RESEARCH NOTE

Morphological and Biometrical Differences among *Trypanosoma vivax* Isolates from Brazil and Bolivia

AMR Dávila+, L Ramirez, RAMS Silva

Laboratório de Ecopatologia, Centro de Pesquisa Agropecuária do Pantanal, EMBRAPA, Rua 21 de Setembro 1880, 79320-900 Corumbá, MS, Brasil

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Trypanosoma vivax, originating in Africa, has been found in Central America, South America, the West Indies and Mauritius (ND Levine 1973 *Protozoan Parasites of Domestic Animals and of Man*, Burgess Publishing Company, Minneapolis, Minessota, 406 pp.). *T. vivax* was reported in the New World for the first time in French Guyana (M Leger & M Vienne 1919 *Bul Soc Pathol Exotique 12*: 258-266) and later in other parts of South America, Central America, and some Caribbean islands (RD Meléndez et al. 1995 *Trypnews 2*: 4). JJ Shaw and R Lainson (1972 *Ann Trop Med Parasitol 66*: 25-32) made the first record of *T. vivax* in Brazil when they recorded its presence in a water buffalo (*Bubalis bubalis*) from the vicinity of the city of Belém and cattle and sheep elsewhere in the State of Pará. RAMS Silva et al. (1996 *Mem Inst Oswaldo Cruz 5*: 561-562) reported the first occurence of *T. vivax* in the Pantanal region of Brazil on the border with Bolivia and in the same year this parasite was found in Bolivia (RAMS Silva et al. *Vet Parasitol* submitted).

In the present study we compared measurements of *T. vivax* in blood-films from naturally infected bovines from Brazil and Bolivia. According to CA Hoare (1972 *The Trypanosomes of Mammals. A Zoological Monograph*, Blackwell Scientific Publication, Oxford, 749 pp.) the range of lengths of *T. vivax* is from 18 µm to 31 µm (including free flagellum 3-6 µm long) with means from 21 µm to 25.4 µm, while over 90% of the measurements are between 20 µm and 26 µm. Biometrical studies of isolates from Pantanal (Brazil) and Santa Cruz (Bolivia) were carried out as described by RAMS Silva et al. (1995 *Vet Parasitol 60*: 167-171) in 100 and 80 observations from thin smears of each isolate, respectively. In each case, five sets of smears were taken from isolates for the biometrical study. The data were analyzed statistically using a T-test. The difference in length among isolates from the Pantanal (18.73 µm), Pará (22.77 µm) reported by Shaw and Lainson (*loc. cit.*) and Bolivia (15.86 µm) were highly significant ($p<0.001$). Based on CA Hoare and JC Broom (1938 *Trans R Soc Trop Med Hyg 31*: 517-534) the size of Bolivian isolate is out of the normal range and could be a sufficient criteria to classify it as *T. uniforme*. The biometrical differences were highly significant between isolates and only the distance from kinetoplast to posterior end between Bolivian and Brazilian (Belém) parasites and the distance from kinetoplast to nucleus between Brazilian trypanosomes were not significant (Table). These results show that there is a similarity in the subterminal position of kinetoplast among Brazilian (Belém) and Bolivian parasites and all three isolates are biometrically different among bovines species from Brazil and Bolivia.

The body of the Santa Cruz parasite at the rounded posterior end was more broad than that of the Poconé trypanosome (Figs 4, 5, 6). However, the Poconé parasite was more tapered than the Santa Cruz toward the anterior and posterior end (Figs 1, 2, 3). The kinetoplast of the Poconé parasite was more oval than that of the Santa Cruz. In the former, the kinetoplast was lateral and subterminal and in the latter it was more terminal. The free flagellum of Bolivian trypanosome was shorter than that of the trypanosomes from Poconé and Belém. The nucleus of the Bolivian parasite was bigger and more rounded than that of the Poconé (Figs 4, 6). H Fairbairn (1953 *Ann Trop Med Parasit 47*: 394-405) showed that short forms were characteristic of the strain causing acute disease in cattle of West Africa, while long forms are associated chiefly with strains causing chronic infection in East Africa. As recent studies by RAPD (Random Amplified Polymorphic DNA) analysis showed that South American *T. vivax* originated from West Africa (MF Dirie et al. 1993 *J Euk Mircrobiol 40*: 132-134), we believe that shorter forms reported in this work could be related with the acute disease observed by us here and Fairbairn in West Africa (*loc. cit.*). In the recent past, authors as Shaw and Lainson (*loc. cit.*) reached the same conclusion with regards the Belém parasite of the water buffalo.

+Corresponding author. Fax: +55-67-231.1011. E-mail: alrida@sede.embrapa.br.
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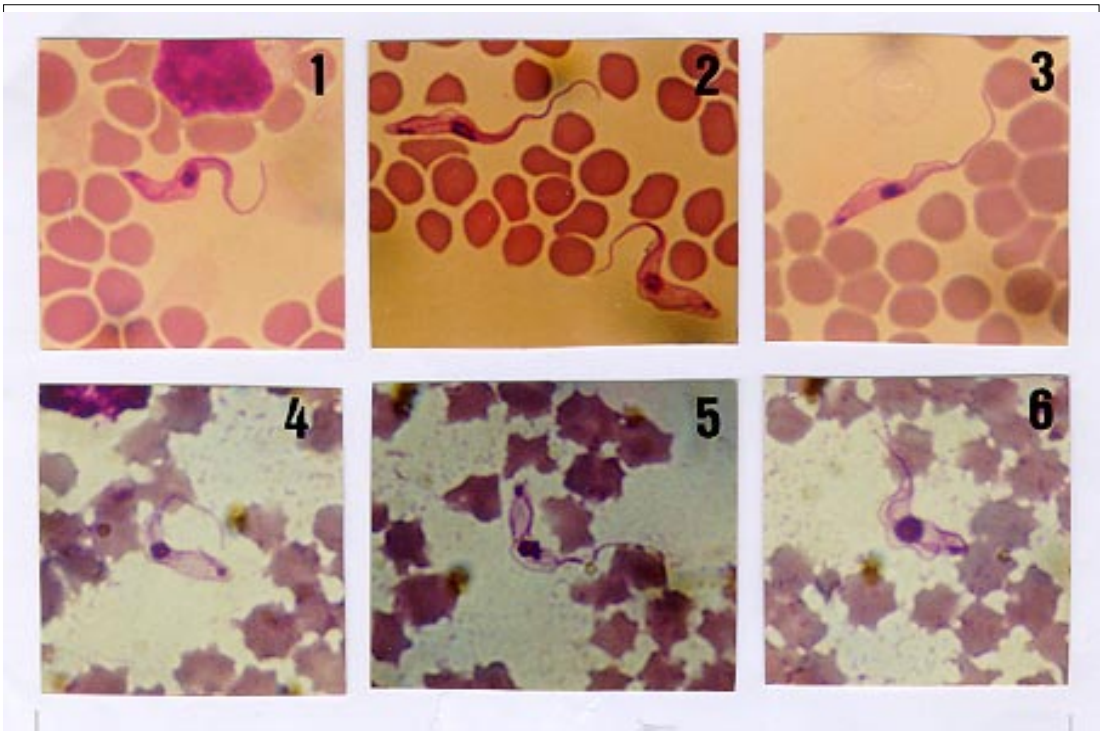

Photomicrographs of *Trypanosoma vivax* isolates. Figs 1, 2, 3: from bovines of Pantanal of Poconé, State of Mato Grosso, Brazil. Figs 4, 5, 6: from bovines of Santa Cruz department, Bolivia.

TABLE

Measurements of *Trypanosoma vivax* of bovines from Brazil and Bolivia, means ± SE (µm)

	PK	KN	PN	NA	F	L	PN/KN	PN/NA
Bolivia (Santa Cruz)	0.54 ± 0.51[a]	5.05 ± 1.07[a]	5.59 ± 1.15[a]	5.90 ± 0.76[a]	4.35 ± 1.26[a]	15.86 ± 2.23[a]	1.10 ± 1.07	0.96 ± 0.24
Brazil (Poconé-MT)	1.02 ± 1.16[b]	6.10 ± 1.29[b]	7.18 ± 1.18[b]	5.40 ± 1.63[b]	6.15 ± 2.38[b]	18.73± 3.80[b]	1.17 ± 0.91	1.50 ± 0.72
Brazil (Belém-PA)	0.65 ± 0.25[a]	6.16 ± 0.57[b]	7.60± 0.57[c]	8.22 ± 1.08[c]	6.92 ± 1.03[c]	22.77 ± 1.38[c]	_	0.94 ± 0.24

PK: from posterior end to kinetoplast; KN: from kinetoplast to middle of nucleus; PN:from posterior end to middle of nucleus; NA: from nucleus to anterior end; F: free fagellum length; L: total length including free flagellum. Values by column followed by a different letter are statistically distinct at $p<0.001$; MT: State of Mato Grosso; PA: State of Pará.