

**GEOGRAPHICAL EXTENSION IN A NEW ECOLOGICAL ASSOCIATION  
OF *PANSTRONGYLUS HUMERALIS* (HEMIPTERA: REDUVIIDAE),  
NATURAL HOST OF *TRYPANOSOMA CRUZI* IN PANAMA<sup>1</sup>**

*Panstrongylus humeralis* (Usinger, 1939) is a triatomine species known to occur only in the type-locality of Barro Colorado Island (BCI), Gatun Lake, Panama Canal Zone, from where it has been occasionally collected since early 1933 (Usinger, 1939, Univ. Calif. Publ. Ent. 7: 38-40). Although much attention has been given to the triatomines found elsewhere in Panama (Pipkin, 1968, J. Med. Ent. 5: 107-24; Sousa & Johnson, 1973, Amer. J. Trop. Med. Hyg. 22: 18-23), *P. humeralis* does not appear to be a common species. Fairchild (1943, Amer. J. Trop. Med. 23: 569-91), listing the bloodsucking insects of Panama, refers to a series of 3 males and 1 female *P. humeralis* taken at light during January 1941 on BCI by K. W. Cooper. Usinger (1944, Pub. Hlth Bull. No. 288, U. S. Pub. Hlth Serv., Washington) offered a brief description of the adult morphology of the species and referred to specimens collected on BCI by James Zetek during April 1941, as well as those of Cooper collected earlier that year. *P. humeralis* can be easily distinguished from *P. lignarius* or *P. herveri* by external morphological characteristics.

Recent interest in the ecological impact of the Bayano River Hydroelectric project in eastern Panama led Gorgas Memorial Laboratory investigators to study the prevalence of potential vectors of disease in the sylvatic area of the Bayano River, which included the collection of wild triatomines. The purpose of this note is to report the presence of *P. humeralis* in the Bayano River area in Panama Province and its role as a potential vector of *Trypanosoma cruzi*.

The collection area (09°00'N, 78°40'W) is located 70 km east of Panama City, above the Hydroelectric Dam on the Bayano River on a ridge that will remain as an island station after flooding of the basin. This area belongs,

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according to Tosi (1971, FAO, Rome, FO: SF/PANG, Informe Tecnico 2), to the Pacific or "Monsoon" regime of the precipitation pattern of the Isthmus of Panama. In this area, in which we have found a new distributional record for *P. humeralis*, there is a prolonged wet season which begins in the latter part of April or the first part of May and ends during the last part of November. The type-locality of *P. humeralis* belongs to the Atlantic regime of the precipitation pattern, characterized by a uniform distribution of rainfall during the year.

The vegetation of the new distributional area of *P. humeralis* corresponds to a tropical moist forest, transitional to tropical dry forest with an average rainfall of approximately 2000 mm. Barro Colorado Island corresponds to a typical tropical moist forest with an average rainfall well over 2000 mm.

Collections of hematophagous insects were made in the study area in October 1972 using different techniques, including human-baited, Shannon and fluorescent light traps. During almost 2-1/2 years, specimens of *Rhodnius pallescens*, *Triatoma dimidiata*, *Eratyrus cuspidatus*, *Panstrongylus geniculatus*, and *P. rifotuberculatus* were obtained. On 13 February 1975, two adult *P. humeralis* were acquired: a female from a human-baited night collection on a bridge above the forest floor and a male from a Shannon trap near the main camp. Two additional specimens were collected, 1 male on 6 March 1975 and a female on 15 May 1975. Both insects were captured using a fluorescent light on a white sheet.

The sudden appearance of this apparently rare species is probably due to the extensive deforestation that has taken place around the study site for the purpose of clearing the future lake basin of the Bayano Dam.

Live specimens were transported in glass jars lined with plaster of paris, to retain moisture, to the Gorgas Memorial Laboratory in Panama City. Parasitological examination of the gut contents was carried out on every specimen to

TABLE 1. Results of inoculation of mice (CFW) with *T. cruzi*-like parasites from naturally infected *Panstrongylus humeralis* (Usinger).

MOUSE NO.	AGE	INOCULUM*	DAY POSTINOCULATION**					
			7	9	11	13	15	16
1	Suckling (2-3 days)	360 parasites per (ic)	-	-	+	+	+++/D	
2	"	"	-	-	+	++	+++/D	
3	"	"	-	-	+	++	Dead	
4	"	"	-	-	+	++	++	Dead
5	"	"	-	-	+	++	++	Dead
6	"	"	-	-	+	+	++	Dead
7	"	"	-	-	+	++	+++/D	
8	"	"	-	-	+	++	+++/D	

\*Inoculum = Saline-suspended flagellates from insects' feces; ic = intracerebral inoculation (0.01 ml per mouse).

\*\* - = Negative blood examination; + = 1-10 parasites/field 10 × obj.; ++ = 11-20 parasites/field 10 × obj.; +++ = over 20 parasites/field 10 × obj.; D = animal died late in the day.

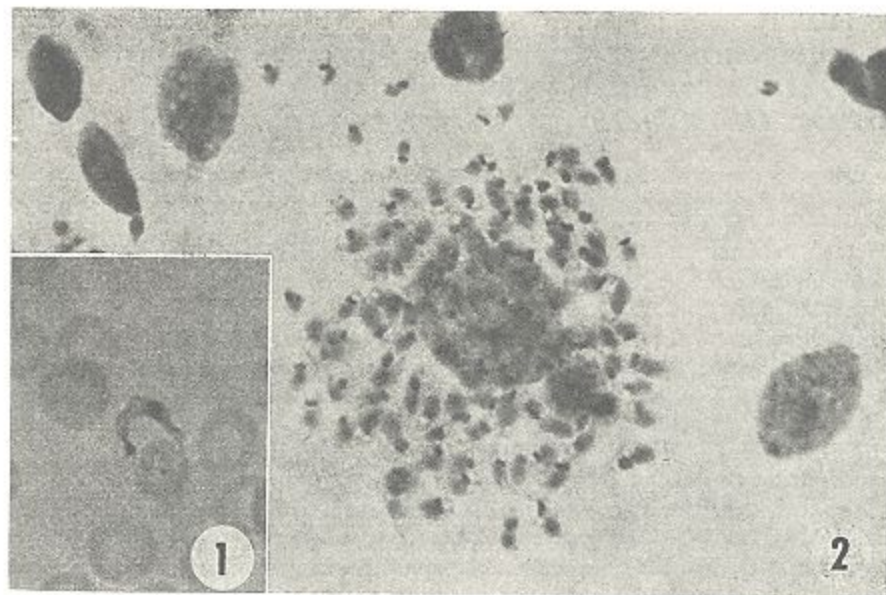


FIG. 1-2. (1) *T. cruzi*-like trypomastigote in the blood of experimentally infected mouse (1000 $\times$ ). (2) Cluster of amastigotes surrounding cell nucleus from a brain smear of a mouse inoculated intracerebrally (1000 $\times$ ).

determine the presence of trypanosomes. The insects collected on 13 February were found to harbor epimastigotes and metacyclic trypomastigotes in the intestinal tract. Parasites from a naturally infected male *P. humeralis* were suspended in sterile saline and inoculated intracerebrally (ic) or intraperitoneally (ip) into laboratory mice.

The results are presented in TABLE 1. All animals inoculated intracerebrally showed parasites in the tail blood by the 11th day. Five mice died on the 15th day and the remaining 3 died on the 16th day following inoculation. Giemsa-stained blood films (FIG. 1) demonstrated typical *T. cruzi*-like trypomastigotes and brain smears were found heavily parasitized with amastigotes of *T. cruzi* (FIG. 2). The intraperitoneal inoculation resulted in a low-level infection (6 parasites per microscope field, 10 $\times$  objective) patent on the 11th day and persisting through the 30th day after introduction.

The parasite has been isolated, through mice, in culture

media (Brain Heart Infusion Blood Agar, 15% defibrinated rabbit's blood) and is also maintained in suckling mice by intracerebral inoculation of blood trypomastigotes. The strain, at present in its 10th mouse-to-mouse passage, is retaining its virulence. A total of 80 suckling mice has been inoculated ic with 0.01 ml. Parasites become patent on or about the 7th day and death of the host occurs from the 8th to the 19th day, avg. 13 days. The morphology and behavior of the parasite in culture media and in laboratory mice is comparable with that of strains of *T. cruzi* isolated from *R. pallescens* Barber and *P. rufotuberculatus* (Champion) from the Bayano area of eastern Panama.

The present findings add a new triatomine to the list of natural hosts of *T. cruzi* in America and incriminate a poorly known species, *P. humeralis*, as a potential vector of Chagas' disease in Panama.—**Octavio E. Sousa** and **Abdiel J. Adames**, Gorgas Memorial Laboratory, P. O. Box 2016, Balboa Heights, Canal Zone.