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# PUBLICAÇÕES AVULSAS

DO

INSTITUTO AGGEU MAGALHÃES

Recife (Pe)

BRASIL

## EFFECTS OF THE DRY SEASON ON *AUSTRALORBIS GLABRATUS* (MOLLUSCA, PLANORBIDAE) (\*)

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The effects of seasonal changes on terrestrial molluscs are well known but comparatively few studies have been made of the hibernation and estivation of fresh water gastropods, especially in the tropics.

In northeast Brazil studies of *Australorbis glabratus* and *Tropicoorbis centimetralis*, the snail vectors of *Schistosoma mansoni* are being made to determine how they survive the dry season. In this region there is a marked rainy season from April to August and the dry period extends from September to March. Near the coast occasional light showers may fall in the dry season.

During the wet season extensive areas become filled with water providing excellent breeding places for the snails. When the waters recede in the dry months often all rain pools of some areas disappear but snail shells may be found everywhere. In the interior, where the rainfall is very sparse in the dry season, it was observed that many breeding places dry up completely. Shortly after the first heavy rains of the wet season, numerous one-year and older snails appear. Presumably all snails in these areas go through an annual estivation period each year.

Experiments show that under laboratory conditions *Australorbis glabratus* survived almost complete desiccation over 5 months. Observa-

(\*) We wish to thank Dr. Charles G. Dobrovolsky for his helpful suggestions and criticism.



tions on the survival of snails under laboratory and field conditions have been made by Barlow (1933), Brumpt (1941), Scott (1942), Barlow and Azim (1945) and Luttermoser (1946).

A small area near Olinda, Pernambuco, was selected for observing the effects of desiccation on snails under field conditions. In this area, consisting of a few shallow ditches, there was no opportunity for snails to be brought in or migrate in from other waters. The area was devoid of trees, and except for the shade produced by short grass which was frequently cut, it was exposed to direct sunlight. When the first observations were made in September 3, 1951, the plot was still covered with about one foot of water, and 76.7 per cent of a large population of *A. glabratus* were alive. Three days later the water disappeared, but the water content of the mud was 68 per cent. Thereafter monthly snail surveys were made, and each time the temperature and water content of the mud were determined (see table). In each survey about 100 snails were collected from the surface of the ground and brought to the laboratory for examination. The number of living snails was reduced to 3.6 per cent in the seven relatively dry months. An increase in the number of living snails to 31.6 per cent occurred in the 8th month (May) after the first heavy rains of the year when the ditches again were filled with water. Since most of the snails recovered in May were over a year old and could not have migrated into the area, they must have survived the dry season in a more favorable environment, possibly in the mud.

TABLE SHOWING RESULTS OF SURVEYS

Date	Snail		Mud		Ground Surface	
	alive	dead	alive	% water	shade	sun
9/ 3/51	138	42	76.7	—	—	—
9/ 6/51	84	24	77.7	63.0	—	—
9/26/51	57	52	52.3	68.0	—	—
10/16/51	42	58	42.0	41.0	27	29.0
11/16/51	38	68	35.8	39.3	28	30.0
12/17/51	16	84	16.0	30.1	28	31.5
1/17/52	14	86	14.0	30.2	28	32.0
2/17/52	8	70	10.2	35.7	29	31.5
3/17/52	4	82	4.8	38.2	27	31.0
4/22/52	3	82	3.6	40.0	28	31.5
5/19/52	24	76	31.6	—	25	27.0

Although this study was concerned only with snails stranded on the surface, most of the specimens that survived may have burrowed



into the mud, as was observed under laboratory conditions. It appears that in the tropics, where there are no striking seasonal variations in temperature, the dry season is an important factor in disturbing the normal balance of the biotic community. The results of more extensive observations on the ecology of fresh water molluscs will be published elsewhere.

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