

Ultrastructural and chemical characterization of the shell of intermediate host species of schistosomiasis in Brazil

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The phylum Mollusca is considered one of the largest and most diverse phylum of the Animal Kingdom, presenting an extensive geological history. The shells, despite the good preservation, have very similar characteristics which makes it difficult to diagnose exclusively by this material. From the epidemiological point of view, the characterization of intermediate host species of *Schistosoma mansoni* (Sambon, 1907) (Trematoda: Schistosomatidae) in Brazil has a extreme importance because each species have different biological and physiological characteristics in the support of the parasite cycle. The objective of this study was to characterize the ultrastructure and chemical composition of the shells of *Biomphalaria glabrata* (Say, 1818) (Gastropoda: Planorbidae), *Biomphalaria tenagophila* (Orbigny, 1835) (Gastropoda: Planorbidae) and *Biomphalaria straminea* (Dunker, 1848) (Gastropoda: Planorbidae), intermediate hosts of schistosomiasis mansoni in Brazil. For this, 18 shells, 6 of each of the 3 species, were described for the ultrastructural morphology and analyzed qualitatively and semi-quantitatively in relation to the chemical elements, using scanning electron microscopy with EDS (energy dispersive X-Ray spectroscopy). The presence of chemical elements was evidenced in the umbilicus and last lap areas, with or without periostracum, in the shells of the three species. The ultrastructural characterization allowed the differentiation between the prismatic layer and the periostracum in the shells and evidenced the angulation between the sutures in the shells of *B. tenagophila* and *B. straminea*. The region of the umbilicus of the three species analyzed was the place where there was a higher abrasion compared to the last lap of these shells. In the preliminary results, the primordial chemical elements of the shell composition (C, O, Ca and N) were observed in all three species in the umbilicus and at the last turn. The Fe ($p < 0,0459$) was identified in the shells of the three species, but showed only significant difference between *B. glabrata* (0,93%) and *B. tenagophila* (0,09%) species. No single chemical element was found in the shells of one of the analyzed species that would allow chemical differentiation. It is suggested that the identification of intermediate host of *Schistosoma mansoni* can be done by the shell, but the separation of the species is not associated with a single chemical element but probably with a pool of substances that form a chemical phenotype that is the result of the incorporation of different elements and the metabolism of each species.

Keywords: *Biomphalaria*, electron microscopy, parasitological vector