

**NOTES AND METHODS ON COLLECTING AND PRESERVING THYSANURA.**

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In studying the Thysanura during the past two years many difficulties were encountered in regard to collecting and preserving specimens which could be used with any satisfaction a few months after they were mounted. A great deal of time and many specimens were lost before anything like satisfactory results were obtained. The Collembola are especially difficult to handle since their chitinous body walls are almost impervious to ordinary fixing agents. If dried they shrink beyond recognition and the same difficulty is met with in using numerous reagents. It is hoped that these methods and reagents which have been found satisfactory in studying the Thysanura may prove helpful in working with other insects whose bodies are of like texture, and whose habits are similar.

In order to facilitate the study of these insects two methods of field collecting are employed; the specimens are either collected and brought to the laboratory alive, or are collected in some reagent which will keep them in as perfect and natural a state as possible. The latter method is very difficult, since reagents that will keep other insects, or even some species of the Collembola in perfect condition will shrink or distort other species to such an extent that they are useless.

For most purposes it is more desirable to collect these small insects alive and bring them into the laboratory for fixing.

**COLLECTING IN CAPSULES.**—One of the most successful methods for collecting alive I have found to be by the use of large size capsules. A small piece of lense paper was placed in each capsule to absorb moisture from the insect and give them something to crawl over. By being careful the larger end of the capsule may be placed over the insect, and if it does not choose to go into its new quarters immediately may be gently urged on by means of a small brush pushed under the edge of the capsule. It is best not to place more than two or three insects in one capsule as they require careful handling to keep them alive for any length of time. Air may be admitted to the capsule by puncturing one end by a fine pin point. It is important that the insects be kept alive since the antennae and body begin to shrink almost immediately after death.

**COLLECTING IN LARGE MOUTHED BOTTLES.**—For this method of collecting one should be provided with several large mouthed bottles and a good sized funnel. The funnel is placed in the neck of the bottle and pieces of decaying wood, bark, etc., on which the insects are hiding are gently tapped or pounded

together over the funnel. The insects falling on the smooth surface tumble down into the bottle. Damp wood, leaves, etc., should be placed in the bottle for the insects to crawl over.

COLLECTING IN FIXATIVES.—For fixing the insects in the field the collector should be provided with a large number of small round bottomed vials filled with the fixative. Two or three fine camel's hair brushes, a large square of white oil cloth and a chisel or pick for dislodging bark or decaying wood.

Pieces of bark, wood, etc., may be pounded together over the cloth on which the insects will fall. The tip of the brush is then moistened with the fixative and quickly placed over the insect. They should be held under the brush until stupified and then placed in the fixing agent; the latter process being easily accomplished if the brush is sufficiently moistened. The matter of proper fixation is very important. Almost all Thysanura are impervious to water. Smynthuridae will float about for days or even weeks on 75% alcohol, and the addition of a little glycerine to 85% alcohol will prevent them from sinking. While 75% alcohol will kill the specimens it fails to fix the tissues and they soon shrivel and become useless. In working with the Thysanura I have found the following reagents to be the most useful both for form and general appearance, as well as internal anatomy.

#### GLACIAL ACETIC ALCOHOL:

Glacial Acetic Acid.....	1 part
Absolute Alcohol.....	1 part
Corrosive Sublimate Saturation.	

For field collecting this is one of the best formulas I have used. Specimens are fixed within a few seconds, but may be left in the reagent for several hours without detriment. They may be preserved indefinitely in 85% alcohol, or gradually transferred to pure glycerine as follows: Place the specimens in a stentor dish, and add glycerine from one side. After a considerable amount of glycerine has been diffused through the reagent the cover should be removed from the dish and the glacial acetic and the alcohol allowed to evaporate.

#### ACETIC-GLYCERINE FIXING AGENT:

Glacial Acetic Acid.....	10 parts
Glycerine.....	1 to 4 parts
Corrosive Sublimate Saturation.	

Possibly better results may be obtained, especially as to preserving the color by the use of this reagent. Specimens will be properly fixed in a few minutes, but may be left in the solution for some time. On exposure to the air evaporation of the glacial acetic takes place leaving only the glycerine. After this has

proceeded for some time the glycerine should be changed frequently in order to dispense with as much corrosive sublimate as possible.

**BOILING ABSOLUTE ALCOHOL.**—This is another method which is particularly applicable for laboratory use. Place the specimens in a straight necked vial and pour over them boiling absolute alcohol. Leave for from five to fifteen minutes and transfer to 95% alcohol, and preserve permanently in 85%. The specimens when properly fixed may be left in this grade indefinitely without shrinking. The changes should be made between the different grades of alcohol about every ten or fifteen minutes. If it is desired to mount the specimens in balsam, xylol may be added gradually to the absolute alcohol. Or on the other hand glycerine may be added and the alcohol allowed to evaporate. The alcohol may be used cold in the same manner as described above; however, there is less liability of shrinking the specimens if the temperature is raised to the boiling point. No more time should be occupied in transferring the specimens from alcohol to balsam than is absolutely necessary however, if the transfer is made too rapidly the specimens will cloud. Cedar or clove oil may be used in place of xylol with less liability of shrinkage. While balsam mounts are almost always shrunken they are almost indispensable for the detailed study of the claws, spring, and hairs of the insect.

**SUGAR JELLY MOUNTING MEDIA.**—One of the best methods for examining the Thysanura is as follows: Specimens that have been in pure glycerine for a few hours are placed in a thick syrup consisting of apple jelly and glycerine. After staying in this syrup for an hour or so they are mounted in pure apple jelly in which a very small amount of carbolic acid or corrosive sublimate has been added. The clearest jelly possible should be selected, melted, and a few drops of carbolic acid or corrosive sublimate stirred in and then filtered through two or three folded filters. The cover glass should be rung with some good cement, Bell's having proved most satisfactory, and afterwards finished with black enamel. This is a method that has been tried and found successful for mounting Papirius, and is the only means by which I have been able to preserve both their form and color. However, the utmost care must be observed throughout, giving the fixing agents plenty of time or the specimens will shrink destroying their correct form and color.

Specimens may also be examined in pure cedar or clove oil which has been boiled down to a thick syrup. The only way such slides can be finished is by ringing them with Bell's cement. This method is excellent for showing some of the finer details.

Live boxes for these minute insects are very easily and simply constructed, when one wishes to study their habits in the lab-

oratory. A piece of damp, decayed wood should be selected with a few crevices in it under which the insects may secrete themselves. Put the insects in a good sized straight necked bottle with a few bits of decayed leaves and dirt in the bottom. The wood should be wedged in tight enough so that it will not roll around and crush the insects. By keeping the wood a little moist all of the time, and in a dark place most Thysanura will thrive apparently quite as well as in their natural surroundings.

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