Essig Museum of Entomology

University of California, Berkley

Rev 2

Standard Operating Procedures and Protocols for Ground Beetle Morphological Identification and Museum Services

1 Dec 2019

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1.0 Traceability of Analysis

~taxonomic keys/references used for identification

In KWW's lab library and/or in the holdings of the University of California, we have access to all of the 124 references listed in the most current NEON identification references list. The two primary references to be used are by Lindroth (1969. The ground-beetles (Carabidae, excl. Cicindelinae) of Canada and Alaska, parts 1-6. Opuscula E. Entomoligiska Sallskapet.) and Ball and Bousquet (in Arnett Jr., R. H., and M. C. Thomas. 2001. American Beetles Archosemata, Myxophaga, Adephaga, Polyphaga: Staphyliniformia. 1st Vol. (C. Press, Ed.). 1st Ed. Boca Raton, FL.)

We also have the Essig Museum's carabid specimen collection for comparison and full access to the California Academy of Sciences collections and library.

~experts working on analysis and summary of years of experience on relevant work

All identifications will be finalized by KWW, who has >20 years working with carabid beetles, worldwide.

Initial sorting may be done by RLB, who has been working with insect collections and frequently with carabid beetles, since 1987.

~training policy if non-experts (technicians/graduate students) are working on analysis

Students may be used for unpacking and repacking specimens. They will be taught safe specimen handling procedures and basic museum methods either during coursework prior to hiring or under direct supervision of the Essig Museum collection manager, KWW or RLB. Particularly skilled students might provide preliminary identifications, but all final identification will be checked by KWW. Students are typically taught to assist in determining the sex of identified specimens.

2.0 Procedure

Detail the following (if applicable):
~Receiving, sample tracking, storage procedure

1. On arrival shipments will be photographed and any apparent damage noted.

2. All specimens will be placed in a -70 C freezer for three days, minimum.
3. After freezer treatments, specimens will be moved from shipping containers to standard drawers and unit trays in the collection. Counts and manifest checks are done at this point.
4. Specimens are sorted by-eye to tribe, where possible to genus or species and placed in unit trays and into EMEC drawers for processing.
5. A tracking tag is added to each unit tray to record progress.
6. Specimens are identified by KWW using a Leica MZ12S or similar microscope.
7. Selected specimens are dissected for identification, as needed. Genitalia are placed in a capsule on the pin under the specimen.
8. Sex is determined by inspection.
9. Identification labels are applied to all specimens.
10. All identification and sex data will be entered into the standard NEON CSV files.
11. All data and specimen counts/numbers will be double checked when specimens are placed into the Essig and returned to NEON domains as appropriate.
12. Specimens to be returned will be repacked in NEON shipping material and packed using standard Museum protocols to ensure safe shipment.

~Sample submission for DNA identification procedures

1. Specimens selected by NEON for DNA barcoding are transferred to drawers marked by grid to correspond with row and number on 96-well plate.
2. Right mesothoracic leg (or alternative as necessary) of each specimen is extracted and placed in well pre-filled with 30 microliters of 95-100% ethanol using CCDB protocol.
3. Green label attached to each specimen indicating tissue was sampled for DNA barcoding.
4. Locations of samples in well plates are entered into MS Excel file CCDB-00000_Record.xls sample data input sheet template along with corresponding NEON sample ID following CCDB protocol.
5. Well plates and accompanying documentation are packaged and submitted to the Canadian Centre for DNA Barcoding following CCDB protocol.

3.0 QAQC Protocols

Detail any quality checks in place (secondary or rechecks or what happens when identification not certain) and acceptance criteria if exists.

The cause of the identification uncertainty will be noted and rectified on a case by case basis. Any changes will require updating existing specimen labels and data entry. In such a case NEON will be notified with a list of specimen numbers and the required changes.