

# Bryophytes

**July 16 - 21, 2018 Highlands Biological Station**

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**Course Description & Goals:** The Highlands area harbors an incredible diversity and abundance of bryophytes and is the perfect setting for this course that will focus on the identification of mosses, liverworts, and hornworts. Considerable time will be devoted to microscopic study and the techniques needed to successfully demonstrate character states. Taxonomic keys to local genera will be provided. Habitat requirements and local diversity will be explored during daily field trips. Lectures will explain morphological features used in identification. In addition to morphology and ecology of bryophytes in general, participants will be introduced to regional species of conservation concern. Participants will build a personal herbarium of reference specimens. This course is suitable for naturalists, professionals, and advanced undergraduate/graduate students with a strong interest in practical taxonomy that relies on microscopic characters.

**Prerequisites:** field botany, plant taxonomy, or permission of the instructor.

**Instructional Materials:** The instructor will provide several handouts including taxonomic keys to genera, descriptive terms, etc. While no book is required you are advised to bring the flora of your choice; suggested titles follow and the first two listed below are of highest priority; the other titles are not comprehensive for the regional flora of western North Carolina but they all have something of value to offer.

Mosses of Eastern North America 2 vols., Crum & Anderson 1981, Columbia University Press. If at all possible bring this work. Limited copies will be available to share.

Guide to the Liverworts of North Carolina, Hicks 1992, Duke University Press. This is the most complete work for regional liverworts.

Mosses of the Great Lakes Forest, Crum, 4th ed., 2004, University of Michigan Herbarium.

Mosses of the Gulf South, Reese, 1984, Louisiana State University Press.

Liverworts of New England: A Guide for the Amateur Naturalist, Lincoln 2008, New York Botanical Garden.

Peat Mosses of the Southeastern United States, Anderson et al. 2009, New York Botanical Garden.

Maine Mosses 2 vols: Sphagnaceae-Timmiaceae, Allen 2006, and Drummondiaceae-Polytrichaceae, Allen 2014, Memoirs of the New York Botanical Garden.

Mosses and Other Bryophytes An Illustrated Glossary, 2nd ed, Bill & Nancy Malcolm 2006.

Common Mosses of the Northeast and Appalachians, McKnight et al. 2013, Princeton University Press.

Mosses, Liverworts, and Hornworts: A Field Guide to Common Bryophytes of the Northeast, Ralph Pope 2016, Comstock Publishing Associates

Outstanding Mosses & Liverworts of Pennsylvania & Nearby States, Munch 2006, Sunbury Press.

Books of interest that cover topics beyond the instructional content of the Highlands workshop: Mosses and Liverworts, Porley & Hodgetts 2005; Structural Diversity of Bryophytes, Crum 2001; Introduction to Bryology, Schofield 1985, \$59.95 from <http://www.blackburnpress.com/intobryol.html> [sic], Gathering Moss: A Natural and Cultural History of Mosses, Kimmerer 2003.

Vols. 27 & 28 (mosses) of Flora North America are free on-line at <http://www.efloras.org/index.aspx>  
Both volumes can be purchased in hard copy from various book sellers.

**Grading:** Students taking this workshop for credit will earn a grade (A 90-100%, B 80-89%, C 70-79%, D 60-69%, or F below 60%) based on the following:

30% Participation in lectures, labs, and field trips

35% Preparation of bryophyte collection

35% Performance on field quizzes, lab identifications and lab quizzes

**Additional Recommended Materials:**

- 10X or 14X hand lens
- pocket knife
- pencil or waterproof pen
- day pack for field trips and collecting
- field clothes to include sturdy shoes, long pants, rain gear, and water bottle
- fine-nosed tweezers if you have a favorite pair; dissection tools will be provided
- the Station supplies dissecting and compound microscopes but you may prefer to bring your own if that is an option for you
- notebook for organizing and recording your thoughts, observations (sketch pad if you like), and content covered in the workshop
- 100-200 specimen packets (I will supply small specimen bags for field collecting); for initial curation, cheap, white paper as used for photocopies, will serve well; see last page of syllabus for how to fold specimen packets
- several cardboard trays such as the low side-wall box that holds a case of can drinks, etc. (needed for sorting and air drying specimens in packets; look for these discarded in the grocery store wherever shelves are being stocked and ask at the checkout counter if you can have them for free).

**Expectations:** Each day will consist of some combination of classroom instruction, field excursion and lab dissecting/keying. A few field trips will require packed lunches. Field trips will entail moderate to low-level strenuous hiking to local gorges and mountain slopes. Making collections during field trips enables you to acquire a search image for the various microhabitats that support different species, some of which can be quite small (both the plant and the microhabitat). Some off-trail collecting may have you in contact with poison ivy and possible encounters with stinging wasps. Long pants are recommended. Comfort in spending extended time with a microscope is required and can be developed with practice. The extended lab times are required to develop the manual skills to dissect the plants and demonstrate (learn) the diagnostic features.

**Schedule:** Class begins each morning at 9 a.m. and ends at 9 p.m. Breaks occur generally from 12-1 p.m. and from 4-7 p.m. Evening time is devoted to working with collected material and receiving individualized instruction. You may choose to stay in the lab later than 9 p.m. on your own and this has been the practice for some students in the past. The course ends Saturday at noon following a graded exercise in specimen identification to include practical questions of structure and function.

**Accommodations for Students with disabilities:** Any student who has a condition that may affect his or her academic performance is encouraged to contact the instructor and Highlands Biological Station personnel (828-526-2602) ahead of time to discuss needs.

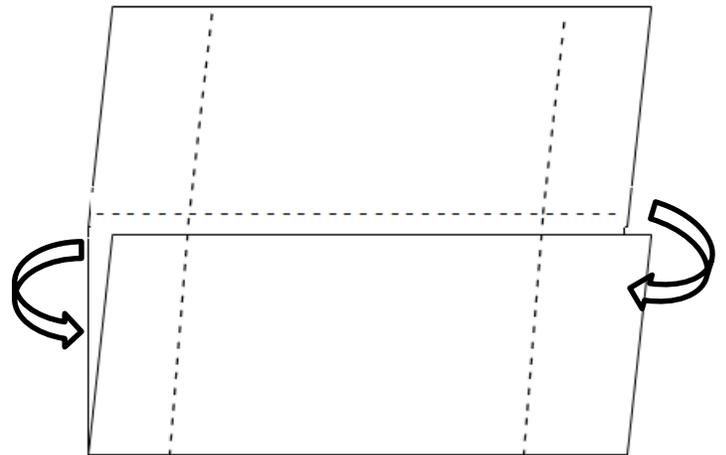
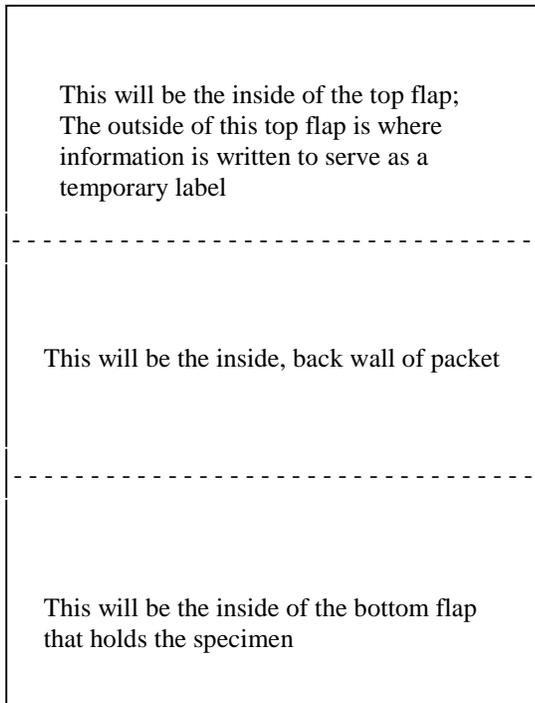
## How to Fold Bryophyte Specimen Packets

You will need 100-200 specimen packets when the course begins. Rather than spending your free time folding packets, you are advised to bring packets already folded. It is a good idea to have a supply of packets with you when you arrive.

For long-term storage, paper should be of archival quality, but for our purposes cheap, photocopy or printer paper, either new or that which is to be recycled and is clean (without print) on one side, serves well. The initial fold is simply a standard business letter fold. As a time saving measure packets can be folded free-hand, i.e. without precise measurements.

8.5 x 11 inch paper to fold at dotted lines

Lift top flap up and fold sides in ca. 1.5 inches on each side; fold top flap down to complete the packet.



Bryophyte packet with hand written label:

