

## SUMMARY OF WRITTEN LAB EXERCISE REPORTS

These exercises were designed to provide 1) instruction in some important techniques useful in studying algae (and other organisms), 2) experience in technical writing, 3) and numeracy practice. You might encounter similar assignments in your future occupation if you are asked to prepare technical reports or grant proposals. Due dates to be announced.

### **Exercise 1. Use of the Sedgewick-Rafter Cell and Inverted Microscope/Settling Chamber (Utermöhl) Techniques for Counting Algae in Mixed Samples.**

Follow the instructions in I A and I B of "Quantitative Determination of Algal Density and Growth" (with modifications and additional advice supplied in class) to count the algae in the mixed assemblage provided, by two methods. You will have to take turns using the two inverted microscopes available. You can work in pairs, sharing the counting effort, and reporting results as a team.

Turn in a written statement of at least a page in length, with counts, and a statement of your perception of the pros/cons of using the Sedgewick-Rafter vs the inverted microscope method for counting algae in mixed assemblages. 40 points.

### **Exercise 2. Comparison of the Use of the Hemacytometer vs Coulter Counter Method for Counting Algal Cells in Unialgal Cultures.**

Use the instructions in II B in "Quantitative Determination of Algal Density and Growth" to make a hemacytometer count of the algae in a cultured sample that we will provide. You will have to take turns, because we do not have enough chambers for everyone to do this exercise at the same time. Be sure to mix the sample well before removing an aliquot! Do at least 5 replicate counts.

Now, with the aid of the instructor, count the same sample, on the same day, with the Coulter Counter--the whole class can use the same 5 replicate counts. Pairs of students may share the counting efforts and preparation of the report. Turn in a statement at least one page in length of the comparative counts (are they significantly different?), and your perception of the pros/cons and potential sources of error for the two methods. 40 points.

### **Exercise 3. Algal Collections from Lake Mendota and another WI source**

Turn in 5 separate sheets of drawing paper for each collection, each with a single large (i.e. fill the whole page) drawing of an identified algal genus from samples provided from Lake Mendota and another body of water. Instructors will help with identifications, on request. Label distinguishing characteristics such as chloroplast(s), flagella, trichocysts, mucilaginous sheaths, or heterocytes. The point of this exercise is to foster observational powers and an appreciation of diversity differences in eutrophic and oligotrophic waterbodies. Put your name on each sheet and staple the sheets together. Compare the two samples. Write at least half a page on your impressions of diversity in the two bodies of water. Were any of the genera you found in other collections also present in L. Mendota and vice versa? 40 points.

#### **Exercise 4. Diatoms of Lake Wingra.**

Read "Sample Preparation, Methods, and Literature for Diatoms." The most effective method for assaying many diatoms from natural collections requires cleaning, because distinctive frustule markings are obscured by cell contents (chloroplast, etc.). The most effective methods for making permanent mounts of diatoms require use of strong acids, which we prefer not to attempt in this course, because of safety considerations. Therefore, we have assembled a collection of permanent slides made from L. Wingra collection for your use.

First, examine a fresh collection of L. Wingra diatoms (mostly members of the periphyton associated with water milfoil). Make a list of the genera that you can confidently identify on the basis of cell or colony shape, or presence of stalks (as with *Cymbella*). Use the Prescott key to start. Consult other references as needed.

Now, examine the prepared slides, and make a list of all the species that you can confidently identify on the basis of frustule shape or ornamentation. You will want to use the notebooks of photos of identified L. Wingra diatoms. The photos were made from the same cleaned preparations that you are using.

This exercise should be done individually. Turn in the two lists, together with a brief statement of a page or so comparing the lists and explaining why they might be different. 40 points.

#### **Exercise 5. Algal Isolation & Culture Techniques.**

Read "Isolation and Culture of Algae," and watch demonstrations for: 1) pulling micropipettes, 2) spraying plates, 3) streaking plates, 4) single cell/colony/filament isolation, 5) making algal culture media & use of the autoclave, & 6) function of the algal growth room/chambers. Make sure that you have heard all 6 demonstrations.

Now, from a field collection recommended by an instructor, use the media provided to make several single-alga isolations. You can choose to isolate desmids, chrysophytes, cryptomonads, diatoms, or blue-greens. You will need to make a supply of micropipettes. These don't need to be autoclaved because the heat of pulling them sterilizes them, but use a separate pipette for each organism. Also try the spraying technique. You will need to check your isolates for growth and contamination at various points in the semester; you may need to subculture isolates.

Turn in at least one unialgal culture, identified to genus, with information on origin, date isolated, and isolator (you) written on the tube/dish with Sharpie. Each individual should turn in at least one culture. The culture should be accompanied by a single page description of the isolation process and interesting aspects of the organism. 40 points.