

# SOP 17: Voucher specimens

Frost Entomological Museum Curator & Interest Group

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## Preamble

The Frost Entomological Museum stands as repository for voucher specimens that represent science, surveys, and related work completed by Penn State researchers and certain affiliates. Vouchering, however, is not always straightforward. This SOP provides guidelines on how to designate vouchers for one's study and also how to get these specimens accessioned into the research collection at the Frost Entomological Museum. If you intend to deposit voucher specimens at the Frost Entomological Museum please contact Museum staff during the *design phase* of your project.

## 1 Importance of vouchers

Repeatability is a tenet of the scientific method [1]. Providing others with the opportunity to verify the subject of your research – the insects and other arthropods, whose biology you investigated – is a key step in making your research repeatable. Properly prepared voucher specimens provide the means for verification and, in many cases, opportunities to build on your research [2, 3, 4, 5, 6, 7]. Depositing voucher specimens is as important as depositing data (e.g., DNA into NCBI's GenBank), especially for insects and other study organisms that are difficult to identify or locate in the wild.

## 2 Designating vouchers – How many?

The nature of your research and data collection will affect what should be vouchered, including how the arthropods were acquired, their level of taxonomic identification, the type of study the arthropods were used for, sex, life stage, or whether variants (geographic, morphological, time series, *etc.*) were important aspects of the project. **A good rule of thumb is to plan for 10 voucher specimens for each type of specimen** [2, 5]. This approach allows you to represent the range of variability while also keeping the investment of time and resources relatively low. Exceptions to the “10 of each type” recommendation may include:

- If working with insects from a lab-reared colony, and (a) a sample of the colony has been previously vouchered and (b) there have been no changes to colony since vouchering you can probably submit fewer specimens. Contact Museum staff for a consultation.
- If your research involved taxonomic revisions or descriptions of new species then *all* of your specimens must be vouchered

- If your research focused on broad ecological concepts, e.g., feeding guilds or all insects in a particular habitat, then contact museum staff to discuss the best vouchering strategy.

If you are unfamiliar with insect curation read our specimen preparation guide [8]. If you do not have the appropriate, archival materials, or you have questions regarding the process please contact Museum staff for assistance.

### 3 Designating vouchers – Other considerations

#### 3.1 Cost

If your research is based at Penn State University *AND* you are generating a relatively small number of voucher specimens *AND* you prepare the specimens and supply their associated data in an acceptable format then there is no cost. Support for materials and supplies, however, is always appreciated!

If your research will generate a large number of vouchers and/or you need assistance in making preparations and generating specimen data in an acceptable format then contact Museum staff.

#### 3.2 Taxonomic and other limitations

As stated in the Collection Management Policy [9], there are limits to the types of specimens that can be deposited in the collection. Molluscs, vertebrates, and plants, for example, do not align with the taxonomic scope of the Frost Museum and would need to be deposited somewhere else. Physical copies of data sheets likewise should be deposited elsewhere.

#### 3.3 Requirements

- Voucher specimens should be prepared following the Specimen Preparation Guide [8]. Voucher specimens should also be identified as such, with a separate label that includes the following:

VOUCHER SPECIMEN  
PhD\_ARDeans\_001

1. The words "VOUCHER SPECIMEN" at the top
  2. Your name, the specimen number (unique for each specimen)
- Specimen data must be submitted using the Frost Museum spreadsheet: <http://bit.ly/FrostVoucherData>. Additional data types (columns) can be added to the spreadsheet, but headers *must be* Darwin Core terms. See <https://dwc.tdwg.org/terms/>
  - A statement should be included in the thesis, dissertation, or publication that indicates the vouchers were deposited at the Frost Entomological Museum at the Pennsylvania State University. The voucher number, quantity submitted, life stage and sex (if known) should be included.
  - Notify staff at the Museum when any publication based on vouchered material is accepted. You will receive a hearty congratulations(!), and specimens will be linked in the database to the article's DOI. Well done!

## References

- [1] F. Bacon. *Novum organum*, 1620. Translated by Thomas Fowler and published in 1878 by Clarendon Press.
- [2] Biological Survey Of Canada (Terrestrial Arthropods). The role of voucher specimens in validating faunistic and ecological research, 2003. Document Series No. 9. Available at <<http://www.biology.ualberta.ca/bsc/briefs/brvouchers.htm>> Accessed 12 March 2019.
- [3] C. M. Yoshimoto. Voucher specimens for entomology in North America. *Bulletin of the Entomological Society of America*, 24(2):141–142, 1978.
- [4] V.A. Funk, P.C. Hoch, A.L. Prather, and W.L. Wagner. The importance of vouchers. *TAXON*, 54(1):127–129, 2005.
- [5] J.T. Huber. The importance of voucher specimens, with practical guidelines for preserving specimens of the major invertebrate phyla for identification. *Journal of Natural History*, 32(3):367–385, 1998.
- [6] N. A. Martin. Voucher specimens: A way to protect the value of your research. *Biology and Fertility of Soils*, 9(2):93–94, Apr 1990.
- [7] S. Turney, E.R. Cameron, C.A. Cloutier, and C.M. Buddle. Non-repeatable science: assessing the frequency of voucher specimen deposition reveals that most arthropod research cannot be verified. *PeerJ*, 3:e1168, August 2015.
- [8] Frost Entomological Museum Curator & Interest Group. *SOP 03: Specimen Preparation Guide*. Frost Entomological Museum, University Park, PA, USA, 1 edition, 2017. Available at <https://doi.org/10.26207/a1kq-xy95>. Accessed 16 July 2019.
- [9] Frost Entomological Museum Curator & Interest Group. *Policies and Procedures*. Frost Entomological Museum, University Park, PA, USA, 1 edition, 2017. Available at <https://doi.org/10.26207/6gt4-ep65>. Accessed 16 July 2019.