

PRESERVING INSECTS AND RELATED ARTHROPODS

*Silvia Rondon, and Mary Corp, OSU Extension Entomologist and Agronomist, respectively
Hermiston Research and Extension Center, Hermiston, Oregon.*

Preserving insects and related arthropods is the next step following collection. There are many methods and materials used depending on the type of insect and the purpose and size of the collection. The key to long-term success in making a collection is attention to detail and organization while selecting the proper methods of preservation. Insects and mites of all kinds may be killed and preserved in liquid agents or a dry gaseous agent. Some kinds of insects are best kept dry.

Ethanol (grain or ethyl alcohol) mixed with water (70 to 80 % alcohol) is usually the best general killing and preserving agent. For some kinds of insects and mites, other preservatives or higher or lower concentrations of alcohol may be better. Because pure ethanol is often difficult to obtain, some collectors use **isopropanol (isopropyl alcohol)**. Isopropanol does not seem to harden specimens as much as ethanol. Concentration to use depends on the kind of insect or mite to be preserved. Some examples:

- Parasitic Hymenoptera (tiny wasps) are best killed and preserved in 95% alcohol. This high concentration prevents the membranous wings from becoming twisted and folded, hairs from matting, and soft body parts from shriveling.
- Soft-bodied insects (aphids, thrips, small flies, and mites) become stiff and distorted if preserved in 95% alcohol and should be preserved in alcohol of a lower concentration.
- Adult bees should not be collected in alcohol because their usually abundant body hairs become badly matted.
- Adult moths, butterflies, mosquitoes, moth flies, and other groups with scales and long, fine hairs on the wings or body may be worthless if collected in alcohol regardless of the concentration.

Formalin (formaldehyde) solutions should NOT be used because the tissues become excessively hardened and the specimens then become difficult to handle.

Special care for caterpillars/larvae and others

Larvae of most insects should be collected, boiled in water to "fix" their proteins and prevent them from turning black, and placed in alcohol. Larvae should be left in hot water for 1-5 minutes, depending on the size of the specimens, and then transferred to 70-80% alcohol. Thrips and most mites are best collected in an **alcohol-glycerin-acetic acid (AGA)**.

How long can you preserve insects and allies?

Larvae and most soft-bodied adult insects and mites can be kept almost indefinitely in liquid preservatives; however, for a permanent collection, mites, aphids, thrips, whiteflies, fleas, and lice usually are mounted on microscope slides. Larvae are usually kept



Microscopes slides showing insect legs



Larva

permanently in alcohol, but some may be mounted by the freeze-drying technique or by inflation. Many

insects collected in alcohol are later pinned for placement in a permanent collection. Hardbodied insects such as beetles can be pinned directly after removal from alcohol, but for them and all softer insects such as flies and wasps special procedures must be followed.

Temporary Storage of Specimens

After specimens have been collected, there are several ways to keep them in good condition until they can be prepared properly. The method used depends largely on the length of time that the specimens may have to be stored temporarily.

Refrigeration and Freezing. Medium to large specimens may be left in tightly closed bottles for several days in a refrigerator and still remain in good condition for pinning as will smaller specimens if left overnight. Some

moisture must be present in the containers so that the specimens do not become "freeze-dried," but if there is too much moisture, it will condense on the inside of the bottle as soon as it becomes chilled. Absorbent paper placed between the jar and the insects will keep them dry. When specimens are removed for further treatment, place them immediately on absorbent paper to prevent moisture from condensing on them.

Alcohol. Insects may be placed in alcohol, as described previously, and kept for several years before they are pinned or otherwise treated. However, it has been shown that many insects, especially small ones, can deteriorate in alcohol stored at room temperature. Long term storage of specimens that suffer from this kind of deterioration can be lessened by storing the containers in a freezer. Even though the alcohol will not freeze at the temperatures obtained by most ordinary freezers, the lower temperature seems to slow or stop deterioration of the specimens.

Dry Preservation. It is standard practice to place many kinds of insects in small boxes, paper tubes, triangles, or envelopes for an indefinite period, allowing them to become dry. It is not advisable to store soft-bodied insects by such methods because they become badly shriveled and highly subject to breakage. Diptera should never be dried in this manner because the head, legs, and most of all the antennae become detached very easily. Almost any kind of container may be used for dry storage; however, tightly closed, impervious containers of metal, glass, or plastic should be avoided because mold may develop on specimens if even a small amount of moisture is entrapped. Nothing can be done to restore a moldy specimen.

ALWAYS label specimens with complete collection data in or on each container. Organization is the key! Label should contained the following information:

- **locality,**
- **date,**
- **collector,**
- **other data.**

“Papering” or Storage Method

Although pinning specimens when they are fresh is preferable, the storage method known as papering



Mounted and preserved butterfly

has long been used successfully for larger specimens of Lepidoptera, Trichoptera, Neuroptera, Odonata, and some other groups. Papering consists of placing specimens with the wings folded together dorsally (upper sides together) in folded triangles or in small rectangular envelopes of glassine paper, which are the translucent envelopes familiar to stamp collectors. It is a traditional way of storing unmounted butterflies and is satisfactory for some moths, although moths too often will have their relatively soft bodies flattened, legs or palpi broken, and the vestiture of the body partly rubbed off. To save space in most large collections, file Odonata permanently in clear plastic envelopes instead of pinning them.

Preservation for Molecular Studies

Systematists are increasingly using molecular methods to study insects. Some of these techniques, such as the study of cuticular hydrocarbons, can be used on dried insects, even those stored in museum collections. However, many others require that specimens be treated so that DNA or other molecules are preserved. In general, specimens for molecular work should be collected in 95% or absolute (100%) ethanol (ethyl alcohol). It is best if specimens are thoroughly dehydrated by changing the alcohol at least a couple of times before the specimens are stored for any length of time. It is also advisable to keep specimens cold (frozen if possible).

More information at:

Simple method of preserving allies

<http://www.ento.csiro.au/education/preserving.html>

NC State Systematic entomology

http://www.lib.ncsu.edu/agnic/sys_entomology/preserve.html

Collecting and preserving insects and mites

http://www.ars.usda.gov/Main/site_main.htm?docid=10141&page=13

For questions or additional information:

Silvia I. Rondon

Extension Entomologist Specialist

Oregon State University-Hermiston Agricultural Research Extension

silvia.rondon@oregonstate.edu

Oregon State University Extension Service offers educational programs, activities, and materials without discrimination based on age, color, disability, gender identity or expression, marital status, national origin, race, religion, sex, sexual orientation, or veteran's status.