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Iowa Diatoms: Part II (Preparation)

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IOWA DIATOMS: PART II (PREPARATION)

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Introduction

This is the second in a series of articles on Iowa diatoms. The first article appeared in the Dec. 1978 issue of the *Iowa Science Teachers Journal* and dealt with the collection of diatoms in the field. After collecting diatoms in the field and labeling the collection jars properly, you must now prepare the diatoms for study in the laboratory. This article outlines the basic techniques for preparing diatoms for laboratory study.

Preparing Diatoms for Study

1. Before preparing your samples for study, you should examine the collected material with a microscope. Make a wet mount of a drop of the sample material to see if diatoms are present. There is little use to prepare the sample if no diatoms are present. If you are just going to demonstrate live material to your classes you may not want to proceed further. If however, you plan to identify diatoms you will have to complete a cleaning procedure.
2. After determining that your sample contains diatoms, you should split the samples and store in small vials. To each vial add a drop of silver nitrate to retard fungal growth. Seal the cap of the vial with parafin. Transfer all pertinent data to labels on or in each vial using India ink. The samples can now be placed in storage for future reference and study.
3. Before the samples can be used for study, they have to be cleaned. The cleaning technique selected will depend upon where you collected and how much organic matter was included in the sample.

In the past, diatoms were cleaned by boiling them in nitric acid under a hood, but this technique is not recommended. The two cleaning techniques recommended are: (1) dry mount cleaning and (2) hydrogen peroxide cleaning. Dry mount cleaning works well with samples containing little organic contamination. Hydrogen peroxide cleaning is recommended for samples with large amounts of organic material.

Dry Mount Cleaning

1. For dry mount cleaning you will need a hotplate and a flat aluminum sheet. Place several #1 glass, microscope coverslips on a aluminum sheet which has been placed on top of the hotplate. Pipette, one drop

at a time, the sample solution on each coverslip until each coverslip is covered. (On the coverslip that you just added one drop too much and it ran all over, throw it away and start over). You will soon learn that it pays to make duplicates of each sample when it comes to pipetting. You may wish to make multiple slides for your class.

2. When you have the coverslips filled with sample solution, turn on the hotplate. As the coverslips turn warm and then hot, the water evaporates. The heating should continue until the organic residues burn away, leaving the diatoms behind. After the organic contaminants have burned away, turn the hotplate off and allow the coverslips to cool. You are now ready to mount the diatoms on slides.

Hydrogen Peroxide Cleaning

This process is to be followed with extreme caution. The hydrogen peroxide used for household antiseptics is too dilute and unsatisfactory. 30% hydrogen peroxide is used and is ten times more active and dangerous than household peroxide. 30% hydrogen peroxide must be obtained through chemical supply houses. (Be sure to follow safety precaution outlined in the next article when handling 30% hydrogen peroxide.)

1. Be sure that the sample that you are going to clean has had time to settle, then pour off any excess water.
2. Dump the watery contents of the sample into a 2000 ml beaker. Cover the sample in the 2000 ml beaker with 30% hydrogen peroxide to the depth of one centimeter. If you have diatoms collected from a diatometer, the slides can be placed in the beaker.
3. Place the beaker in a sink and let it stand for 15 to 30 minutes.
4. Add a pinch of potassium dichromate. Potassium dichromate serves as a catalyst and produces the following reaction:

$$2H_2O_2 \longrightarrow 2H_2O + O_2$$

5. After this reaction has cooled, pour the residue into a 500 ml beaker and rinse out the 2000 ml beaker with a small amount of distilled water. Add the rinse water to the small beaker.
6. Fill the 500 ml beaker with distilled water and allow the beaker to stand overnight.
7. The next morning, decant the liquid from the 500 ml beaker being careful not to disturb the diatomaceous sediment at the bottom. Transfer the material to a 250 ml beaker. Rinse the 500 ml beaker and pour the rinse water into a 250 ml beaker. Fill the 250 ml beaker with distilled water and decant in the late afternoon before you leave school. (It is important that several hours of settling time are allowed after you decant and add distilled water). After decanting, transfer to another 250 ml beaker, rinse and fill as before and allow to stand overnight.

8. Repeat the process the next day and transfer the diatomaceous sediments to a 100 ml beaker.
9. Repeat the process the third day. At the end of the day transfer the diatomaceous residue to small vials and label. Add a drop of silver nitrate to each vial and store.

Whether you use the dry mount cleaning process or the hydrogen peroxide process you are now ready to mount diatoms on a slide. The procedure for mounting diatoms on slides will be the topic of Iowa Diatoms Part III: (Slide Preparation).

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Science Enrichment Events for Iowa Secondary Students
Summer 1980

University of Iowa science enrichment activities. Environmental science, research, computer science, physics, and biochemistry. Cost varies with program involvement and financial need. Scholarships available. Apply by April to assure consideration. Contact: Edward Pizzini, 455 Physics Building, Science Education Center, University of Iowa, Iowa City, Iowa 52242

Drake University physics computer program (pending NSF funding). June 2-July 11. Costs deferred pending identified need. Contact: Dave Robinson, Physics Department, Drake University, Des Moines Iowa 50312.

Luther College environmental biology program for high school juniors (pending NSF funding). Room and board expenses deferred pending identified need. Contact: Jim Ekblad, Biology Department, Luther College, Decorah, Iowa 52101.

Earthwatch Career Training Program. Expeditions for scientists of all ages. Application deadline, March 31. Contact: Earthwatch training program, Ten Juniper Road, Box 127, Belmont, Massachusetts 02178.

Energy research participation for high ability high school students (June-July). Fifteen students selected competitively or quality of papers submitted. No cost for those selected. Application deadline, March 31. Contact: Lynn Glass, 106 Quadrangle, Iowa State University, Ames, Iowa 50011.