

## AQUATIC SUBMERGENCE OF *ACANTHEPEIRA VENUSTA* (BANKS) (ARANEAE, ARANEIDAE)

Few spiders are known to move about effectively on or under water. The European water spider, *Argyroneta aquatica* (Clerck), which lives entirely in water and maintains an underwater air supply in a silken sac, is the only known spider capable of swimming under water. However, many pisurids and lycosids that live near water (e.g. *Dolomedes*, *Pardosa*, *Pirata*) are quite adept at moving about on the water surface. The common fishing spiders, *Dolomedes* spp., also are capable of submerging by clinging to underwater vegetation. Adaptations to an aquatic mode of life are virtually unknown in other spiders.

Our recent observations of the araneid spider, *Acanthepeira venusta* (Banks), however, indicate that this species is capable of aquatic submergence. On November 1, 1985, behavioral observations of *A. venusta* were made where it occurred abundantly in the sawgrass (*Cladium jamaicense* Crantz) marshes of Everglades National Park and two other similar sites in Dade County, Florida. The water depth at each location was approximately 15 cm. All observations were made between 1300 and 1500 h.

Female spiders were found clinging to flowering stalks of sawgrass and other plants, just beneath one or a series of egg sacs. None were found on the more flexible leaf blades. The globular egg sacs were 5.5 to 6.0 mm in diameter with a smooth, papery outer covering and were tightly appressed to the plant stalks. They occurred most commonly in groups of 3 but up to as many as 7. A few stray lines of silk were usually evident but none of the spiders possessed complete orbs. The spiders clung tenaciously to the plants when attempts were made to remove them. No males were observed.

When disturbed, several individuals dropped into the water. Others crawled down the plant and entered the water with no apparent difficulty. Once beneath the surface, they clung motionlessly to underwater stems or other submerged objects. The periods spent under water by three spiders timed were 38 seconds, 2 minutes 20 seconds, and 2 minutes 58 seconds. After this period of submergence, the spiders quickly reemerged by crawling out of the water on adjacent emergent vegetation.

*Acanthepeira venusta*, the smallest member of this American genus, is found from Virginia to Florida and Cuba where it inhabits tall grassy areas of fields, roadsides and swamps. It has been frequently collected in sawgrass of the Florida Everglades and in floating-island vegetation of wet areas in southern Georgia (Levi, H. W. 1976. Bull. Mus. Comp. Zool., 147:351-391). Although it is not restricted to wet areas, vegetation emerging from standing water appears to be a common habitat for this species.

Although the ability to submerge may be important in predator evasion, it might also represent an adaptation to wind. In open grassy areas over water the spiders are subject to frequent strong winds as evidenced by their severely damaged orb webs. Submergence behavior would allow a dislodged spider to gain access to the substrate without being blown across the water surface. Additional characteristics which may be adaptations to frequent winds include the egg sacs tightly appressed to the plants, the spiders clinging tenaciously to the plant stems, and their location only on the more rigid plant parts.

Although submergence behavior is unusual among araneids, certain other orb-weaving species frequently build their webs over water. These include *Argiope argentata* (Fabricius), *Gasteracantha cancriformis* (L.), *Leucauge venusta* (Walckenaer), *Nephila clavipes* (L.), and most *Tetragnatha* spp. With the possible exception of some *tetragnatha* spp. (Foelix, R. F. 1982. Biology of Spiders. Harvard University Press), these spiders move clumsily about when forced onto or into the water. They typically inhabit wooded areas where they are shielded from winds and therefore are not subjected to the same selective pressures as *A. venusta*.

**Debbie Rymal Folkerts**, Department of Zoology and Wildlife Science, and **Gary R. Mullen**, Department of Entomology, Auburn University, AL 36849.

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