

Guidelines and Procedures for the Malacology Collection
of the Tom Ridge Environmental Center at Presque Isle
Gastropoda – snails
Bivalvia - mussels

Introduction, Arrangement, and Storage of Specimens

Any systematic collection is an irreplaceable scientific resource and should be cared for properly as a public trust.

The Tom Ridge Environmental Center's (TREC) malacology collection is arranged systematically by class then family; specimens are arranged alphabetically by genus within each family. Unidentified specimens are at the end of the collection.

The dry shells in the collection are housed in metal museum cabinets with metal drawers subdivided by wooden partitions. Small specimens are stored in glass vials and plugged with cotton to reduce risk of breakage. The cabinets are in a dry storage room.

Specimens stored in ETOH are housed in vial cabinets in a wet storage room where all other museum specimens that are preserved in ETOH are also stored.

Resource sites include: <http://cbc.amnh.org/mussel/conservationstudyframeset.html> and <http://www.itis.gov/> (Integrated Taxonomic Information system)

General Collecting and Preservation Techniques

1. Collecting materials:

- a. COLLECTION PERMITS
- b. rake, dredge, tongs
- c. small hooks
- d. sieves
- e. PVC quadrat tubes
- f. several mesh bags – at least one per collection site
- g. glass bottom bucket if available
- h. snorkel/mask for some aquatic sites
- i. thermometer - optional
- j. numbered metal tags or fishing line and paper, depending on labeling technique being used
- k. pocket knife
- l. GPS if available
- m. fieldbook
- n. archival, ETOH proof (Pigma) pen
- o. wash tub to carry supplies and specimens

2. Documenting and labeling:

- a. in fieldbook, record site, date, coordinates, ecological information and other pertinent data (like air temperature, water temperature, time of day, etc) for possible future use
- b. use a different collection bag at each new site; if specimens are to be processed later, a numbered (metal) tag can be added to each bag with its number noted in the fieldbook
- c. for small collections create a label with all collecting data (site, date, collector, coordinates, habitat) and attach to specimen with a short length of fishing line
- d. assign field number; example: BLT:07:2006
 - collector's initials
 - specimen number or lot number
 - year collected
- e. write with archival (*Pigma*) pen

3. Cleaning and processing aquatic shells:

- a. use a stiff (vegetable) brush to clean exterior of shells; take care not to scratch surfaces; take care not to break small and fragile shells
- b. boil a few at a time
 - choose like sizes for similar cooking requirements
 - when bivalves open, they are ready
- c. remove body while hot
 - strong water pressure hoses work well
 - crochet hooks and dental tools work well
- d. if time is of little concern allow blow-fly larvae and other carrion insects to clean shells; after a few weeks, rinsing is all that is necessary
- e. when only a few specimens are collected, shells may be opened at the site, cutting the adductor muscles to remove; keep shell halves together with rubber bands or by tying
- f. small shells may be fixed in alcohol; do NOT boil
- g. if specimen is an operculate snail
 - boil and remove body using crochet hook or similar tool
 - save operculum
 - fill shell with cotton or crumpled paper
 - glue operculum to filler
- h. if preserving for anatomical purposes
 - do not boil
 - store in 60% ETOH

4. Processing terrestrial snails:

1. specimens to be used for anatomical purposes
 - drown for 8-10 hours
 - store in 60% ETOH
 - if radula only is to be studied, use higher % ETOH

2. specimens collected for shells only
 - place in bag; immerse bag into boiling water
 - boiling time - 30 seconds for small shells; one minute or more for larger shells
 - boiling land snails may cause color to fade; if enough specimens were collected, give trial to test for color fastness
- c. alternative methods to maintain color
 - place snails, aperture down, on a towel in tin plate or on dry sand; place in 300° for 5 - 7 minutes; too much heat will fade pink tints
 - freeze for 12 hours

Collecting Freshwater Gastropoda – snails

1. Bait traps:

- a. small mesh bag, or use twine to tie either 9 inch square double thickness cheesecloth (darkened color), or 9 inch square cut from burlap bag
- b. tie to a stake – preferable using willow because it will leaf out and appear natural
- c. place in aquatic habitats, exclusive of lakes; inclusive of vernal pools and snow pools

2. Bait:

- a. place dried chicken feces in trap as bait
- b. dead fish serve as a good bait for trapping *Campeloma* sp.

3. Trap retrieval:

- a. move to new locations every 10 – 14 days
- b. collect by removing trap and screening mud from area about 15 inch circumference around trap using screened scoop or spinach strainer

Collecting Freshwater Bivalvia – mussels

1. Choosing collection sites:

- a. limestone regions best collecting sites; small land-locked rivers/lakes low species diversity;
 - French Creek one of most diverse in Eastern U.S.
- b. mussels most abundant on stream shoals; imbedded in gravel, sand, mud bottom
- c. tracks/scat/middens of muskrat, raccoons and mink along shore indicate mussel beds nearby;
 - good shells can be found in feeding piles; thin-shelled forms often broken by mammal's teeth

2. Collecting procedures:

- a. glass-bottomed bucket indispensable collecting tool; dredges, tongs, rakes; snorkel useful
- b. store specimens in properly marked mesh bag

Collecting Terrestrial Shells

1. Choosing collection sites:

- a. shells from moss
 - edges of swamps but not flooded
 - shaded areas - under trees, base of cliffs
 - gather moss to fill 10 lb. paper sack; tie the mouth securely; dry few days; pass through sieves of various sizes
- b. shaded ravines
 - ground moisture
 - leaf cover
 - under bark and along edges of fallen trees
 - rocks not too deeply imbedded
 - limestone ledges of mountainous areas
- c. stream drift
 - collect where obstruction (log, fence, stream bank, roots) has caused accumulation
 - place in bags and allow to dry
 - sort for shells
- d. quarries and ledges
 - limestone ledges especially good
 - those partly covered with soil productive

2. Processing empty shells:

- a. take care not to damage
- b. take field notes, label, and clean same as those with living animals (see general processing guidelines above)

3. Processing shells with live snails – see steps above in general processing guidelines; also see below in section called “trapping terrestrial snails”

Trapping Terrestrial Snails

1. Snail trap:

- a. wet burlap sack
- b. fold to several layers (3-6 times)
- c. cover with 2⁺ layers of rocks – small rocks on bottom; flat ones on top
- d. make sure there is still AIR CIRCULATION
- e. examine traps 2-4 times per week
- f. specimens will be on underside of sack, in debris, soil
- g. slugs may also be attracted – see later section for special handling

2. Keep alive until processing:

- a. put a mixture of moist leaves and grass in cloth bags
- b. store out of sun
- c. reminder: take careful field notes

Rearing Terrestrial Snails and Slugs

1. Space:

- a. each species requires different amounts of available space
- b. rule-of-thumb: provide 1cm (diameter) snail at least 100 c.c. crawl space and 2-3 cm depth
of loose substrate

2. Receptacle:

- a. styrofoam boxes work well; moisture proof
- b. cut hole in top
- c. cover hole with glass to let in light

3. Substrate:

- a. well aerated leaf litter mixed with well-aerated damp soil – sterilize in autoclave or oven
- b. important ingredient: lime (powdered dolomite garden lime or crushed limestone); mix liberally with the substrate

4. Food:

- a. most snails subsist on leaf litter
- b. supplement with tender green leaves from cabbage or lettuce; mushrooms
- c. occasionally add slice of raw potato, radish, or apple.
- d. add small quantity cracked wheat, wheat germ, porridge, boiled egg yolk or dry porridge to
increase protein; will prevent cannibalism or eating eggs
- e. for starch and sugar, add small pieces of banana
- f. sprinkle lime on wet newspaper, paper toweling or cardboard (cardboard may also serve as
shelter)
- g. remove rotting food immediately; it releases deadly alcohol, acetic acid, ammonia.

5. Temperature: - best range is 10-20° C (50-68°F)

6. Pests:

- a. springtails, fungus gnats, mites, small annelids and nematodes
- b. initial sterilization of soil and letter
- c. wash fresh food to minimize pests
- d. vigilance monitoring

Special Handling of Slugs

1. Collecting:

- a. damp, organic habitats
- b. rainy weather

2. Preservation:

- a. fill tight container with water; add enough *Chloretone* to insure a saturated solution
- b. let stand several days to dissolve
- c. to use, pour some into a jar and add enough water to make a 5 – 10% solution
- d. add slugs which will become relaxed and extend themselves
- e. requires 3 – 10 hours depending on temperature
- f. fix in 1 part 37% formaldehyde to 16 parts water for 24 – 48 hours
- g. store specimens in 75% ETOH

Curating a Museum Collection

1. Specimens preserved in ETOH:

- a. long-term stability is determined by:
 - biggest threats: inadequate preservation, loss of fluid preservative, heat, light, UV light
 - quality of fixation or initial preservation
 - post-preserving process
 - quality and stability of the storage environment
- b. optimum is 65°F and 50% relative humidity
- c. fluorescent lights produce significant UV - keep in dark when not in use
- d. do not put preserved specimens in water for examination
- e. denatured ethyl alcohol is undesirable

2. Transfer of specimens - from field fixative to museum storage:

- a. osmotic pressure rises steadily with ethanol concentrations below 75%, so it is suggested that approximately equal concentration increments are the most appropriate for stepping specimens to higher ETOH concentrations.... 10% formalin-H₂O; 20% ETOH; 40% ETOH; 60% ETOH; 70% ETOH
- b. fill containers to the top leaving no air space

3. Collection management:

- a. accession - a formal process by which a museum takes legal possession of a specimen from receipt/collection of specimens through the preparation for cataloging; check specimen data for completeness and accuracy
- b. accession record - shows how specimens were acquired, date of receipt, date of accession, accession number, collector's name (or donor's name) and address, plus sufficient description to identify specimens
- c. accessioning decisions – these benchmark questions help determine if

specimens should be accepted into the collection; any negative answer means accession should be declined:

- do the specimens fall within the categories identified as important to collection growth?
- are the specimens appropriate for the collection; could they be of more use in another institution?
- are the specimens well preserved?
- are the field notes and other documentation in good order?
- are there originals or copies of the proper permits for collecting, exporting, and importing the specimens?
- has a clear understanding been reached with the donor regarding the terms of deposit of the specimens? (deed of gift or transfer)
- if specimens come from a live-animal facility (e.g.: zoo), have proper necropsy protocols been followed; were the specimens exposed to toxins, infectious agents, or radiation?

4. Accession process:

- a. receive specimens - handle with care; watch for loose specimens, ruptured containers,
information written on containers, field notes stuck between packed specimens;
check all
specimens against the packing list; provisionally mark each container with source name
- b. complete the accession checklist:
 - accession number - filled in when assigned by museum
 - collectors - full names of all collectors who contributed to collecting specimens
 - date - when the specimens were received by the museum
 - descriptions of collection, including number of individual specimens
 - list of required permits, field notes, correspondence, and other documentation that accompanies the collection
 - name and signature of the person responsible for completing the accession checklist
 - source - name, address, telephone, and email address of the collector, donor, seller, or contact person at museum donating the specimens
- c. assemble the accession file:
 - accession checklist
 - correspondence relating to collection, transport, and ownership of specimens
 - deed of gift or transfer - statement of good faith; establishes ownership; signed by donating individual or institution

- field notes - location in museum should be noted
- permits as required
- other documentation pertaining to the accession
- d. assign the accession number :
 - establishes the **legality and time museum takes ownership** of specimen
 - check that all appropriate documentation is in place prior to assigning accession number
 - all like species collected at same place and same time have same number
 - label all containers with respective accession number
 - accession numbers are successive numbers within each taxa (e.g. mollusks might be M-026, M-027, M-028; reptiles might be R-01, R-02, R-03)

5. Appropriate documentation inclusions:

- a. standard locality - use topography map or GPS to establish coordinates
- b. traditional catalog entry - include:
 - country, state/province, district/region/township, county
 - distance and direction to nearest map locality
 - directional coordinates and elevation
 - date - format: dd mmm yyyy
- c. scientific name
 - always double/triple check current scientific name
 - name - format: *Genus species* author (author may have parenthesis or not; be accurate)
- d. collector – include: full name as recorded in accession document
- e. field number or original number:
 - record field number on specimens received directly from collector
 - record original museum number of previously cataloged specimens received from another collection
 - museum names may be abbreviated using standard code of institution; standardized codes available in Leviton, et al 1985

6. Drawer storage spaces and containers:

- a. never store different species within same vial/container or storage space/box
- b. never store specimens with different accession numbers within same vial/container
- c. dry shells of same species with different accession numbers may be stored within the same space/box
- d. multiple specimens of same species and same accession number may be stored in same vial/container
- e. glass containers with tightly fitting lids are ideal when vials are needed for ETOH preservation or for storage of small, dry specimens
- f. use appropriate size container for specimen size
 - container size is determined by having a ratio of at least twice the volume of liquid as specimen volume

- vials containing small, dry specimens should be large enough to view shell and read label; vial is filled with cotton to avoid breakage of shells

7. Container labels:

- preparation:
 - fluid-resistant , durable paper (e.g.: *Resistall*)
 - print label with thermal printer where heat bonds a carbon powder
- data:
 - accession number
 - scientific name
 - family
 - locality
 - preservation fluid if relevant

8. Dry specimens in storage drawers

- mark each shell with extra-fine (0.005mm), archival *Pigma* pens; include accession number
- write on non-diagnostic parts of shell
- place shells in a -20° freezer for decontamination; freeze for 48 hours, remove for 24 hours,
return for another 48 hours
- shells are ready to place storage drawers within respective space – one species per space
- keep both halves of bivalves together
- do not house glass vials in same space as loose shells; put in separate space, giving each
species its own space
- monitor specimens regularly for signs of pest activity

9. Special formalin considerations:

- preserve in 10% formalin buffered with two salts
- handle with care:
 - well-ventilated space (fume hood)
 - eye protection
 - formaldehyde resistant gloves

10. Responsibility of collection manager:

- protect integrity of collection and data
- use and access electronic database as management and assessment tool
- make specimens and data available for use
- keep records of all chemicals and procedures used to process and care for specimens
- monitor storage environment
- monitor collections for pests and/or deterioration
- update electronic and digital collection records – databases, images, recordings

Collection records

- 1. Handwritten catalog – archival copy**
- 2. Electronic data storage – backup copy:**
 - a. superior for data manipulation and management tool, but not permanent
 - b. make multiple copies of writable CDs; store separately
 - c. requires perpetual expense and need for updated software
 - d. databases – not just digital catalog but a collection management tool
 - ability to handle size of collection and future growth
 - easily accessible
 - fully searchable
 - allow data input without using codes and/or abbreviations
 - allow correlation of support documents (audio, visual, field notes)
 - functions: report writing, labels, loan forms, electronic export
 - track collection growth
 - make available online
- 3. Images:**
 - Images are designated with a TREC catalog number (e.g. TREC Mo- 00001) if no physical specimen was collected. The image then serves as the specimen, and is entered into the database for that group of organisms.
 - If photographs are taken of a collected specimen, they are designated with the catalog number of the specimen plus a lower case letter (e.g. TREC Mo- 00001a; TREC Mo-000001b, etc.). If multiple photos are taken of a specimen not collected, one is designated as the primary image and given a TREC catalog number, and additional images are designated with the additional lower case letter. These are recorded in the ‘TREC Images’ field in the database.
 - Digital image files are named with the catalog number of the specimen depicted, followed by the species (or higher taxon, if species not determined), e.g. “TREC Mo-00001 *Actinonaias ligamentina*.“ Photographic prints and slides are labeled with the catalog number and the collection data normally written on a specimen label.
 - Images are stored as both digital files and prints. Digital images are kept in a designated folder, and prints are stored in archival albums labeled with the range of catalog numbers they contain (e.g. TREC Mo- 00001 – TREC Mo- 00120).
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- 4. Video and audio recordings:**
 - Video and audio recordings are designated in the same manner as photographic images, with each receiving a TREC catalog number if no physical specimen is collected, and an added letter designation for recordings of collected specimens each disc.
 - video recording numbers are added to archival catalog and electronic database for ease of retrieval.
 - additionally, a list of all recordings for all taxa is also stored in a single ‘recording database’ as a file and retrieval system; the recording format is noted (audio, video, audio/video).