OBSERVATIONS ON THE *ALDROVANDA*-CONTAINING AND *ALDROVANDA*-LACKING AREAS OF GIRRAWEEN LAGOON, AUSTRALIA

DOUGLAS W. DARNOWSKI • Life Sciences, Room 318• Department of Biology • Indiana University Southeast • 4201 Grant Line Road • New Albany, IN 47150 • USA • ddarnows@ius.edu

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Observations of any plant in nature often help deciphering that plant's cultural requirements. Since questions often arise as to the best way to grow *Aldrovanda vesiculosa*, I am reporting my observations of the conditions at Girraween Lagoon just south of Darwin in the Northern Territory, Australia. This permanent lagoon is many hectares in size, and contains *Aldrovanda* to the right side of a boat launch, when facing the water (see Figure 1). On the other side of the boat launch is a similar area which does not contain *Aldrovanda*, even though it is only about 20 m away from the *Aldrovanda*-containing area. I hoped that observations of the two areas—both perhaps 50 m long—might help in understanding cultural preferences of *Aldrovanda*. These observations were made in midwinter, 25 June 2002. These plants are from a form which is not red year round but rather only during colder temperatures—it is the form of Australian *Aldrovanda* most commonly grown outside Australia.

The pH was measured using Baxter pH paper, the temperature was recorded using a meat thermometer inserted into the water (the accuracy of the thermometer was probably about ± 1°C). The plants, protists, and small animals such as crustaceans were examined by eye. Small samples of water were taken; these samples were studied microscopically and photographed within 6 hours. No material was permanently retained; rather some water containing algae was moved to a different site for easier use of the microscope.

The pH values in the *Aldrovanda*-containing and *Aldrovanda*-lacking sides of this site were simi-



Figure 1: The *Aldrovanda*-containing area at Girraween Lagoon. The white arrow points to shallow channel among sedges and rushes where *Aldrovanda vesiculosa* and *Utricularia muelleri* grow.

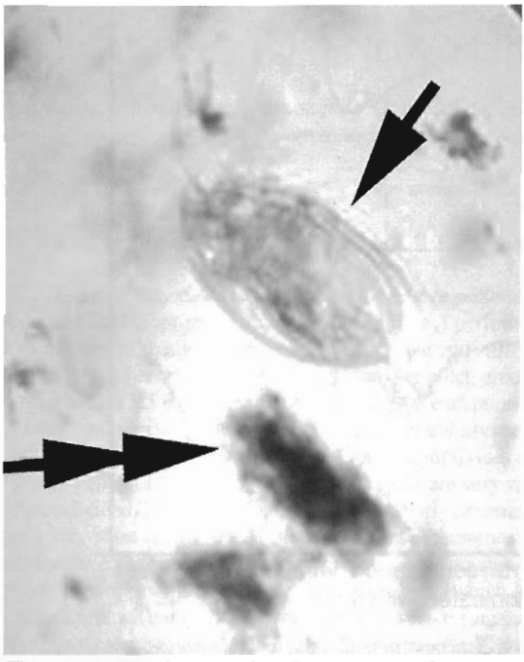


Figure 2: A micrograph of a sample from the *Aldrovanda*-containing side of the site. The single arrow points to a *Daphnia*-like crustacean and the double arrowhead points to a piece of organic debris. The *Daphnia*-like organism is about 0.5 mm long.

lar (Table 1), but both the level of incident sunlight and the temperature on the *Aldrovanda*-containing side were much higher because the tree canopy was more complete on the side lacking *Aldrovanda*. It is unclear whether allelopathy by the trees could explain the difference between the two sides—*e.g.* whether toxins from fallen leaves could have been killing any *Aldrovanda* plants which reached the *Aldrovanda*-lacking side. There was also much more non-carnivorous emergent vegetation on this side.

Microscope observations of the two sides of this site (three slides were made from each of the two sites) showed somewhat similar distributions of microscopic organisms, ranging in size from single cells to small crustaceans, although the size and numbers of the samples were not very extensive.

Another carnivorous plant, *Utricularia muelleri*, also grew on the *Aldrovanda*-containing side, while a non-carnivorous eukaryotic macroalga, a member of the stonewort algae or Characeae, grew on both sides along with smaller diameter eukaryotic string algae, although the string algae grew less vigorously on the *Aldrovanda*-containing side. Taken together, these observations suggest that the greater lighting on the *Aldrovanda*-containing side may be important for reducing the growth of string algae (which can harm *Aldrovanda*) and for increasing growth of emergent vegetation (with which *Aldrovanda* often grows well). Loosely organized cyanobacteria were also observed in the *Aldrovanda*-containing side—they are also a common occurrence with healthy *Aldrovanda* in cultivation. The presence of *Utricularia muelleri* and cyanobacteria on the *Aldrovanda*-containing side are indicative that this side of the boat launch was a healthier place for *Aldrovanda* to grow, as has been reported elsewhere (Darnowski, 2002).

Thus, it seems from these observations that the key difference between the *Aldrovanda*-containing side and the *Aldrovanda*-lacking side of the site at Girraween Lagoon may be difference in lighting and the different flora and fauna that accompany it. Given that the sites are connected and only about 20 meters apart, it is unlikely that significant differences in water chemistry would occur between them. The differences in lighting and in flora and fauna the most likely causes of the presence or absence of *Aldrovanda* on the two sides. These observations agree with observations of artificial habitats in which *Aldrovanda* grows successfully (Chadwick & Darnowski, 2002; Darnowski, 2002), further indicating

Table 1: Conditions on the *Aldrovanda*-containing and *Aldrovanda*-lacking sides of the boat launch.

Feature observed	*Aldrovanda*-Containing	*Aldrovanda*-Lacking
pH at shoreline	4.5-5.0	4.5-5.0
Water temperature (°C)	27.2	22.8
Amount of sedge and rush	Abundant	Sparse
Amount of light	Dappled, ample	Heavy shade
Utricularia muelleri	Present	Absent

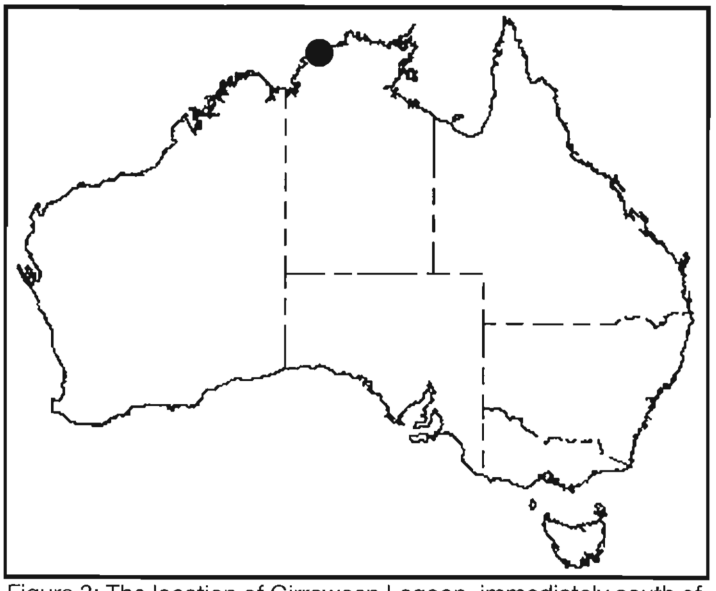


Figure 3: The location of Girraween Lagoon, immediately south of Darwin, Northern Territory, indicated with a dot.

the importance of the indicated conditions for the successful cultivation of *Aldrovanda vesiculosa*.

References:
Darnowski, D.W. 2002, A method for growing *Aldrovanda*, Carniv. Pl. Newslett. 31:113-115.
Chadwick, Z.D. and Darnowski, D.W. 2002. Observations on prey preference and other associations of *Aldrovanda vesiculosa* in a new culture system. Proceedings 4th International Plant Conference, Tokyo, Japan, pp. 39-47.

Table 2: Microscopic observations on samples from the *Aldrovanda*-containing and *Aldrovanda*-lacking sides of the boat launching site.

Algae, Diatoms, and Debris		
Feature observed	*Aldrovanda*-Containing	*Aldrovanda*-Lacking
Eukaryotic string algae	Present	Present
Characeae—little Ca crystals	Present	Present
Cyanobacteria	Loosely organized	With gelatinous sheath
Diatoms	Present	Absent
Organic debris	Present	Present
String algae	Present, not abundant	Present
Animals		
Daphnia-like organisms	Present	Present
Nematodes	Present	Present
Non-predatory Ciliates	Few	Many
Predatory Ciliates	Absent	Present
Arthropod larvae	Present	Absent
Ostracods	Present	Absent
Copepods	Absent	Present