

BRIEF COMMUNICATIONS

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**BIOMPHALARIA IN SOUTH CAROLINA.** — Robert T. Dillon, Jr. and Ana Virginia C. Dutra-Clarke — The freshwater snail genus *Biomphalaria* includes among its members the well-known intermediate hosts of *Schistosoma mansoni* Sambon in both old and new worlds. In the United States, populations have been reliably documented only from Texas, Arizona, Louisiana, and Florida (Burch & Tottenham, 1980) and from California (Basch *et al.*, 1975). Here we report a significant range extension for *Biomphalaria*, to Charleston, South Carolina.

The taxonomy of American *Biomphalaria* has been in a state of flux for many years. But snails from Charleston appear to match closely the typical descriptions of the only native U.S. species, perhaps best considered *B. obstructa* (Morelet) (*e.g.*, Malek, 1969) but also often referred to *B. havanensis* (Pfeiffer) (*e.g.*, Burch & Tottenham, 1980). Voucher specimens in alcohol have been deposited at the U.S. National Museum, The Academy of Natural Sciences of Philadelphia, the Museum of Zoology, University of Michigan, and in the W.H.O. Collaborating Center for Medical and Applied Malacology at Tulane University, New Orleans.

Snails identified as *Biomphalaria havanensis* from both the U.S. and the Caribbean have been experimentally infected with *Schistosoma mansoni* on many occasions (*e.g.*, Cram and Files, 1946; Brooks, 1953; McQuay, 1953; Michelson, 1976). Snail populations seem to vary greatly in susceptibility to *Schistosoma*, however, so that other workers have found U.S. *Biomphalaria* refractory (Malek, 1967; Kuntz *et al.*, 1978). Louisiana *Biomphalaria* serve as the natural intermediate hosts for several other trematodes (Malek, 1977). But we found no evidence of any parasitism of any sort in 30 Charleston individuals cracked and examined in October, 1990, nor were any cercariae shed by 100 snails isolated for several days.

Mazyck (1913) reported a nineteenth century collection of "*Planorbis glabratus*" (= *Biomphalaria glabrata* (Say)) from the Santee Canal, north of Charleston. The museum lot upon which this record was based contains, however, only *Helisoma trivolvis* (Say) (*vide* H. A. Pilsbry). Pleistocene fossils from Kansas previously assigned to *Biomphalaria* have been transferred to a new genus, *Pecosorbis*, by Taylor (1985). Van Damme (1984) noted that the northernmost *Biomphalaria* in the old world is the Egyptian *B. alexandrina* (Ehrenberg). Thus the Charleston site, which at 32°48'N; 79°59'W would lie just north of Dallas, Texas, and about 100 km north of the Egyptian coast, would seem to be among the northernmost populations of *Biomphalaria* known in the world. Only the California populations (Riverside County and Salton Sea), both of which are in the vicinity of tropical fish farms, are from more northerly latitudes (Basch *et al.*, 1975).

We first discovered this population in June, 1988, in an ornamental pond on the grounds of Charles Towne Landing, a state park on the western shore of the Ashley River, within the city limits of Charleston. This is the site of the original European settlement of South Carolina in 1670. Prehistorically there were springs and freshwater marshes on the site, almost certainly among the factors that attracted the village of Kiawah Indians reported by the first European settlers. The pond currently inhabited by *Biomphalaria* dates from the 1940's, when a low earthen dam was built separating the salt marsh from the springs and freshwater marshes, and the freshwater side dredged for ornamental purposes. The pond has been extended and deepened several times subsequently, most recently in the 1960's, to its current dimensions of about 500 m X 50 m. Originally it was reported to be "22 feet (6.7 m) deep and crystal clear," but it is currently estimated to be no more than 2 - 3 m deep at maximum. The site became a public park in 1970.

There are no records of the introduction of any exotic plants or animals into this pond, although the state wildlife department did stock it with local bass, brim, and catfish in the 1960's. Aquatic vegetation first became a noticeable nuisance about 1987. The pond has been treated with herbicides every year since, each time resulting in striking immediate reductions of plant biomass but no permanent effect. The pond seems to have always attracted migratory waterfowl, and ducks may well have been responsible for the introduction of the nuisance vegetation.

The snails are most common in the thick mat of filamentous green algae (*Cladophora* and *Pithophora*) mixed with duckweed (*Lemna*) that often spans the surface of the pond. There is also some alligator weed (*Alternanthera*), upon which the snails seem to feed. The banks of the pond are mostly kept clean of emergent vegetation by the grounds crew, although some water pennywort (*Hydrocotyle*) persists. A deep layer of flocculent organic matter seems to cover most of the bottom of the pond. Bottom samples generally seem quite anaerobic, and rarely contain snails.

We have no collections or observations prior to our initial discovery in June of 1988, but have monitored the *Biomphalaria* population, rather informally, since that date. As there is normally no detectable surface flow into or out of the pond, summer water temperatures normally exceed 35°C for extended periods. In addition, local precipitation dropped more than 50% below normal during July 1988. Perhaps consequently the population of *Biomphalaria* seemed to be restricted to a small region at the "head" of the pond (furthest from the salt marshes) in 1988, in the region of one of the

larger (now inundated) springs. The population spread over half the pond in 1989, until Hurricane Hugo hit in late September. The park lost about 75% of its trees, and the pond was covered by a tidal surge (presumably fairly salty) of about 1 meter. About 20 cm of snow fell in late December, the first "white Christmas" on record for Charleston. Necessarily brief field trips during this time failed to discover any *Biomphalaria* until about June, 1990. But the population expanded rapidly from the "head" during the summer of 1990, and by September had covered the entire 500 m pond. On October 3, six 1 ft X 1 ft (929 cm<sup>2</sup>) net samples of surface vegetation spread along the pond head contained on average 44 *Biomphalaria* each, with a range of 11-67 individuals.

We will not speculate regarding the age of the *Biomphalaria* population at Charleston or its origin. Given the volume of traffic attracted by the park, the introduction could well have been artificial, and given the growth of nuisance vegetation since 1987, the introduction may well have been recent. But the environment at the site is also unique - prehistoric springs at sea level would (normally) constitute an unusually mild and favorable habitat for the snail this far north. We know of no other such environments locally. Nor have extensive collections in Charleston and surrounding areas disclosed additional populations of *Biomphalaria*, even in numerous other ponds fouled by nuisance vegetation recently. The *Biomphalaria* population at Charleston has by now become established to the point of resistance to drought, cold, hurricane, and annual application of herbicide. Regardless of the population's origin, its permanence seems fairly certain.

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