

**PSA Education Workshop Report: Algae and the Broader Impacts of Science
July 8, 2006 Juneau, Alaska
by Gisèle Muller-Parker and Rich Triemer**

The workshop provided an overview of how phycologists and PSA may engage in education and outreach activities that meet the National Science Foundation's "Broader Impacts" review criterion. Four areas of "Broader Impacts" activities were addressed: "Broader Impacts" in general, teacher professional development, public outreach, and outreach to members of under-represented groups. Respondents to a pre-workshop survey were equally interested in these four topics.

The first hour of the workshop consisted of presentations, including an overview by Gisèle Muller-Parker (NSF) on the NSF Broader Impacts Criterion and NSF programs that address education and public outreach. This was followed by presentations that showcased algae-based education and public outreach. Rich Triemer (Michigan State) spoke about his online database and training and resources for teachers, Lise Weise (Holt High School, Holt, MI; NSF Research Experiences for Teachers teacher) spoke about her experiences using euglenoids in the classroom, Mark Farmer (Univ. of Georgia) discussed effective practices to provide outreach to students from underrepresented groups, and Rui Periera (Univ. Connecticut) described the Bridgeport Aquaculture College Alliance programs.

In the second hour, about 35 of the approx. 60 attendees participated in small group discussions. The main points raised in each group are summarized below. We hope this report will stimulate phycologists to engage in some of these activities and to share their experiences at future PSA meetings. The PSA Education Committee may use this report as guidance for developing outreach efforts for the Society.

The "Broader Impact" of our science: The role of PSA in helping phycologists engage in broader impacts activities was a major focus. There was general consensus that the PSA website could serve as a portal for the education and outreach activities undertaken by members of the society and as a means to bring "algae to the forefront" of peoples minds. In the area of "most effective practices" for K-16 education, the group thought major concepts in biology could be illustrated with algal examples, with the PSA website serving as a repository/clearing house for proven laboratory exercises or examples from lectures that use algae. Members of the Society could contribute new ideas for the website as part of their own Broader Impact goals. These exercises/examples could be translated for K-12 teachers. Phycologists should be encouraged to work with K-12 professionals to develop material that stimulates excitement and interest in science and that indicates how the exercise fits with either local or national education standards or frameworks.

The group also thought that visual aides and products are important for public education and outreach. Placing posters in public venues or creating items that can be placed "in the hands" of the public are important. Small posters that illustrate the local algal flora can be generated inexpensively and spark the interest of the public. These visual aides could be distributed to schools or other educational groups. There may be mechanisms to involve undergraduate students in the development and dissemination of the material.

Teacher professional development: PSA could serve as a "clearinghouse" to connect teachers who want to do projects with researchers who would like to work with teachers. Connections

could be made by having PSA members/representatives attend National Science Teacher Association meetings and state meetings to give talks or host a PSA information booth. Phycologists could also give lectures at teacher conferences on algae and their use in the classroom. For example, evolution is a national benchmark –ways to use algae to teach evolution would be helpful.

Phycologists may take advantage of NSF programs to support this outreach, including RET (Research Experiences for Teachers) Supplements and GK-12 (Graduate Teaching Fellows in K-12 Education). Connections between researchers and educators are also promoted through COSEE (the Centers for Ocean Sciences Education Excellence program).

Public outreach: Several initiatives for PSA were discussed to help promote algae in public outreach, including a traveling exhibit on algae with a regional focus and hands-on materials, a general public lecture series with a Speaker's bureau, and development of science fair materials that use algae. PSA could also sponsor science fairs in each state and perhaps provide an award (\$50) and a certificate for an algae project. Awardees could attend the PSA annual meeting for a final competition (\$500 award and a plaque).

Phycologists could identify opportunities to highlight algae in exhibits at free-choice learning institutions. Individuals could contact museums and aquariums to make sure seaweeds and phytoplankton are represented (and correctly, if they are mentioned). There are many opportunities to highlight algae in these institutions to bring them into the public arena.

Outreach to under-represented groups: Recognizing that phycologists should participate in programs that provide outreach to members of under-represented groups, the discussion centered on ways to do this outreach through programs and individual efforts. These programs include on-campus summer programs for undergraduates from under-represented groups such as the SERF Program at the University of Georgia and the STARS Program at UCSD. Developing links with off-campus programs such as Outward Bound and Upward Bound can provide targeted populations access to our science through activities such as guest lectures, lab tours, and campus visits. Interactions with programs focused on under-represented students such as Centers of Research Excellence in Science and Technology (CREST) at neighboring campuses can be effective outreach. Guest lectures, reciprocal campus visits, participation in CREST programs are ways of supporting the CREST efforts while reaching out to diverse students.

Programs that bring local area teachers into the lab and campus followed by subsequent return visits by the teachers and selected students may also be effective ways to reach out to local under-represented populations, to enhance education, and to “teach” your science. Faculty, students, and/or postdocs may plan to visit minority-serving schools and give guest lectures or do lab demonstrations. However, “diversity training” for the participants is absolutely essential to be sure the participants can communicate effectively in what may be a foreign culture for them.

In these outreach efforts, it is important to keep in mind possible social barriers, e.g., students from under-represented groups may be focused on the medical profession rather than biology. These students may also desire to stay within a nurturing and supportive environment, underscoring the need to make campuses “welcoming” both in recruitment materials and in providing mentoring when students do choose to attend. In addition, university faculty should support broader diversity efforts on their campuses, as a lack of diversity among faculty and administrators may present a major barrier to efforts to recruit students from under-represented groups.