A Closer Look at the Rams-horn of the Jumper Creek Cornucopia

by Harry G. Lee

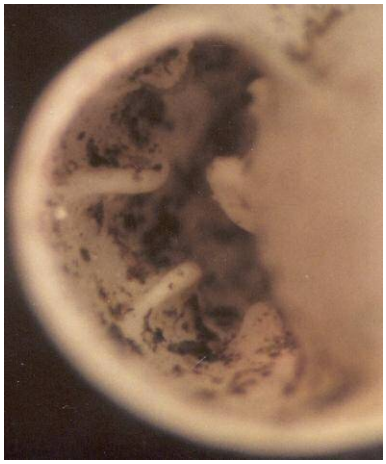
Of the 10,000-odd shells comprising much of the Jumper Creek flotsam reported in a preceding article, over ninety percent were pallid dime-sized (and shaped) aquatic pulmonates for which the official vernacular name Ghost Rams-horn apparently was intended. Although there is little doubt that this apt moniker belongs with this horde of Jumper Creek shells (one example **shown here**), the correct scientific name of this species, is not settled.

The group of snails in which the Ghost Rams-horn belongs is distributed throughout much of the tropical and other warm regions of the New World and Africa and is of considerable medical and veterinary importance. Along with other trematode worms, various parasitic blood flukes, including members of the genus *Schistosoma* infect a wide variety of vertebrate hosts, including hundreds of millions of humans (see also <http://www.jaxshells.org/mollusks.htm>). Many kinds of these flatworms spend an essential part of their life cycle infecting certain species of the genus *Biomphalaria*. Consequently scientists have given a lot of attention to the biology of these snails – including their taxonomy. However, there are obstacles to an easy understanding of the phylogenetic relationships of these critters. For one, their shells, like other members of the family Planorbidae are notoriously variable within species and even within populations [see Rob Dillon's blogs at <http://fwgna.blogspot.com/search/label/Planorbidae>], secondly, susceptibility to parasitism may vary more within apparent biospecies than among them, which fact appears to have dampened the enthusiasm of parasitologists to adhere to a conventional system of taxonomy and nomenclature, and, thirdly, until recently there was a confusing morass of generic and specific names used for the snails. Workers in one part of the world often called the same snail by a different generic **and** specific name than their scientific counterparts elsewhere.

Over the last fifty years or so there has considerable clarification of planorbid taxonomy and nomenclature. The genus *Biomphalaria* Preston, 1910 [Type Species (TS): *B. smithi* Preston, 1910 by monotypy] has subsumed several other generic units. *Tropicorbis* A.P. Brown and Pilsbry, 1914 [TS: *Planorbis liebmanni* Dunker *in* Küster, 1886 by original designation (OD)] and *Australorbis* Pilsbry, 1934 [TS: *Planorbis guadalupensis* G.B. Sowerby I, 1822 OD] were recognized as consensus junior synonyms. Pursuant to a petition (followed by a modified version thereof) to the ICZN by C.A. Wright, originally submitted in 1958, *Biomphalaria* was given precedence over *Planorbina* Haldeman, 1842 [TS: *Planorbis olivaceus* Spix, 1827 by subsequent designation (SD) Dall, 1905], *Taphius* H. and A. Adams, 1855 [TS *Planorbis andecolus* d'Orbigny, 1835 OD], and *Armigerus* Clessin, 1884 [TS *Planorbis albicans* L. Pfeiffer, 1839 SD Morrison, 1947], all potential senior synonyms, when any or all of the three were considered synonymous (which is now the consensus). Rather than suppressing them the Commission placed all these four generic names on the Official List; see Wright (1962) <http://biostor.org/reference/2169.text> and ICZN (1965). At least this part of the puzzle is settled – but with no little contention among the Commissioners evident in the published proceedings of this case.

Species-level taxonomy in *Biomphalaria*, although very intensively studied (e.g., DeJong et al., 2001), hasn't reached stasis. In the latter third of the 20th century there was a tendency for large-sale lumping of taxa, but recent molecular genetic perspectives seem to have dampened that trend. In particular, consensus on the identity of the Ghost (or Obstructed?) Rams-horn of Jumper Creek, which has been assigned to *B. havanensis* (L. Pfeiffer, 1839) by Thompson (1968: 71-72) [including its updated cyber-version: <http://www.flmnh.ufl.edu/natsci/malacology/fl-snail/snails1.htm> figs 177-179; last edited March 5, 2004] and Turgeon, Quinn *et al*. (1998: 135). In this study I follow Dillon and Dutra-Clarke (1992), whose material was identified by veteran malaco-parasitologist Emile Malek, and assign the shells to *B. obstructa* (Morelet, 1840). Further, on review of the literature and hundreds of Jumper Creek specimens, I cannot rule out the synonymy of these two taxa.

One shell feature that preoccupied early workers in *Biomphalaria* taxonomy was the presence of apertural barriers, and forms the basis of the identity of *Planorbis obstructus* Morelet, 1840. Subsequently, however, such lamellae were described in some individuals of several species of *Biomphalaria*. These structures have a rather stereotypical topology with two parietal and four labral plates. It has been demonstrated that they confer an advantage by strengthening the shell and by facilitating aestivation, presumably by reducing the area across which water vapor may escape and anchoring the mucous epiphragm secreted by the snail. The barriers tend to occur in younger animals, and have a genetic basis (Paraense, 1957, 1996; Richards, 1964, 1968). In the hundreds of *B. obstructa* I examined it was apparent that such lamellae were present in more than half of the shells measuring 2 to 4 mm but could not be found in larger specimens. A photomicrograph of a 3.5 mm shell is shown on the **left**, and the aperture is shown in greater magnification on the **right**.



Just why is this feature limited to this subset of Jumper Creek Ghost Rams-horns? Would the two to four mm shells continue to grow and reach, say 10 to 12 mm like the largest shells in the sample? If that were the case, then the lamellae would have to have been reabsorbed since I saw no evidence of these structures by transilluminating and/or manually dissecting the larger shells. Is this little subset, of which I kept a small sample of about 50 specimens, prematurely adult – an enclave of pygmies in the larger colony? I suspect the latter scenario is not operative, at least for many of the lamellate specimens. Those shells also manifest a pattern of narrowing followed by expansion of the last 20 percent of the whorl, the narrowing roughly correlated with the position of the lamellae and the entire segment thicker than the rest of the shell. This feature can be seen, although not optimally, in the figures of the preceding paragraph. The correlation is so uniform that I could reliably predict the presence of internal lamellae by looking at the external aspect of the shell. Inversely, nonlamellate shells in the same size class lacked the change in whorl caliber. Of further interest is evidence, in the larger shells examined, of periodic interruption of the otherwise consistent spiral growth pattern by segments of narrowing, expansion, and thickening. Such growth interruptions may be seen in the 12 mm giant shell in the first figure (**above**). It seems reasonable that periods of stress may recur repeatedly in the lifetime of any Ghost Rams-horn, that some individuals alter their shells to adapt, and that many resume normal growth after the environment ameliorates. This reversible pattern of adaptation includes the development of internal lamellae only among the younger snails with shells two to four mm. It would be interesting to test this hypothesis by rearing lamellate snails in an aquarium.

Maybe that experiment will require another Valentine's Day immersion into Jumper Creek.

See: <http://www.jaxshells.org/rule.pdf> for a previous article concerning Jumper Creek.

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Epilogue: All the shells collected at Jumper Creek on this occasion were placed as vouchers at the Florida Museum of Natural History (FLMNH) on 13 May, 2011.