COMUNICAÇÃO CIENTÍFICA

NOTES ON THE BIOLOGY OF *Triatoma costalimai* VERANO & GALVÃO, 1958. (HEMIPTERA; REDUVIIDAE; TRIATOMINAE)

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RESUMO

Notas sobre a biologia de *Triatoma costalimai* Verano & Galvão, 1958

Desde a descrição original da espécie, não houve nenhum outro estudo sobre *Triatoma costalimai* VERANO & GALVÃO, 1958. O presente trabalho descreve algumas novas observações sobre a biologia desta espécie.

Ninfas de *T. costalimai* foram coletadas em rochas calcáreas no município de Mambaí, Goiás. A maioria delas foi alimentada em sangue de lagartos e três mostravam infecção com um tripanosoma que acreditamos não ser *Trypanosoma cruzi*. Entretanto *T. costalimai* mostrou-se susceptível à infecção com *T. cruzi* quando foi alimentado em laboratório em um coelho em fase aguda de Chagas.

As primeiras ninfas de *T. costalimai* foram mantidas em laboratório até adulto quando 64 ovos foram recolhidos para estudo do ciclo de desenvolvimento. Mantidos a uma temperatura de 27°C e alimentados cada quinze dias em sangue de galinha o desenvolvimento foi muito lento; 603 dias após a postura de ovos as ninfas tinham alcançado apenas o quinto estágio. Infelizmente a experiência não foi terminada devido a um ataque de formigas que mataram todas as ninfas de quinto estágio.

O lento desenvolvimento e seu habitat atual rupícola leva-nos a concluir que *T. costalimai* não representa uma ameaça para colonizar ambiente doméstico ou peridoméstico como vetor da doença de Chagas.

Since the original description of *Triatoma costalimai* by VERANO & GALVÃO (1958) there has been, to our knowledge, no further work concerning this species. Both MILES (1976) and LENT & WYGODZYNSKY (1979) give the distribution of *T. costalimai* as Goiás and Bahia, but do not

Recebido em 20/03/1980.

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cite their sources for this information. The type specimens were collected from the municipality of Taguatinga, Goiás, about 700 Km NE of Brasilia. We describe here observations on specimens from the municipality of Mambaí, Goiás, about 300 Km NE of Brasilia. The two areas are both of about 500 m elevation, with similar cerrado vegetation, and similar geology.

Nymphs of *T. costalimai* were fairly common amongst outcrops of eroded grey limestone (rochas calcáreas) which are found in both Taguatinga and Mambaí. These outcrops discourage land clearance and so are usually surrounded by shady trees. Cacti and succulents are often rooted in the rich litter which collects in the crevices of the rocks. (Fig. 1, 2, 3,).

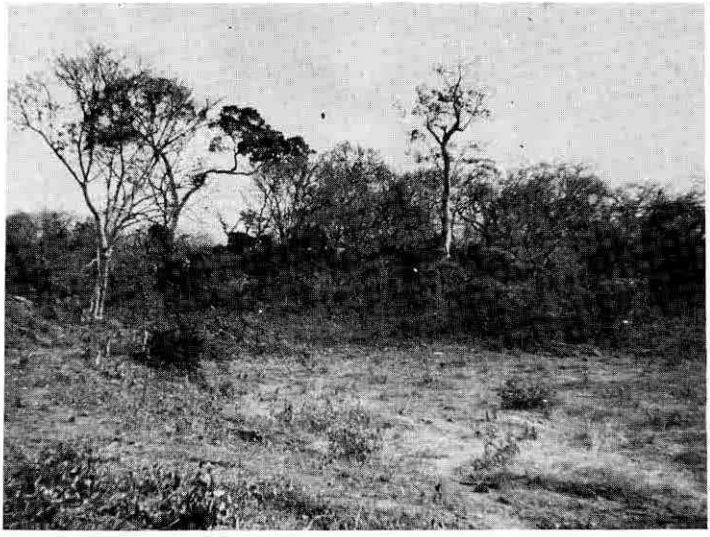

FIGURA 1 - Eroded grey limestone rocks (rochas calcáreas) where nymphs of *T. costalimai* were found. The rocks discourage land clearance and are thus usually surrounded by trees. This picture, and figs. 2,3,4, were taken during winter (July) after leaf-fall, in order to show the rocks more clearly.

FIGURA 2 - Detail of limestone rocks showing typical cracks where nymphs of *T. costalimai* were found. Cacti and succulents (*Philodendron* spp.) were commonly rooted in the rich litter collecting in the older cracks.

FIGURA 3 - Dismantling rock piles in the search for *T. costalimai*.

Nymphs of all stages of *T. costalimai* were black in colour when reared in the laboratory, but those living amongst the limestone rocks were more usually pale grey in colour due to particles of limestone dust adhering to the cuticle. This 'camouflage phenomenon' has been noted in other species of Triatominae (ZELEDÓN *et alii*, 1973). We have only found nymphs within the drier cracks between the rocks, never in the more moist cracks where litter collects, and they were more commonly on the underside of the rocks. Nymphs were most commonly found during the later part of the rainy season, between January and April; we have never encountered adult bugs in the field.

Of 28 bloodmeals from 2nd, 3rd, 4th, and 5th stage nymphs, analysed by Dr. P.F.L. Boreham of Imperial College, London, only 10 gave identifiable sera. Of these, 8 were from reptiles, 1 from rodent, and 1 from primate. Lizards, chiefly *Tropidurus sp.* were common amongst the limestone rocks and probably account for the reptilian feeds. The source of the rodent feed is unknown, but the primate could have been either marmoset, *Callithrix sp.*, which was often seen in trees around the rocks, or possibly man. A small local industry in Mambaí involves the collection of limestone rocks which are then furnaced to produce lime; there is therefore the possibility of man-bug contact. (Fig. 4).

FIGURA 4 - An open wood-fired furnace in which limestone rocks were heated to produce lime. A pile of white lime, which is used in plaster for house walls, is to the right of the furnace.

Three 4th stage nymphs, found together under the same rock, contained large numbers of an unidentified flagellate in the intestine. These flagellates were morphologically similar to *Trypanosoma cruzi* but failed to grow when inoculated into a culture medium (LIT, Yaeger, monophasic; courtesy Dr. I. Roitman) in which *T. cruzi* normally grows well. Blood-meals from two of these bugs were unidentifiable, but the third was from reptile. For these reasons, we are of the opinion that the flagellates were not *T. cruzi*.

A simple comparative xenodiagnosis was made to see if *costalimai* was, in fact, susceptible to infection with *T. cruzi*. Five each of *T. costalimai* 3rd instar, *Triatoma infestans* (Klug, 1834) 3rd instar, and *Dipetalogaster maxima* (Uhler, 1894) 1st instar, all bred in the laboratory from eggs, were fed simultaneously on a laboratory rabbit in the acute phase of infection with *T. cruzi* (Ernestina strain, courtesy Dr. A.R.L. Teixera). Each group of 5 bugs was weighed before and after feeding, and each bug was examined for infection by rectal dissection 27 days after feeding.

The mean blood-meal of the *D. maxima* was 53 mg; on examination, all five had moulted to 2nd nymphs, and four were heavily infected with *T. cruzi*. The mean blood-meal weight of the *T. infestans* was 24 mg; on examination, none had moulted and none was infected with *T. cruzi*. The *T. costalimai* took only 16 mg mean blood-meal; two of these moulted to fourth stage nymphs and developed infection with *T. cruzi*, the other three neither moulted nor developed infection.

These results demonstrate that *T. costalimai* is susceptible to infection with *T. cruzi*, and suggests also that the relative size of the blood-meal, which must reach a certain amount in order to initiate the moulting cycle (WIGGLESWORTH, 1934), could be an important factor in determining infection with *T. cruzi*. Although the work of CUBA *et alii* (1978) failed to show a clear correlation between blood-meal size and subsequent infections of *T. cruzi* in *D. maxima* (cited as *D. maximus*) and *T. infestans*, a further study by MINTER *et alii*, (1978) not only indicated interspecific differences in susceptibility to infection between *T. infestans*, *Rhodnius prolixus* Stal, 1959, and *Panstrongylus megistus* (Burmeister, 1835), but also showed a correlation between blood-meal size and subsequent infection in these species.

From our original collections of wild nymphs of *T. costalimai*, seven (4 males, 3 females) survived to the adult stage. Two males and one female have been deposited in the collection at the Instituto Oswaldo Cruz, Rio de Janeiro, the remainder are in the collection of the senior author. From these adults, a total of 64 eggs were maintained at 27 ± 3°C and 40-80% RH and the subsequent nymphs were fed fortnightly on chickens. As the data of Table 1 show, the rate of development under these conditions was very slow, although instrinsic mortality in 3rd, 4th, and 5th stage nymphs was low. Unfortunately our data are incomplete due to an attack by ants which destroyed all the 5th stage nymphs 603 days after the first eggs were laid.

The slow rate of reproduction and current rupicoline habitat of *T. costalimai* suggest that this species is unlikely to pose a threat to

either the domestic or peridomestic environment as a vector of Chagas disease.

TABLE 1 - Partial life-table *Triatoma costalimai* maintained in laboratory colony at 27 ± 3°C and 40-80% RH. Nymphs were fed fortnightly on chicken.

Stage	Number entering stage	Number dying in stage	% mortality	Approximate mean development time (days)
eggs	64	14	21.9	22
1	50	22	44.0	40
2	28	9	32.1	145
3	19	2*	10.5	126
4	11	0	0	108
5	11	0**	-	162+

* - 5 nymphs removed for comparative xenodiagnosis
** - All 5th stage nymphs destroyed by ants.

ACKNOWLEDGEMENTS

This work received financial support from CNPq. We thank Professors A.R. Prata and V. Macedo for provision of field facilities in Mambaí. Messrs. M.A. de Belder, N.J. Belby, and J.E. Akers assisted in field collections.

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