Short Communication

Variation of snail's abundance in two water bodies harboring strains of Pseudosuccinea columella resistant and susceptible to Fasciola hepatica miracidial infection, in Pinar del Río Province, Cuba

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The abundance of freshwater snails in two rural sites of Pinar del Río, Cuba, which harbor Pseudosuccinea columella susceptible and resistant to miracidia of Fasciola hepatica was followed for one year. Susceptible snails were found in the most anthropic site (IPA) whereas the resistant population inhabited the most preserved one (El Azufre). Only two snail species coexisted with P. columella at IPA site (Physa cubensis and Tarebia granifera) while five species were found at El Azufre, including an endemic from that province (Hemisinus cubanianus). Populations of both resistant and susceptible snails showed stable densities throughout the year, although the susceptible strain attained higher abundance. The highest densities were observed in April-May 2004 for the susceptible population whereas the resistant strain attained its highest abundance in January 2004. No record of Fossaria cubensis was made and the thiarid T. granifera occurred only at low densities. One of the sampled sites (IPA) meets all the conditions for the first report of P. columella naturally infected with larvae of F. hepatica.

Key words: Pseudosuccinea columella - Lymnaeidae - freshwater snails - Fasciola hepatica - abundance - diversity - resistance - susceptibility - Cuba

In Cuba two Lymnaeid snails, Fossaria cubensis and Pseudosuccinea columella, act as intermediate hosts in the life cycle of the digenean parasite Fasciola hepatica, although only the former has been found naturally infected. Nonetheless, high infection rates for P. columella have been observed in laboratory exposures. In addition, natural infection has been reported in Argentina, Brazil, and Australia (Ueta 1980, Boray et al. 1985, Oliveira et al. 2002, Prepelitchi et al. 2003). Recently, several populations of P. columella were reported to show no susceptibility (i.e. resistance) to miracidia of F. hepatica and some studies were conducted in order to compare various traits between resistant and susceptible snails under laboratory conditions (Gutiérrez et al. 2002, 2003a, b, Calienes et al. 2004). However, due to the disappearance of resistant populations from their original sampling sites, no study including resistant P. columella had been conducted so far under natural conditions. One site recently surveyed (El Azufre) harbors a population of resistant snails which seem to thrive in a more stable environment (Calienes et al. 2004). The present study was conducted with the objective of providing data on the variation of abundance throughout a year of resistant (for the first time) and susceptible populations under natural conditions and to observe the possible association between their densities and those of other snail species present in their habitats.

The work was carried out in the village of San Andrés, La Palma municipality, Pinar del Río province. Two sampling sites were selected (Fig. 1): El Azufre, a spring source which shows little signs of human activity, and IPA, a small canal whose waters are drained from a dam located close to the IPA (Instituto Politécnico Agropecuario) school and where sheep and cows are seen grazing everyday. Both sites are separated 1.85 km from each other. The samplings were performed by collecting snails with a sieve and forceps, always by the same collector during 15 min; the abundance was measured as the number of snails collected per 15-min sampling. A total of 22 and 20 samplings were made in IPA and El Azufre respectively from July 20, 2003 to June 10, 2004. The snails were identified and counted in their corresponding sampling site.

The snail species found in the two study sites are as follows. IPA - P. columella (susceptible strain), Physa cubensis, and Tarebia granifera; El Azufre - P. columella (resistant strain), P. cubensis, T. granifera, Hemisinus cubanianus, Drepanotrema lucidum, and Eupera cubensis.

The abundances of species at each sampling are presented in Figs 2 and 3. In IPA (Fig. 2) P. columella shows the most stable populations as well as the highest abundances for most of the study period compared to the other two species. The highest P. columella densities were found in April-May 2004. T. granifera showed the lowest densities, with peaks only in October and November 2003.
In El Azufre (Fig. 3) the population of *P. columella* is also stable during the study year, and its stability is comparable only to *H. cubanianus*, since all other species showed an intermittent occurrence. The abundance of resistant *P. columella* was lower compared to the abundance attained by the susceptible strain present in IPA, the highest densities (25 snails/15 min sampling) being observed in January 2004 (nine times lower than the maximum densities of susceptible *P. columella* in IPA).

Two interesting results are worth mentioning: (1) in spite of the frequent occurrence of *F. cubensis* in most of the habitats of Pinar del Río province, no snail of this species was found during the whole study in any of the sites; (2) the prosobranch *T. granifera* occurs only at low densities in both sites and does not seem to interfere with the other species. This thiarid is known to displace other snails in numerous habitats where it is introduced (Perera et al. 1994, 1995, Gutiérrez et al. 1997). A previous study in a rural area of Pinar del Río province had reported a negative association between *F. cubensis* and *P. columella*, suggesting that both lymnaeids do not usually co-occur at comparable densities. The same study indicated that *T. granifera* could affect the densities of all snail species present in the habitat except those of *P. columella* and *C. fluminea*.

The dominance of *P. columella* observed in this study suggests that this species should play a role as intermediate host of *F. hepatica* in this particular region. One of the localities sampled in the present study (IPA) meets all the conditions necessary for the transmission of the parasite (there is a relatively big grazing sheep herd and some cows, plenty of susceptible snails and bovine fasciolosis in the surrounding area). The first *P. columella* snails naturally infected in Cuba could be probably reported at this locality in the future.


