u>Parts HOH</u>
1	20	3	77
2	50	3	47
3	75	0	25
4	100	0	00

Procedure for Rehydrating Dehydrated Herps

Which will need to be used on all Mayhew specimens

This is the short version of a paper in publication by G.M. McLaughlin and K. R. Zamudio. Should this reference sheet be insufficient, please either use the references given below, or see Kelly Zamudio for a manuscript of the paper.

1. Vogt, K.D. 1991. "Reconstituting Dehydrated Museum Specimens." *Curator* 34: 125-131.
2. Marhue, L. 1983. "Techniques to Restore Dried-up Invertebrate Specimens." In: Proceedings of the 1981 Workshop on the Care and Maintenance of Natural History Collections, ed. D.J.Faber, *Syllogeus* no. 44: 175-177.
3. Thompson, J.R.; Thompson, M.H.; Drummond, S. 1966. "A Method for Restoring Dried Crustacean Specimens to Taxonomically Usable Condition." *Crustaceana*, 10: 109.
4. Van Cleave, H.J.; Ross, J.A. 1947. "A Method for Reclaiming Dried Zoological Specimens." *Science* 105:318.
5. Levi, H.W. 1966. "The Care of Alcoholic Collections of Small Invertebrates." *Systematic Zoology* vol. 15, #3: 183-188.

Rehydration in Acetic Acid:

Place specimens in a bath of 10% by volume glacial acetic acid and distilled water. Leave them in for 7-14 days depending on live weight (specimens greater than 50g should remain in the bath for more than 7 days). The longest they are left in, the more permeable the membrane becomes and the better the rehydration. However, the longer they are left in, the more sensitive the skin and scales become to deterioration. The most extreme situation is where the scales are brushed off simply by handling. After 7-14 days in 10% acetic acid, the specimens should be transferred directly to a 5% acetic acid bath, with no distilled water wash in between. This second acetic acid solution is run for another 7-14 days. Next, place the specimens in a distilled water wash overnight (8 hours). Next, place them in 30% ethanol for 24 hours. Gradually work the concentration of ethanol up to 70% (I used 30%, 50% and 70% and it worked fine) with 24 hours in each solution. Flexibility should come into muscle tissue, color should return to skin, and some texture may be restored. Internal organs and musculature will NOT be completely rehydrated, but this is the best method available.

Received: from [128.32.214.38] (mvz28.MVZ.Berkeley.EDU [128.32.214.38]) by socrates.berkeley.edu (8.8.8/8.8.0) with ESMTTP id PAA20157 for <bstein@socrates.berkeley.edu>; Mon, 26 Oct 1998 15:05:02 -0800 (PST)
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Message-Id: <v04011701b25a5472fbfb@[128.32.214.38]>
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X-mailer: Eudora Pro 4.0.1 Macintosh
Date: Mon, 26 Oct 1998 15:06:34 -0800
To: "Barbara R. Stein" <bstein@socrates.berkeley.edu>
From: "Kelly R. Zamudio" <zamudio@socrates.berkeley.edu>
Subject: Re: Mayhew summary
X-UIDL: aff10b02f4615e34b468540379e40ddc

Barb- sorry for the delay... but here it is. Modify/edit as you wish- I am just writing the basic outline.
We found a house to rent in ithaca for the first year- that was pretty straightforward- now for the final push (6 more weeks to go)!

Significance of the Mayhew collection:

The collections of W. Mayhew span the length of his active career, from the 1950's to the 1960's and are concentrated on the herpetofauna of southern California. Two factors make these collections especially valuable as records for the biodiversity of this area: first, for many species Mayhew collected series of individuals from the same localities over long periods of time, allowing for analyses of temporal and individual variation in population characteristics such as reproductive patterns and size distributions of individuals in these populations. Secondly- many of the species included in Mayhew's collections are currently threatened or endangered at state or federal levels, thus, these collections could not be duplicated and offer a unique source of information about the biology of these species.

Mayhew's research focused primarily on reproductive patterns in lizards of the Coachella Valley and Imperial County, California. To achieve his research goals, Mayhew collected series of individuals at regular intervals throughout the active season. Thus, by examining these specimens, we can reconstruct the proportion of reproductive individuals in these populations during the course of the year. Urban and agricultural development in southern California, and especially in the Coachella Valley, are the main causes of habitat modification in this region. Many of the habitats where Mayhew focused his studies no longer exist, thus his collections are important records of population characteristics of extinct or threatened populations of lizards. In particular, the Coachella Valley fringe-toad lizard (*Uma inornata*) and the flat-tailed horned lizard (*Phrynosoma mcalli*) are currently listed as endangered by state and federal authorities. The information contained in Mayhew's extensive collections will undoubtedly shed light on natural history and some aspects of the population biology of these taxa.

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A Qualitative Comparison of Rehydration Methods for Preserved Herpetological Specimens

G.M. McLaughlin and K.R. Zamudio¹

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right running head: Rehydration of Desiccated Museum Specimens

left running head: G.M. McLaughlin & K.R. Zamudio

Keywords: desiccated, herps, reconstitution, rehydration

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Herpetological specimens initially prepared in formalin and preserved in ethanol (standard museum procedure), will, if left exposed, eventually desiccate. Due to the brittleness and diminished scientific value of such specimens, this paper attempts to compare, qualitatively, eight different methods of rehydration.

In October of 1997, the Museum of Vertebrate Zoology (MVZ) at the University of California, Berkeley accessioned the extensive collection of lizards compiled by Wilbur Mayhew during his time at the University of California, Riverside. This collection includes hundreds of specimens of desert reptiles some of which, like *Phrynosoma mcallii* and *Uma inornata*, are threatened or endangered, thus the value of this collection is very high. In an attempt to preserve the pristine quality of the collection, each specimen had, subsequent to Mayhew's retirement, been placed in an individually sealed plastic pouch containing ample ethanol for prolonged storage. Although the specimens were not exposed to direct sunlight, the plastic pouches eventually ruptured (likely due to pressure of the evaporating ethanol), causing the specimens to desiccate and diminishing their value for future studies.

It is undesirable to leave specimens in a brittle and dehydrated state because they are easily damaged and crumble with handling (ref.?*). As such, we explored possible options for rehydration. Unfortunately, the literature contains only five written sources applicable to the rehydration of herpetological specimens (Vogt, 1991; Marhue, 1983; Thompson, Thompson & Drummond, 1966; Van Cleave & Ross, 1947; Levi, 1966). Out of these sources and one personal communication (Jones), only four procedures were deemed gentle enough to be applicable to the lizard specimens being treated. With 10 specimens, we tested these four protocols, both singularly and in tandem, resulting in a total of eight rehydration methods.

To our knowledge, no test has ever been performed comparing the various rehydration techniques in the literature. Marhue (1983) describes methods of specimen reclamation, but never compares the results of each. Moreover, literature dealing with the subject of specimen rehydration is sparse at best and often targets invertebrate specimens. Our goal is to report on and evaluate the effectiveness of several methods of specimen reclamation in order to determine which procedure best restores desiccated specimens to museum quality without causing any significant damage.

All specimens used in this study were Flat Tailed Horned Lizards, *Phrynosoma mcallii* collected by Wilbur Mayhew between 1959 and 1967. All organs save reproductive had been removed by Mayhew prior to fixing in formalin. The abdominal wall and, in some cases, the limbs and/or tail were likewise absent from the specimens. Wet mass subsequent to dissection was not recorded, preventing a quantitative analysis of the rehydration methods. Only one of the 315 specimens of *P. mcallii* accessioned by the MVZ had evaded desiccation. As such, this specimen was directly transferred to ethanol and used as a basis to qualitatively judge rehydration of the other 10 test specimens.

Table 1 summarizes each of the rehydration methods. It also includes the size, sex and tag number of the individual or individuals which were used to test that method, and general synopsis of the result. It should be noted that specimen 2 was run in two separate tests. It was first run only in aquammonia and evaluated for rehydration quality. Then, having deemed the specimen insufficiently rehydrated, it was placed in .5% TSP to determine the effects of aquammonia followed by TSP.

Acetic acid solutions were made by mixing glacial acetic acid with distilled water to achieve 10% and 5% by volume solutions. Propylene glycol was obtained through the Sigma chemical corporation. It was mixed with distilled water to a 50% by volume solution. The TSP used was Landmark brand TSP and was obtained at a local hardware store. All TSP solutions were percent by mass. The aquammonia was premixed and obtained from Bob Jones of the MVZ. It was prepared by bubbling ammonia through water (concentration unknown).

Two males, specimen numbers 34 and 102 were placed in propylene glycol. Bubbling was apparent on the specimens within hours, and lasted up until the time prescribed for removal (24 hours). As such, and due to the fact that the specimens were still floating, they were left in the propylene glycol solution for an additional 48 hours, for a total of 3 days. When placed in ethanol, specimen 102 was weakly neutrally buoyant, but specimen 34 was strongly positively buoyant. Eventually (over 4 weeks) they both became negatively buoyant. The skins of these animals closer resembled that of the control specimen (301), but the limbs were still quite stiff and the testes retained the appearance of desiccation.

Specimens 82 and 104 were intended to run in .5% TSP for 24 hours. After only 3 hours, however, the skin of both specimens looked translucent and detritus was present at the bottom of the jar. There was little or no evidence of rehydration of the muscular or reproductive tissue (testes) and, since it seemed that the damage being done the organism was greater than the benefits, they were removed and transferred to ethanol. When placed in the ethanol, both were very slightly positively buoyant but eventually sank over the course of two to three weeks. The skin of these individuals became, to some degree, flexible but the limbs remained quite rigid. The scales and horns of these individuals fall off very easily when handled and the specimens as a

whole are highly subject to deterioration.

When specimen 2 was placed in aquammonia, it began to bubble. I was known from Jones (pers. comm.) that prolonged exposure (greater than 4 hours or so) to aquammonia would begin to deteriorate and/or bleach and clear the specimen. As such, the specimen was removed after only 1.5 hours. By this time, the specimen had stopped bubbling, but was not brittle or subject to deterioration. It was, however, insufficiently rehydrated, with the skin and muscles still quite rigid. In an attempt to more completely rehydrate this specimen, it was transferred to a .5% TSP solution. Like all other specimens placed in TSP, specimen 2 was bleached to translucency after only a few hours of exposure, became brittle and subject to deterioration, and remained insufficiently rehydrated. It was later placed in 70% ethanol with the rest of the specimens run in TSP and eventually sank. Due to the risks of damaging specimens by running them in aquammonia for more than a few hours and the lack of rehydration present in specimen 2, plain aquammonia was not run again.

After having run these several specimens in TSP and seeing the damage accorded to them, we were hesitant to expose specimens which had received ample rehydration from acetic acid to the risk of damage, deterioration and brittleness. However, the effect of eliminating TSP from the procedure was also something we wanted to test. As such, specimen number 50 was run in 10% acetic acid for 7 days, 5 hours, then transferred to 5% for a period of 7 days, 18 hours. By the time it was removed from the 10% acetic acid, semi-normal coloration (still darkened) and texture (more flexible) had returned to the skin. It was then placed in TSP for an expected 3 days. After only 8.5 hours, however, the skin was seen to be discolored, flaccid and bleached. No further swelling was seen in muscle tissue, so it was removed to avoid further damage. The specimen

was determined to have been damaged enough to make the step-up from 30% to 70 % ethanol unnecessary and so was placed directly in 70% ethanol. When placed in 70% ethanol, it was not negatively buoyant, but became so within a few days. At around the same time as the specimen sank, much detritus (scales, skin etc.) was seen at the bottom of the jar. This was true of all specimens which were exposed to TSP. The ethanol in the jar quickly turned brown, suggesting that the fat or some other portion of the specimens had been dissolved by the ethanol. This was likely facilitated by the damage done by the TSP.

We did not run the better hydrated of the two acetic acid specimens (number 103) in TSP. Like specimen number 50, specimen 103 was run in 10% and 5% acetic acid. After only a few days in 10% acetic acid, this specimen seemed to show a return of texture to the follicles. After seven days, five hours in 10% acetic acid, the same was observed, with slightly more mobility of the limbs. After 7 days and 18 hours in 5% ethanol, the limbs were considerably more mobile with the musculature retaining the appearance of slight desiccation. This specimen was then washed in distilled water for 8 hours exactly, then stepped up from 30% to 50% and 70 % ethanol after 24 hours in each. After the procedure was complete, the follicles and the oviducts remained slightly discolored and it took the specimen several weeks to become negatively buoyant in ethanol. The skin and scales of this specimen were quite resilient to deterioration and handling this specimen is possible without scales falling off.

Two specimens were run in aquammonia followed by acetic acid without TSP. Similar results as procedure 2 were found after exposure to aquammonia for 1 hour: bubbling had occurred initially, ending within 1 hour; skin and limbs remained relatively rigid, with scales relatively brittle and prone to decay. The specimens were then run in 10 % acetic acid for 7 days

and 16 hours, 5% acetic acid for 7 days and 8 hours followed by a 16 hour wash in distilled water.

The specimens were then stepped up from 30% ethanol (24 hours) to 50% ethanol (27 hours) and 70% ethanol.

Upon placement in acetic acid, the texture of skin and reproductive organs (follicles) began to return, but not as dramatically as in specimen 103 (it is possible that these had sustained more damage from the desiccation process). Discoloration (brownish-red) persisted in most of the follicles of specimen 125 and all of the follicles of specimen 17 (the discoloration faded slightly over several weeks in 70% ethanol). The scales of these specimens were, like that of specimen 2, extremely sensitive to the touch and the integrity of the skin was compromised easily. Both specimens initially floated in ethanol, but over three weeks, eventually sank.

Specimen 1 was exposed to 1.5 hours of aquammonia, and was then transferred to propylene glycol for 13 days and 19 hours. Bubbling was apparent for roughly 10 days. When it was removed, the limb stubs and body wall were still quite rigid. The skin and muscles retained a wilted appearance. The skin, like that of all others exposed to aquammonia, was brittle and prone to deterioration.

Due to the damage sustained by all of the specimens exposed to TSP or aquammonia, and the inability of propylene glycol to affect substantial change in visceral (reproductive) tissue, we feel that sequential exposure to 10% and 5% acetic acid followed by a wash in distilled water and gradual increase in the concentration of ethanol ending with 70%, is the best known method for reconstituting desiccated museum specimens. The acetic acid procedure neither bleached nor cleared the skin and muscles of the specimen, and the integrity of the skin and scales were preserved. Texture and deep-organ rehydration (judging from comparison to the control and

personal observations) seem to be best obtained through this method. It should be noted that musculature and some visceral organs sustain damage during the desiccation process which it is not possible to reverse with any of the available rehydration methods. As such, desiccation of specimens should be avoided whenever possible.

It is perhaps possible that the specimens used in this study were so desiccated as to have required more than 1 week's exposure to acetic acid. Specimens run in acetic acid do not bubble, causing some ambiguity in correct extraction timing. It may be true that had specimens been run in either the 10% or the 5% acetic acid for several more days, rehydration quality would have been improved. Similarly, it may be true that using concentrations other than 10% and 5% may affect more efficient rehydration. These factors were not tested.

Also not tested were several methods which called for boiling specimens. These procedures included boiling specimens in 85% ethanol and then exposing them to TSP and boiling them in a solution of sodium perborate tetrahydrate ($\text{NaBO}_3 \cdot 4\text{H}_2\text{O}$). Due to the fact that these specimens had been dissected, eviscerated and left with their abdominal cavity and reproductive organs exposed, we rejected these procedures for fear of damaging the specimens. It was feared that boiling the specimens, especially females, would result in the damage or loss of the fragile reproductive tissues like testes and follicles.

It might be of some use in the future to obtain post-fixing weights for several specimens, dry them, and attempt rehydration, comparing the weights before and after. This would mean, however, sacrificing several specimens to the possibility of unusability and with museum specimens this is often an unaffordable risk. As such, we must rely on this and other qualitative studies of available methods for rehydration.

Acknowledgements

The authors would like to thank the Museum of Vertebrate Zoology at the University of California, Berkeley. We would also like to thank Al Muth and Deep Canyon for saving the specimens before their transfer to the UC Berkeley.

Literature Cited

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2. Marhue, L. 1983. "Techniques to Restore Dried-up Invertebrate Specimens." In: *Proceedings of the 1981 Workshop on the Care and Maintenance of Natural History Collections*, ed. D.J.Faber, *Syllogeus* no. 44: 175-177.
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5. Levi, H.W. 1966. "The Care of Alcoholic Collections of Small Invertebrates." *Systematic Zoology* vol. 15, #3: 183-188.
6. Jones, R. 1997. Personal Communication.

Kathy Hall, 01:18 PM 10/22/97, rehydrating specimens

Received: from ucml1.Berkeley.EDU. (ucml1.Berkeley.EDU [128.32.109.244]) by socrates.berkeley.edu (8.8.7/8.8.0) with SMTP id NAA16339 for <bstein@garnet.berkeley.edu>; Wed, 22 Oct 1997 13:18:12 -0700 (PDT)
Received: from ucml1.Berkeley.EDU by ucml1.Berkeley.EDU. (SMI-8.6/SMI-SVR4) id NAA15902; Wed, 22 Oct 1997 13:18:48 -0700
Date: Wed, 22 Oct 1997 13:18:48 -0700
Message-Id: <199710222008.PAA15745@mail.utexas.edu>
Errors-To: benson@sci.mus.mn.us
Reply-To: kathyhall@mail.utexas.edu
Originator: nhcoll-1@ucml1.berkeley.edu
Sender: nhcoll-1@ucml1.berkeley.edu
Precedence: bulk
From: kathyhall@mail.utexas.edu (Kathy Hall)
To: Multiple recipients of list <nhcoll-1@ucml1.berkeley.edu>
Subject: rehydrating specimens
X-Listprocessor-Version: 6.0c -- ListProcessor by Anastasios Kotsikonas
X-Comment: Natural History Collections Mailing List
X-Mailer: Windows Eudora Version 1.4.4
X-UIDL: be734931c2c0609078183301ce05685b

Hi,

I'm an objects conservator at Texas Memorial Museum. One of our curators just asked me about what would be the best way to rehydrate specimens from a collection of cave invertebrates which unfortunately dried out. I understand that these types of specimen are difficult to rehydrate due to the chitinous exterior.

I have read 2 papers (see below) which recommend using combinations of trisodium phosphate/or other detergents with (deionized) water or 'alcohol', heated or perhaps under vacuum, to rehydrate specimens.

Can anybody offer any other suggestions/helpful hints?

I'm trying to work out what would be the least damaging method to use, accepting that some damage will occur, but that this is acceptable if the specimens regain some scientific value. Of course, all procedures carried out on the specimens will be recorded.

I'd be grateful for any help anybody could give,

Kathy Hall

"A method for reclaiming dried zoological specimens" by Van Cleave and Ross, in Science, vol 105, #2723, March 21, 1947.

"The Care of Alcoholic Collections of Small Invertebrates", Herbert W. Levi, Systematic Zoology, vol 15, #3, september 26, 1966.

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Received: from ucmp1.Berkeley.EDU. (ucmp1.Berkeley.EDU [128.32.109.244]) by socrates.berkeley.edu (8.8.7/8.8.0) with SMTP id JAA13298 for <bstein@garnet.berkeley.edu>; Thu, 30 Oct 1997 09:46:50 -0800 (PST)
Received: from ucmp1.Berkeley.EDU by ucmp1.Berkeley.EDU. (SMI-8.6/SMI-SVR4) id JAA07166; Thu, 30 Oct 1997 09:47:32 -0800
Date: Thu, 30 Oct 1997 09:47:32 -0800
Message-Id: <3.0.1.32.19971030104056.006b95d4@picea.cnr.colostate.edu>
Errors-To: benson@sci.mus.mn.us
Reply-To: desnyder@CNR.ColoState.EDU
Originator: nhcoll-1@ucmp1.berkeley.edu
Sender: nhcoll-1@ucmp1.berkeley.edu
Precedence: bulk
From: "Darrel E. Snyder" <desnyder@CNR.ColoState.EDU>
To: Multiple recipients of list <nhcoll-1@ucmp1.berkeley.edu>
Subject: Re: rehydrating specimens
X-Listprocessor-Version: 6.0c -- ListProcessor by Anastasios Kotsikonas
X-Comment: Natural History Collections Mailing List
X-Mailer: Windows Eudora Light Version 3.0.1 (32)
X-UIDL: b54700bf935432f57d44e5ee07761ad1

Kathy,

We recently had a similar problem with fish larvae that had been preserved in straight ethanol (specimens had not been fixed prior to preservation). We returned some to straight ethanol and placed others in 3% formalin. The former of course could not "rehydrate" but we hoped fluid would enter and swell the body back to somewhat pre-dried condition. However it had no notable effect; specimen condition continued to appear as "dried out" as in air. In 3% formalin (1.2% formaldehyde in water) some specimens absorbed water and body tissues returned to a somewhat more normal appearance (still a bit mis-shapen and shrunken) whereas others failed to show any apparent rehydration. I suspect the former "dry" specimens were probably not entirely dried-out whereas the latter were (some even to the extent of having turned brownish in color).

As we ascertain from our experience in trying to rehydrate fish larvae, we would also very much like a more effective procedure. Thank you for the references you provided (I was not aware of them). I look forward to seeing other responses to your query.

Darrel

At 01:17 PM 10/22/97 -0700, you wrote:

>Hi,

>

>I'm an objects conservator at Texas Memorial Museum. One of our curators >just asked me about what would be the best way to rehydrate specimens from a >collection of cave invertebrates which unfortunately dried out. I understand >that these types of specimen are difficult to rehydrate due to the >chitinous exterior.

>

>I have read 2 papers (see below) which recommend using combinations of >trisodium phosphate/or other detergents with (deionized) water or 'alcohol', >heated or perhaps under vacuum, to rehydrate specimens.

>

>Can anybody offer any other suggestions/helpful hints?

>

>I'm trying to work out what would be the least damaging method to use, >accepting that some damage will occur, but that this is acceptable if the >specimens regain some scientific value. Of course, all procedures carried >out on the specimens will be recorded.

Kathy Hall, 01:23 PM 11/6/97 , responses to 'rehydrating' que

Received: from ucmp1.Berkeley.EDU. (ucmp1.Berkeley.EDU [128.32.109.244]) by socrates.berkeley.edu (8.8.7/8.8.0) with SMTP id NAA22030 for <bstein@garnet.berkeley.edu>; Thu, 6 Nov 1997 13:23:15 -0800 (PST)
Received: from ucmp1.Berkeley.EDU by ucmp1.Berkeley.EDU. (SMI-8.6/SMI-SVR4) id NAA18208; Thu, 6 Nov 1997 13:23:59 -0800
Date: Thu, 6 Nov 1997 13:23:59 -0800
Message-Id: <199711062119.PAA09625@mail.utexas.edu>
Errors-To: benson@sci.mus.mn.us
Reply-To: kathyhall@mail.utexas.edu
Originator: nhcoll-1@ucmp1.berkeley.edu
Sender: nhcoll-1@ucmp1.berkeley.edu
Precedence: bulk
From: kathyhall@mail.utexas.edu (Kathy Hall)
To: Multiple recipients of list <nhcoll-1@ucmp1.berkeley.edu>
Subject: responses to 'rehydrating' query
X-Listprocessor-Version: 6.0c -- ListProcessor by Anastasios Kotsikonas
X-Comment: Natural History Collections Mailing List
X-Mailer: Windows Eudora Version 1.4.4
X-UIDL: e46ef8e0eeae0f4a2de36af0596818e7

Thanks everyone! A summary of the replies on this question:

Extra References:

Marhue, L. 1983. Techniques to restore dried-up invertebrate specimens. In: Proc. of the 1981 Workshop on the Care and Maintenance of Natural History Collections, edited by D.J.Faber, Syllogus no.44: 175-177.

Gives concentrations and soaking times for two different treatments;- the propylene glycol technique (50% solution for 24 hours, recommends not using ethylene glycol due to toxicity), and trisodium phosphate (0.5% overnight). Both found to be effective, no conclusions drawn as to best method. Also discusses using a few drops of surfactant in water (not tried but also said to be a successful method).

Vogt, K.D. 1991. Reconstituting Dehydrated Museum Specimens. Curator 34:125-131.

A response to problems with the trisodium phosphate (TSP) method with larger vertebrate specimens which can't be boiled and which would need impractically long soaking times. Describes a method which involves first soaking in a weak solution of acetic acid (to aid in disruption of the cell membrane and water transport across it), and then in TSP. The acetic acid will also act to inhibit microbial growth. This reduces soaking times. Probably not useful for calcareous invert. specimens, though.

Also:

Thompson, Thompson and Drummond. 1966., Crustaceana 10, p109.
Also discusses the ethylene glycol technique.

Holm, Ake. 1978. Om Carl Clerk Spindelsamling. Fauna och Flora, 73(5):201-205.
On reclaiming the oldest spider collection in the world (thanks to James Cokendolpher for the translation) -specimens were first wet with drops of ethylacetate and then 50% alcohol added, after a few days this replaced with 80%. [I assume this works in the same way as using acetic acid].

In addition:

Several people said they had used the TSP method, and were happy with the

results, one person recommended leaving the specimens as they are (dry), one person mentioned contacting the SPNHC Fluid Assessment Subcommittee, and one person had tried rehydrating fish larvae using ethanol or 3% formalin with mixed results (no change in ethanol, some specimens absorbed some fluid in formalin but were still mis-shapen).

Also mentioned was the possibility of using a 75:25 mix of isopropyl alcohol in distilled water and heating in a microwave. (I would think that using a microwave is not a good heating technique as it is so very uncontrolled).

One person also recommended adding glycerin to the final ethanol solution -so that specimens will remain flexible if they dry out. Levi*, however, does not recommend this, saying that it is messy and will encourage mould growth if they dry out again.

*"The Care of Alcoholic Collections of Small Invertebrates", Herbert W. Levi, Systematic Zoology, vol 15, #3, september 26, 1966.

So.. I guess that we will try using TSP or a surfactant on a small batch of test specimens, at as low concentrations and for as short a time as possible, soaking to remove residue, refixing, and then taking them up to 70% ethanol in steps. Hopefully this will give some idea on the best way to treat the rest of the specimens.

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PROCEDURES FOR DEALING WITH NEW TYPE MATERIAL

New type specimens are often designated from material that has already been catalogued into the collection. If this is not the case, the new specimen should be accessioned and catalogued immediately (see pp. 6-12).

The labels on jars containing type specimens are bordered in red ink. Departmental catalogue cards and specimen tags for types are also marked with a red border.

For Paratypes, only the jar label & catalogue card are marked in red, not the specimen tag.

Type reference reprints are marked one inch from the top with a horizontal red line. These are placed in the type reference reprint box in the herp lab.

Type specimens are stored separately from the regular collection.

Specimens that are going to be types are not housed with the type collection. Too often specimens have been placed there when someone claims they are going to describe a taxon, and then the taxon doesn't get named.

DBW
 → these "sp. nov" specimens are now kept in type collection but w/ no red border on label or type status written on cat card until description is published
 - with no red ink on the label until name is published

DBW
 ↑ Specimens of new species that have not yet come out in print are housed in the regular collection in jars labelled like the following: PSEUDOEURYCEA SP. NOV. "PARVA." When the publication comes out, the label is changed to PSEUDOEURYCEA PARVA and the types are moved to the type collection area.

type collection

- ~~Record types in the new MVZ Herp Type List, on the shelf above the type collection.~~
- 6/00 - Start a new list of types so that we can eventually update the type collection.
- Tell Curatorial Assoc. so TAXID type field can be updated.
- If installation requires new shelf label - tell Cur. Assoc.

Some paratypes have the word "paratype" written in black ink on the specimen tag.

- To prevent fading of labels:*
- ① rinse labels → follow to dry
 - ② apply red ink + let dry
 - ③ rinse labels again → let dry
 - ④ rinse labels in EtOH → let dry

On cat card:
 write down word "holotype" or "paratype" above the name of the species.
 write the name of the author, year, Journal, volume, page number if already published.

HOLOTYPE
<i>Psammodynastes pulverulentus</i> <i>papenfussi</i>
Zhao E. 1995. Sichuan J. Zool. 14(3):108.
University of California Museum of Vertebrate Zoology

LOAN PROCEDURES

Outgoing Loans

Loans are made only to other academic or research institutions where they then become the responsibility of the permanent faculty and staff at that institution; they are not made to students and they are not to be mailed to home addresses.

All requests for materials must be approved by a curator and should be received in writing. Occasionally, phone requests will be honored but in general these are followed by a formal, written request.

1. Obtain a loan number by recording the next consecutive loan number on the top sheet of the most recent loan invoice binder ~~in the reprint room~~. In the space next to the number place your initials and the name of the borrower.
2. At the time the specimens are removed from the collection, make certain that a blue loan slip is left in the place(s) from which specimens have been removed. Slips should note:

species name
MVZ catalogue numbers
name of person who removed the specimens and date removed
name of person to whom the loan is being sent and the loan number.

At least one blue slip should be left in each tray from which specimens are taken, even if they are all of the same species and arranged numerically. When removing alcoholic specimens, blue slips should be placed in the jars or may be taped to the jar lids. Blue slips placed in jars must be filled out using Higgins Eternal Ink.

3. Begin a loan flow chart (see attached), copies of which are kept in each departmental filing cabinet. As steps are completed, indicate this with the date and your initials. Keep the flow chart with the specimens until they have been shipped. It will then be stapled to a photocopy of the loan invoice and filed in the departmental filing cabinet.
4. Make a list of the specimens to be shipped, arranged taxonomically, numbers ordered sequentially, and the condition of the specimens noted. Record missing or broken parts and processes, body incisions, etc.
5. Obtain a loan invoice form and prepare it in triplicate, ~~using the computerized program on the AT created to prepare loan invoices~~. Blank loan forms and documentation for the program are kept ~~next to the computer~~. Fill in the address, date and loan number, then type in the list of specimens already prepared. MVZ loans within the U.S. are generally shipped library rate and insured for \$200.00. **Holotype specimens** are always shipped by certified mail! Specimens to be shipped outside the U.S. should be sent by airmail. Consult a curator or the receptionist concerning the particulars and inquire about size limitations on boxes or customs forms which might be needed.

Add your name in the "recorded by" space and make two (2) photocopies of the invoice.

International packages require a customs declaration form (found at mailing table) and a declaration for exportation (found in ^{permitted} filing cabinet). Package can't be sent until decl. for exportation clears.

Customs declaration form is to be attached to the box in a sticky envelope.

UPS
Ground
Parcel
INT'L. Air
Post for overseas

Don't use
in a...
in a...

Flow Chart for Loans

See detailed instructions

Loan Number: _____

Date: _____

Outgoing Loans:

Partial installment? Yes/No (circle one)	If yes, ____ of ____ installments
Blue Slips for each specimen or series	_____
List of specimens with condition noted	_____
Loan Invoice typed _____	Shipping instruction sheet filled out _____
Two mailing labels typed _____	Specimens wrapped _____
Specimens boxed _____	Box wrapped _____
Box weighed _____	Shipping instructions signed _____
Loan log entered _____	Blue copy filed _____
Box to front office _____	Loan invoice xeroxed (2 cc) _____
Packing slip on box _____	Flow chart & list filed _____

When MVZ loans are returned:

Flow chart & list removed from file	_____
Specimens checked against invoice	_____
Blue copy of invoice marked	_____
Corner torn off blue copy	_____
Return (Y) marked in computer	_____
Loan log marked that specimens returned	_____
Specimens & box fumigated (Birds, Mammals, non-anatomical herps)	_____
Specimens reinstalled/Blue Slips removed	_____
Loan log marked that specimens reinstalled	_____
Acknowledgement of receipt sent	_____
Correspondence filed	_____
Flow chart & list discarded (unless it has info. on other installment(s))	_____

FedEx Shipping Format

My Shipment Profiles

My shipment profiles (formerly Fast Ship): Select if applicable

1. From

(Alter based on curator)

- a. Country/Location
- b. Company
- c. Address 1
- d. Address 2
- e. City
- f. State
- g. ZIP
- h. Phone no.

2. To

- a. Country/Location
- b. Company
- c. Address 1
- d. Address 2
- e. City
- f. State
- g. ZIP
- h. Phone no. (MUST ENTER)

3. Package & Shipment Details

- a. Service type: FedEx Ground
- b. Package type: Your Package
- c. No. of packages: 1 (variable)
- d. Weight: XX
- e. Dimensions: L, W, H inch
- f. Declared value: 500.00
- g. Ship date: XX/XX/XXXX

4. Billing Details

- a. Bill transportation to: UCB Master Acct-377
- b. Your reference: MVZFEDEX

Special Services (optional)

If Applicable

Pickup/Drop-off (optional)

- Use an already scheduled pickup at my location

E-mail notification (optional)

a. Sender E-mail
fill-in@gmail.com

Notification type

- Ship
- Tendered
- Exception
- Delivery

b. Recipient E-mail
where-to@yahoo.com

Notification type

- Ship
- Tendered
- Exception
- Delivery

Rates & Transit Times (optional)

Calculate: FedEx Ground (least expensive)

5. Complete your Shipment

Save for later

Ship

Working with Loans in Arctos

Finding a loan

1. If you have a loan number, simply follow the menu: Management->Transactions->Find Loan and type the loan number into the top right field.
2. If you don't have the loan number but know what animals or people it involves, you can click on "Find all loans that are not closed", which is a button all the way to the right of the "Find Loan" page. You can then scroll to the bottom and search for your loan.
3. A summary page for the loan will appear. Click on "edit loan."

Adding specimens to a loan

1. Within the loan page, click on "Add Items" which is located just before the shipment information.
2. This will bring up the Arctos search page. Notice that in red it says that you are adding things to a loan. Enter the MVZ numbers you want (you can type in multiple numbers separated by commas or a range separated with a hyphen).
3. A search results page appears. If this is a subsample loan, check off the "subsample" box, and click "add". If this is a whole organism loan, just click "add".
4. Click on "back to loan" at the top. This will return you to the main loan page. Click on "Save Edits" to save the changes you made. You can also close down any duplicate tabs you now have open.
5. Click on "Review Items". This will show you a list of specimens that are currently part of this loan. If there is a mistake and you would like to remove one, you can click on the X to the right of that specimen.
6. Change the condition to good. You can later come back and modify this if you find something wrong with the specimen.
7. If this is a subsample loan, you should change the disposition of all the tissues to "transfer of custody". You can change the disposition of all the items at once by using the drop-down box at the top of the screen.
8. Click on the loan number to link back to the main loan page. Save Edits.

Print out an Invoice

1. To print out a list of items (for example so that you can take that list upstairs to do the subsampling), use the dropdown menu located under the Save Edits button and choose "MVZ Item Invoice".
2. A screen will appear where you can adjust the number of items per page. Click on "Get the pdf" to see what it looks like with 15 items per page.
3. If items are cut across page breaks, go back, change the number to something smaller, and click "submit query". Look at the pdf again. Keep doing this until it looks good. You can then print it.

SHIPPING

Shipping a tissue subsample loan within the US is the most simple type of loan. Use the Loan Flowchart to help remember the different steps.

1. Print out an invoice header, and get the appropriate person to sign it.
2. Once it is signed, photocopy 2 extra copies. The original will go in the MVZ loan green book, one copy will go in the outside packing sleeve, and the other copy will go inside the box (highlight "upon receipt, sign and return one copy to" to make that stand out for the inside-the-box copy).
3. Print out (or copy) 3 copies of the item invoice.
4. Print out the shipping label. Though this will print 2 copies of the address, you will only need one.
5. Fill out the Shipping Information sheet, located above the typewriter in the curatorial area.
6. Put together a small cardboard box, also found above the typewriter, fill it with styrofoam pellets and place the tissue subsamples (which should be in 95% EtOH, labeled, parafilm, and in a labeled ziplock bag) inside, with a copy of the item invoice and the highlighted copy of the invoice header.
7. Seal the box and tape the address to the top with clear tape. Make sure the address is completely taped over so that it is protected. Stick the orange sleeve to the side of the box, containing a copy of the item invoice and invoice header. If the package contains accepted quantities of ethanol (e.g. a tissue loan in 95% ethanol or fluid animal loan), write "This package conforms to 49CFR 173.4" nice and clear on the outside of the package.
8. You can then weigh the box and add that information to the Shipping Information sheet you filled out earlier. Get it signed by the curator. Bring the box with the signed shipping information sheet to the front desk.
9. Place the original invoice header, with a stapled item invoice, in the green book located next to the typewriter. Write the loan number at the bottom of the invoice header so that it is easier to flip through the green book when you are looking for a specific loan.
10. In Arctos, change the status of the loan to "in process".

To summarize, you will have the original invoice header and an item invoice in the greenbook, an invoice header and an item invoice in the outside orange sleeve, and a highlighted invoice header and an item invoice in the box.

When the highlighted invoice header is returned with the signature of the recipient of the loan, add "Signed invoice received on 'day month year' (your initials)". You can then change the loan status to closed.

The **white** copy of the loan invoice, accompanied by all relevant correspondence, is given to the Curator who will write the cover letter.

The **yellow** copy of the invoice will go inside the box with the specimens.

The **blue** copy will be filed in the loan invoice binder kept in the reprint room once preparation is completed.

One **photocopy** will be placed on the outside of the box after it is wrapped. (in packing slip)

The **second photocopy** should be stapled to the flow chart and filed in the departmental filing cabinet when complete. This will be used when the specimens are returned.

6. Pack specimens.

- a. **Alcoholic Specimens:** Wet specimens should be removed from their jars and wrapped carefully in several layers of cheesecloth that have been dipped in alcohol. The wrapped specimens should then be triple-bagged and fastened securely to prevent leakage. The plastic sacks are then arranged snugly in a **cotton-lined** cardboard box. Styrofoam "peanuts" may also be used as packing material. If the animals are small, several may be bound together in cheesecloth before bagging.

Skeletal specimens are to be packed in a *wooden* box of suitable size. If none is available, one can be made by the Senior Museum Scientist on request although sufficient notice must be given. Line wooden boxes with tissue paper, leaving the ends hanging out. These ends will later be folded over the top layer of packing cotton. Line the box with packing cotton (synthetic dacron). Skeletons should be placed in a small plastic bag with a little air to act as a cushion. Secure the top of the bag with a rubber band or "twisty." Place the bag back in the box and secure the lid with a rubber band. Pack the boxes securely in the cotton-lined wooden box.

Live Material: Occasionally it may be necessary to ship live material. Animals that might eat one another should be separated. Amphibians must be packed in damp paper towels or other water-absorbent material. The amount of moisture must not be so great as to leak out of the packing container, and yet it must be sufficient to last throughout the period of shipment. The shipping container must be free of formalin, alcohol, or other poisonous material. An excellent way to insulate the container against temperature extremes is to nest one box within another, with an airspace between. In practice, this is done by placing the amphibians in a suitable metal container (a coffee can, plastic jar, or clean tobacco tin is excellent, providing it has a cover) and, after punching holes in the can, placing it in a cardboard box. Holes should be punched outward. Pack the box with excelsior or similar material, close it and punch holes through it, then pack this box in a larger box, liberally insulated with excelsior. Holes are also punched in the outer box. This outer box is then wrapped as usual, but the wrapping paper should not be sealed with tape. The package should be clearly labelled, "Live Reptiles" or "Live Frogs" or a similar designation, and "Keep out of Sun", as a small container can very rapidly warm up to the lethal temperature. Poisonous reptiles and snakes generally cannot be sent by parcel post (Library Rate).

- b. All specimens should be placed snugly, but not tightly, against each other to prevent shifting. They should not lie against the wall of the box, but should always be padded with cotton or "peanuts."
 - c. When cotton is used, a top layer should be placed between the specimens and the box lid. The ends of the tissue should be neatly and snugly folded over the top layer of cotton and secured with transparent tape. Cards bearing the address of the MVZ should be placed on several sides of the inside of the box, and one taped to the top of the tissue with the name and address of the loanee written on the blank side in Higgins Eternal Ink. Carefully place the yellow copy of the invoice on top of the tissue. Also include a card requesting that reprints be sent of publications based on Museum specimens.
 - d. The lid of a wooden box ideally should be fastened with screws. However, if this is not possible, galvanized nails may be used, which should be hammered in at a slight angle.
 - e. Strapping tape should be wrapped around all boxes once or twice lengthwise and/or breadthwise. The MVZ address card should be taped to the exterior of the box, and a mailing label should be affixed to the top of the box in case the paper should be ripped off during shipment.
 - f. Wrap the box neatly and snugly in heavy brown paper, then use brown tape to cover the loose edges that might catch on something and tear. Strapping tape should then be placed around each end of the box.
 - g. An MVZ label bearing the address of the loanee and "Scientific Specimens / No Commercial Value / No Endangered Species" should be secured onto the box with transparent tape, covering all addresses and edges. A photocopy of the invoice should be placed on the outside of the box in a self-adhesive, clear plastic envelope (kept above the mailing table). Remember, loans should not be addressed to students; they are made only to permanent faculty and staff, although often for student use.
7. ~~Use the computer to fill~~ ^{Fill} out the Shipping Instructions sheet, and obtain the signature of the Curatorial Associate. It may then be given to the receptionist, who will take care of placing the shipment in the hands of a carrier. *This form w/ a tracking label will go back in the cur. Assoc box and should be filed in the top drawer of the loans filing cabinet. When a loan is received this form can be discarded.*
 8. Fill out the loan log file that is kept next to the Curatorial Associate's desk.
 9. Complete the loan flow chart. The second photocopy of the loan invoice should be stapled to it. File them together in the departmental filing cabinet.
 10. File the blue copy of the invoice in the loan invoice binder.
 11. After a loan is shipped, the white copy of the invoice will be signed and returned by the recipient. Check off the appropriate column in the loan log file to acknowledge receipt of the signed invoice, and then file the invoice with the correspondence in the front office. The shipping invoice may be torn up and discarded at this time. ←

When Loans Are Returned to MVZ

1. Unpack the loan. Check in all specimens, using the photocopied invoice stapled to the flow chart in the departmental filing cabinet. If the returned lot represents part of a loan, mark this copy **and** the blue copy of the invoice clearly, indicating which specimens have been returned and the date of return. ~~This is indicated on the~~ computerized invoice by calling up that invoice via the "search" option and then typing a "y" after the word "RETURNED" at the upper right. Do not mark "y" if it is a partial return.
2. If an invoice written by the loanee is included with the specimens, this should be signed by a Curator and returned to the loanee. If no invoice is enclosed, an MVZ postcard may be sent acknowledging the safe return of the specimens. Postcards may be obtained from the Curatorial Associate or from the Receptionist.
3. Skeletal specimens should be placed in the fumigation case with a note indicating the date received and the initials of the person handling them. Fluid-preserved specimens may be returned directly to their jars and the blue slips torn up. If all the specimens have been returned, the loan log file should be marked to indicate that. Then sign and date the blue copy of the loan invoice and **TEAR OFF THE LOWER RIGHT-HAND CORNER OF THE SHEET**. If only part of the loan has been returned, mark the loan log file and the blue copy of the invoice accordingly, but do not tear off the lower right corner.
4. Once fumigated, the specimens may be re-installed in the collection. Tear up the blue loan slips placed in the cases and the loan flow chart. Mark the loan log file to show that specimens have been re-installed.

Gifts, Permanent Loans, Unusual Situations

Occasionally, specimens are not loaned but must be sent to other institutions either as gifts, exchanges, or the return of specimens sent for identification. Such specimens may be either catalogued or uncatalogued material, and they are prepared for shipping exactly as a regular loan would be with the following exceptions:

1. Type "Permanent Loan" or "Gift" next to the loan number on the loan invoice sheet.

If it does not seem appropriate to use an MVZ loan invoice, as in the case of sending personal specimens to a student who has moved to another institution, make out a list of specimens on a plain sheet of paper. Indicate name and address of recipient, date, condition of specimens, and a sentence about the purpose of shipment. When in doubt - ASK !

2. If a loan invoice is used, file the blue copy in the loan invoice binder **BUT TEAR OFF THE LOWER RIGHT-HAND CORNER** of the sheet immediately. These specimens will not be coming back.
3. If an invoice is not used, make sure that a ~~postcard~~ is included with the specimens (see #2, Returning Borrowed Specimens) or that space is left at the base of the plain sheet of paper for a signature, so that receipt of specimens may be acknowledged.

4. Draw "X"s through the last two columns of the loan log file, making it clear that the specimens are gone for good.

Remember, accession cards, catalogue cards and TAXIR data banks must be changed to reflect the removal of catalogued specimens from the collection. Consult your curator.

Loans Made TO MVZ Faculty and Students

1. Unpack specimens and check them against the enclosed invoice. If specimens have been received for student use, the latter should do the checking. Either the Curatorial Assistant or the student should enter the date of receipt and other required information on the invoice.
2. If no invoice has been received, make out a list of numbers on a plain sheet of paper. Indicate name and address of lender, date, condition of specimens, and the person to whom the loan was made. Do NOT type a new list of specimens on our loan invoice sheets.

Either this sheet, or the invoice accompanying the specimens, should be photocopied. The original should be given to a curator for signature and then returned to the lender. The photocopy should be filed in the departmental filing cabinet. It will be used when the specimens are returned.

3. Place dried specimens in the fumigation case with a note indicating the date received and the initials of the person handling them.

Returning Borrowed Specimens

1. Obtain a copy of the loan invoice from the departmental filing cabinet or from the borrower. Check to see that all specimens to be returned are included in the lot you were given. Check the condition of the material against the invoice.
2. Pack specimens as you would for any outgoing loan (see previous pages) BUT enclose a self-addressed, stamped postcard (see attached) with a copy of the invoice that you place inside the box. Fill out shipping instructions.
3. Give all correspondence materials to the Curator or Curatorial Assistant who will write a cover letter. Correspondence should then be filed.

REPRINT COLLECTION

An extensive reprint collection located in the Herp Lab and arranged alphabetically is to be maintained by the Curatorial Assistants. Refiling, stamping, and additions are to be done periodically.

Only persons associated with MVZ may check out reprints. A notebook in the laboratory reprint room is maintained which includes a page for each person authorized to remove reprints. When checking out a reprint, the borrower is to place the author and date of the reprint on the page bearing his or her name. Reprints are to be promptly returned, and the borrower is to then cross out the citation in the loan notebook.

ROOM 3169

DIPNOI (genus, species)

Protopterus

GYMNOPHIONA (families, genera, species)

CAECILIAIDAE: *Afrocaecilia*, *Boulengerula*, *Caecilia*, *Dermophis*,
*Gegeneophis*², *Geotrypetes*, *Gymnopsis*, *Hypogeophis*, *Osaecilia*, *Schistometopum*,
Siphonops

ICHTHYOPHIIDAE: *Ichthyophis*

RHINATREMATIDAE: *Epicrionops*

SCOLECOMORPHIDAE: *Scolecormorphus*

TYPHLONECTIDAE: *Chthonerpeton*, *Typhlonectes*

URAEOTYPHLIDAE: *Uraeotyphlus*²

ROOM 3169

CAUDATA (families, genera, species)

AMBYSTOMATIDAE: *Ambystoma*, *Rhyacosiredon*

AMPHIUMIDAE: *Amphiuma*

CRYPTOBRANCHIDAE: *Andrias*, *Cryptobranchus*

DICAMPTODONTIDAE: *Dicamptodon*

HYNOBIIDAE: *Batrachuperus*, *Hynobius*, *Onychodactylus*, *Ranodon*,
Salamandrella

PLETHODONTIDAE: *Aneides*, *Batrachoseps*, *Bolitoglossa*, *Bradytriton*,
Chiropterotriton, *Dendrotriton*, *Desmognathus*, *Ensatina*, *Eurycea*, *Gyrinophilus*,
Haideotriton, *Hemidactylium*, *Hydromantes*, *Ixalotriton*^{*}, *Leurognathus*, *Lineatriton*,
Nototriton, *Nyctanolis*, *Oedipina*, *Parvimolge*, *Phaeognathus*, *Plethodon*,
Psuedoeurycea, *Pseudotriton*, *Stereochilus*, *Thorius*, *Typhlomolge*, *Typhlotriton*

PROTEIDAE: *Necturus*, *Proteus*

ROOM 3169

RHYACOTRITONIDAE: *Rhyacotriton*

SALAMANDRIDAE: *Chioglossa, Cynops, Euproctus, Mertensiella, Neurergus, Notopthalmus, Pachytriton, Paramesotriton, Pleurodeles, Salamandra, Salamandrina, Taricha, Triturus, Tylototriton*

SIRENIDAE: *Pseudobranchius, Siren*

ROOM 3169

ANURA: "ARCHAEOBATRACHIA" (families, genera, species)

ASCAPHIDAE: *Ascaphus*

BOMBINATORIDAE: *Bombina*

DISCOGLOSSIDAE: *Alytes*, *Discoglossus*

LEIOPELMATIDAE: *Leiopelma*

ANURA: MESOBATRACHIA (families, genera, species)

MEGOPHRYIDAE: *Leptobranchella*, *Leptobranchium*, *Leptolalax*,
Megophrys, *Oreolalax*, *Scutigera*

PELOBATIDAE: *Pelobates*, *Scaphiopus*, ~~*Scaphiopus*~~
Vibrissaphora

PELODYTIDAE: *Pelodytes*

PIPIDAE: *Hymenochirus*, *Pipa*, *Xenopus*

ROOM 3169

RHINOPHRYNIDAE: *Rhinophrynus*

ANURA: NEOBATRACHIA (families, genera, species)

ARTHROLEPTIDAE: *Arthroleptis*

BUFONIDAE: *Ansonia, Atelopus, Bufo,*

(Continued)

ROOM 3167

BUFONIDAE (Continued): *Bufo*, *Dendrophryniscus*, *Melanophryniscus*,
Nectophrynoides, *Pedostibes*, *Peltophryne*, *Rhamphophryne*, *Schismaderma*

CENTROLENIDAE: *Centrolenella*

DENDROBATIDAE: *Colostethus*, *Dendrobates*, *Miniobates*, *Phyllobates*

HELEOPHRYNIDAE: *Heleophryne*

HEMISIDAE: *Hemisus*

HYLIDAE: *Acris*, *Agalychnis*, *Anotheca*, *Aparasphenodon*, *Cyclorana*,
Gastrotheca, *Hemiphractus*, *Hyla*, *Limnaoedus*, *Litoria*, *Nyctimystes*, *Ololygon*,
Osteocephalus, *Osteopilus*, *Pachymedusa*, *Phrynohyas*, *Pyllomedusa*, *Plectrohyla*,
Pseudacris, *Pternohyla*, *Ptychohyla*, *Scarthyla*, *Smilisca*, *Sphaenorhynchus*,
Trachycephalus, *Tripurion*

HYPEROLIIDAE: *Afrixalus*, *Hyperolius*, *Kassina*, *Leptopelis*, *Phlyctimantis*

ROOM 3167

LEPTODACTYLIDAE: *Adenomera*, *Alsodes*, *Atelognathus*, *Batrachyla*,
Ceratophrys, *Chacophrys*, *Edalorhina*, *Eleutherodactylus*, *Eupsophus*, *Hylactophryne*,
Hylorina, *Ischnocnema*, *Lepidobatrachus*, *Leptodactylus*, *Lithodytes*, *Odontophrynus*,
Phyllonastes, *Physalaemus*, *Pleurodema*, *Proceratophrys*, *Syrrhophus*, *Telmatobius*,
Thoropa, *Tomodactylus*

MICROHYLIDAE: *Breviceps*, *Chaperina*, *Chiasmocleis*, *Cophixalus*,
Dermatonotus, *Elachistocleis*, *Gastrophryne*, *Glyphoglossus*, *Hamptophryne*,
Hypopachus, *Kalophrynus*, *Kaloula*, *Metaphrynella*, *Microhyla*, *Otophryne*,
Phrynomerus, *Ramanella*, *Sphenophryne*

MYOBATRACHIDAE: *Adelotus*, *Crinia*, *Limnodynastes*, *Mixophyes*,
Paracrinia, *Pseudophryne*, *Taudactylus*, *Uperoleia*

PSEUDIDAE: *Pseudis*

ROOM 3167

RANIDAE: *Amolops*, *Batrachylodes*, *Cacosternum*, *Ceratobatrachus*,
Conraua, *Hylarana*, *Micrixalus*, *Microbatrachella*, *Nannophrys*, *Nanorana*,
Occidozyga, *Petropedetes*, *Phrynobatrachus*, *Platymantis*, *Ptychadena*, *Pyxicephalus*,
Rana, *Staurois*, *Strongylopus*, *Tomopterna*

RHACOPHORIDAE: *Boophis*, *Buergeria*, *Chirixalus*, *Chiromantis*,
Nyctixalus, *Philautus*, *Polypedates*, *Rhacophorus*

RHINODERMATIDAE: *Rhinoderma*

UNIDENTIFIED TADPOLES

CLEARED AND STAINED COLLECTION

ROOM 3165

CHELONIA (families, genera, species)

CHELIDAE: *Chelodina, Chelus, Elseya, Phrynops, Platemys*

CHELONIIDAE: *Caretta, Chelonia, Eretmochelys, Lepidochelys*

CHELYDRIDAE: *Chelydra, Macroclemys, Platysternon*

DERMOCHELYIDAE: *Dermochelys*

EMYDIDAE: *Chinemys, Chrysemys, Clemmys, Cuora, Deirochelys, Emydoidea, Graptemys, Malaclemys, Malayemys, Mauremys, Ocadia, Pseudemys, Rhinoclemmys, Sacalia, Terrapene*

KINOSTERNIDAE: *Claudius, Kinosternon, Staurotypus, Sternotherus*

PELOMEDUSIDAE: *Pelomedusa, Pelusios, Podocnemis*

TESTUDINIDAE: *Geochelone, Gopherus, Homopus, Kinixys, Malacochersus, Psammobates, Testudo*

ROOM 3165

TRIONYCHIDAE: *Lissemys*, *Trionyx*

CROCODYLIA (genera, species)

Alligator, *Caiman*, *Crocodylus*, *Paleosuchus*

SPHENODONTIDA (genus, species)

Sphenodon

ROOM 3165

IGUANIA (families, genera, species)

AGAMIDAE: *Acanthosaura*, *Agama*, *Amphibolurus*, *Calotes*, *Ceratophora*,
Chlamydosaurus, *Cophotis*, *Diporiphora*, *Draco*, *Gonocephalus*, *Hydrosaurus*,
Japalura, *Leiolepis*, *Lophognathus*, *Moloch*, *Oriocalotes*, *Otocryptis*, *Phoxophrys*,
Phrynocephalus, *Physignathus*, *Stellio*, *Trapelus*, *Tympanocryptis*, *Uromastyx*

CHAMAELEONIDAE: *Brookesia*, *Chamaeleo*, *Rhampholeon*

IGUANIDAE: *Amblyrhynchus*, *Anolis*, *Aperopristis*, *Basiliscus*, *Callisaurus*,
Chamaelinorops, *Conolophus*, *Cophosaurus*, *Cortytophanes*, *Crotaphytus*,
Ctenoblepharis, *Ctenosaura*, *Cupriganus*², *Cyclura*, *Diplolaemus*, *Dipsosaurus*,
Enyalioides, *Enyalius*, *Gambelia*, *Holbrookia*, *Hoplocercus*, *Iguana*, *Leiocephalus*,
Leiosaurus, *Liolaemus*, *Morunasaurus*, *Oplurus*, *Petrosaurus*, *Phenacosaurus*,
Phrynosaura, *Phrynosoma*, *Phymaturus*, *Plica*, *Polychroides*, *Polychrus*, *Pristidactylus*,
Proctotretus, *Sator*, *Sauromalus*, *Sceloporus*, *Stenocercus*, *Tropidurus*, *Uma*,
Uracentron, *Urosaurus*, *Uta*

ROOM 3165

GEKKOTA (families, genera, species)

DIPLODACTYLIDAE: *Crenadactylus*, *Diplodactylus*, *Hoplodactylus*,
Nephrurus, *Phyllurus*

EUBLEPHARIDAE: *Aelurascalabotes*, *Coleonyx*

GEKKONIDAE: *Afroedura*, *Alsophylax*, *Aristelliger*, *Chondrodactylus*,
Cnemaspis, *Colopus*, *Cyrtodactylus*, *Gehyra*, *Gekko*, *Gonatodes*, *Hemidactylus*,

(Continued)

ROOM 3139

GEKKONIDAE (Continued): *Hemiphyllodactylus*, *Heteronotia*,
Holodactylus, *Homonota*, *Homopholis*, *Lepidoblepharis*, *Lepidodactylus*, *Lucasium*,
Lygodactylus, *Nactus*, *Pachydactylus*, *Palmatogecko*, *Phelsuma*, *Phyllodactylus*,
Phyllopezus, *Pristurus*, *Pseudogonatodes*, *Pseudothecadactylus*, *Ptenopus*, *Ptychozoon*,
Ptyodactylus, *Quedenfeldtia*, *Rhoptropus*, *Saurodactylus*, *Sphaerodactylus*,
Stenodactylus, *Tarentola*, *Teratoscincus*, *Thecadactylus*, *Tropicolotes*,
Underwoodisaurus

PYGOPODIDAE: *Aprasia*, *Delma*, *Lialis*, *Pygopus*

"AUTARCHOGLOSSA" (families, genera, species)

ANGUIDAE: *Abronia*, *Anguis*, *Anniella*, *Barisia*, *Brachymeles*, *Celestus*,
Diploglossus, *Elgaria*, *Gerrhonotus*, *Mesaspis*, *Ophiodes*, *Ophisaurus*, *Wetmorena*

CORDYLIDAE: *Cordylus*, *Gerrhosaurus*, *Platysaurus*, *Pseudocordylus*

DIBAMIDAE: *Anelytropsis*, *Dibamus*

ROOM 3139

LACERTIDAE: *Acanthodactylus*, *Adolfus*, *Aporosaura*, *Eremias*,
Heliobolus, *Ichnotropis*, *Lacerta*, *Latastia*, *Meroles*, *Mesalina*, *Nucras*, *Ophisops*,
Pedioplanis, *Podarcis*, *Poromera*, *Psammodromus*, *Takydromus*

HELODERMATIDAE: *Heloderma*

SCINCIDAE: *Ablepharus*, *Acontias*, *Afroablepharus*, *Anomalopus*, *Anotis*,
Apterygodon, *Ateuchosaurus*, *Brachymeles*, *Carlia*, *Chalcides*, *Cophoscincopus*,
Corucia, *Cryptoblepharus*, *Ctenotus*, *Dasia*, *Egernia*, *Emoia*, *Eugongylus*, *Eumeces*,
Feylinia, *Hemiergis*, *Lamprolepis*, *Lampropholis*, *Leiolopisma*, *Lerista*, *Lipinia*,
Lobulia, *Lygosoma*, *Mabuya*, *Menetia*, *Morethia*, ^{ophiomorphus} *Panaspis*, *Prasinohaema*,
Proablepharus, *Riopa*, *Saiphos*, *Scincella*, *Scincopus*, *Scincus*, *Sphenomorphus*,
Sphenops, *Tiliqua*, *Trachydosaurus*, *Tribolonotus*, *Tropidophorus*, *Typhlosaurus*

ROOM 3139

TEIIDAE: *Ameiva*, *Anadia*, *Arthrosaura*, *Bachia*, *Callopistes*, *Cercosaura*,
Cnemidophorus, *Crocodylurus*, *Dicrodon*, *Dracaena*, *Echinosaura*, *Euspondylus*,
Gymnophthalmus, *Iphisia*, *Kentropyx*, *Leposoma*, *Neusticurus*, *Pantodactylus*,
Pholidobolus, *Prionodactylus*, *Proctoporus*, *Ptychoglossus*, *Teius*, *Tupinambis*

VARANIDAE: *Varanus*

XANTUSIIDAE: *Lepidophyma*, *Xantusia*

XENOSAURIDAE: *Shinisaurus*, *Xenosaurus*

ROOM 3139

AMPHISBAENIA (families, genera, species)

AMPHISBAENIDAE: *Amphisbaena, Anops, Blanus, Cynisca, Leposternon, Zygaspis*

BIPEDIDAE: *Bipes*

RHINEURIDAE: *Rhineura*

TROGONOPHIIDAE: *Trogonophis*

SERPENTES: SCOLECOPHIDIA (families, genera, species)

ANOMALEPIDIDAE: *Anomalepis*

LEPTOTYPHLOPIDAE: *Leptotyphlops*

TYPHLOPIDAE: *Ramphotyphlops, Rhinotyphlops, Typhlina, Typhlops*

ROOM 3139

SERPENTES: "HENOPHIDIA" (families, genera, species)

ANILIIDAE: *Anilius*

BOIDAE: *Boa, Calabaria, Candoia, Charina, Corallus, Epicrates, Eryx*
Lichanura?

CYLINDROPHIIDAE: *Cylindrophis*

LOXOCEMIDAE: *Loxocemus*

PYTHONIDAE: *Aspidites, Chondropython, Liasis, Morelia, Python*

TROPIDOPHIIDAE: *Exiloboa, Tropidophis, Ungaliophis*

XENOPELTIDAE: *Xenopeltis*

SERPENTES: CAENOPHIDIA (families, genera, species)

ACROCHORDIDAE: *Acrochordus*

ROOM 3139

ATRACTASPIDIDAE: *Amblyodipsas*, *Aparallactus*, *Atractaspis*,

Homoroselaps

COLUBRIDAE: *Achalinus*, *Adelphicos*, *Ahaetulla*, *Alsophis*, *Amastridium*,
Amblyodipsas, *Amphiesma*, *Amphiesmoides*, *Antillophis*, *Apostolepis*, *Arizona*,
Arrhyton, *Aspidura*, *Atractus*, *Bogertophis*, *Boiga*, *Calamaria*, *Carphophis*,
Cemophora, *Cerberus*, *Chersodromus*, *Chilomeniscus*, *Chionactis*, *Chironius*,
Chrysopelea, *Clelia*, *Coluber*, *Coniophanes*, *Conophis*, *Conopsis*, *Contia*, *Coronella*,
Crotaphopeltis, *Cryophis*, *Dasypeltis*, *Dendrelaphis*, *Dendrophidion*, *Diadophis*,
Dinodon, *Dipsadoboa*, *Dipsas*, *Dispholidus*, *Drepanoides*, *Dromophis*, *Drymarchon*,
Drymobius, *Drymoluber*, *Dryocalamus*, *Duberria*, *Echinanthera*, *Eirenis*, *Elaphe*,

(Continued)

ROOM 3137

COLUBRIDAE (Continued): *Elaphe*, *Elapomorphus*, *Enhydris*, *Entechinus*,
Enulius, *Eridiphas*, *Erpeton*, *Erythrolamprus*, *Farancia*, *Ficimia*, *Geagras*, *Geophis*,
Gerarda, *Goniontophis*, *Gyalopion*, *Hapsidophrys*, *Helicops*, *Heterodon*,
Hydrodynastes, *Hydromorphus*, *Hypsiglena*, *Imantodes*, *Lampropeltis*, *Lamprophis*,
Leptodeira, *Leptodrymus*, *Leptophis*, *Liophis*, *Lycodon*, *Lycodonomorphus*,
Lycophidion, *Lystrophis*, *Lytorhynchus*, *Macropisthodon*, *Macropophis*?,
Macroprotodon, *Malpolon*, *Masticophis*, *Mastigodryas*, *Mehelya*, *Meizodon*, *Mesaspis*,
Miodon?, *Natriciteres*, *Natrix*, *Nerodia*, *Ninia*, *Nothopsis*, *Oligodon*, *Opheodrys*,
Opisthotropis, *Oxybelis*, *Oxyrhopus*, *Pareas*, *Philodryas*, *Philothamnus*, *Phimophis*,
Phyllorhynchus, *Pituophis*, *Plagiopholis*, *Pliocercus*, *Polemon*, *Psammodynastes*,
Psammophis, *Psammophylax*, *Pseudablables*, *Pseudaspis*, *Pseudoboa*, *Pseudoficimia*,
Pseudoleptodeira, *Pseudorhabdion*, *Pseudotomodon*, *Pseudoxenodon*, *Pseustes*, *Pytas*,
Regina, *Rhabdophis*, *Rhadinaea*, *Rhamphiophis*, *Rhinocheilus*, *Rhynchocalamus*,
Salvadora, *Scaphiodontophis*, *Scolecophis*, *Seminatrix*, *Senticolis*, *Sibon*,
Sibynomorphus, *Sibynophis*, *Simophis*, *Sinonatrix*, *Sonora*, *Spalerosophis*, *Spilotes*,
Stegonotus, *Stenorrhina*, *Stilosoma*, *Storeria*, *Symphimus*, *Sympholis*,

(Continued)

ROOM 3137

COLUBRIDAE (Continued): *Tachymenis, Tantalophis, Tantilla, Tantillita**,
Telescopus, Thamnodynastes, Thamnophis, Thelotornis, Thrasops, Toluca, Tomodon,
Trimetopon, Trimorphodon, Tripanurgos, Tropidoclonion, Tropidodipsas,
Tropidodryas, Tropidonophis, Uromacer, Virginia, Waglerophis, Xenochrophis,
Xenodon, Xenopholis, Xenoxybelis, Zaocys

ROOM 3135

ELAPIDAE: *Acanthophis*, *Aspidelaps*, *Austrelaps*, *Bungarus*, *Cacophis*,
Calliophis, *Cryptophis*, *Dendroaspis*, *Drysdalia*, *Elapsoidea*, *Emydocephalus*,
Enhydrina, *Hemachatus*, *Hemiaspis*, *Hydrophis*, *Lapemis*, *Laticauda*, *Leptomicrurus*,
Micruroides, *Micrurus*, *Naja*, *Notechis*, *Oxyuranus*, *Pelamis*, *Pseudechis*, *Pseudonaja*,
Suta

VIPERIDAE: *Agkistrodon*, *Atheris*, *Azemiops*, *Bitis*, *Bothrops*, *Causus*,
Cerastes, *Crotalus*, *Deinagkistrodon*, *Echis*, *Eristicophis*, *Lachesis*, *Sistrurus*,
Trimeresurus, *Vipera*

TYPE COLLECTION

*Means that the specimen(s) is (are) missing from the collection.

Varanus indicus
SOLOMON ISLANDS

- Italicized
- Bold
- 26 pt

- 22 pt

U.S. Trust Territory of the Pacific

Font: Times New Roman

Italics 17 pt
(Kodotype labels)

Bothriechis

Times New Roman



Curatorial

MVZ documents

Curatorial docs

Herp Curatorial

table

Label-templates

template of above label

Shelf-label.pptx