

# George D. Umphres IV

## **Golden Algae Research**

Since its discovery in 1985 in the Pecos River (James and De La Cruz, 1989), the bloom formation of the harmful algal species known as Golden Algae has been a problematic occurrence in Texas waters. During periods of stress, the organisms secrete toxins known as pycnophycin into their surroundings killing most species that come into contact with it. Texas has lost millions of dollars to toxic Golden Algae blooms (Sager et al., 2008) and currently, research efforts have not yet produced a feasible protocol to deal with the problem on a large scale (Southard et al., 2010).

The research that I am interested in is utilizing a chemical approach to control the initiation of a Golden Algae bloom. It is well known that *Prymnesium parvum*, or Golden Algae, gains a competitive edge over other algal species over a certain range of conditions (Sallenave, 2009). For this reason, I believe that *P. parvum* blooms could be controlled if the body of water where it is living is treated with an algaecide during a bloom initiation phase. Ideally, a chemical treatment would reduce *P. parvum* cell numbers until changes in water conditions would allow a less harmful algal competitor to persist.

In my undergraduate research studies in the Plankton Ecology Lab, under the supervision of Dr. Daniel Roelke, I have conducted six in-lab microcosm chemical screening experiments on pure cultures of *P. parvum*. The chemicals used are enzyme inhibiting compounds formulated for the control of aquatic vegetation. From these chemicals I have chosen a single compound, Flumioxazin, that showed promising results in its ability to control Golden Algae.

For the second phase of my experiment, I am currently looking the ability of Flumioxazin to control Golden Algae in a natural phytoplankton assemblage. Because this chemical is an enzyme inhibitor, its effects are specific to organisms that utilize the individual enzyme being blocked. I have run two consecutive chemical screenings using Flumioxazin at different concentration levels and am now in the process of utilizing light microscopy to determine changes in phytoplankton taxa as a result of each chemical addition.

If in fact Flumioxazin additions resulted in decreased biomass of *P. parvum* and allowed some beneficial algae to survive, then Flumioxazin may be a potential means for Golden Algae control in larger settings, such as coves of lakes and reservoirs, due to its ability to degrade rapidly in water causing little environmental danger.

In the past decade, Golden Algae has become more prevalent in the southern US than ever before (Henrikson et al., 2010). Through my research, I hope to find new avenues for mitigation of this nuisance species and to help keep our lakes healthy for Texans to enjoy for decades to come.

## **Academic Qualifications:**

Bachelor of Science  
Texas A&M University  
Wildlife and Fisheries Science (Emphasis in Aquatic Ecology and Management)

### **Specialized Courses Taken**

Fundamentals of Ecology  
Ecology of the Coastal Zone  
Fundamentals of Environmental Decision Making  
Ichthyology  
Principles of Fisheries Management  
Ecology of Lakes and Rivers  
Disease Management of Fish and Aquatics  
Aquaculture  
Aquatic Animal Nutrition  
Biology of Fishes  
Conservation of Natural Resources

### **Proposed use of Funds**

I plan to use to use scholarship funds to pay for graduate tuition, and as a means to attend scientific research symposiums. The funds will also help pay for the publication of my research in a peer reviewed journal.

### **Intended Career Path**

Upon graduation, I intend to pursue a career in the field of aquatic ecology. My main area of interest is water quality assurance. With my strong background in the oilfield industry, I hope to work with oil production corporations to ensure safe and clean production practices when drilling around water sources. I believe that with revised drilling and fracking protocols, drilling can be a much less harmful to the environment.

### **Faculty Advisor:**

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Wildlife and Fisheries Sciences  
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