Zeitschrift: Acta Tropica
Herausgeber: Schweizerisches Tropeninstitut (Basel)
Band: 41 (1984)
Heft: 1

Artikel: Studies on "Trypanosoma rangeli" Tejera, 1920. Part II, Its effect on feeding behaviour of triatomine bugs : short communication
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DOI: https://doi.org/10.5169/seals-313283

Acta Tropica *41*, 93–95 (1984)

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Studies on *Trypanosoma rangeli* Tejera, 1920
II. Its effect on feeding behaviour of triatomine bugs

Short communication

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The transmission of parasites by the bite of their vectors is perhaps the most efficient mechanism of infection of vertebrate hosts. Among the Trypanosomatidae transmission by bite of the vector occurs in *Leishmania* (Killick-Kendrick and Molyneux, 1981), salivarian trypanosomes (Molyneux, 1980) and *Trypanosoma rangeli* (Hoare, 1972).

Killick-Kendrick et al. (1977) summarised earlier observations on sandfly feeding behaviour in relation to transmission of Leishmaniasis and observed when *Lutzomyia longipalpis* was infected with *L. mexicana amazonensis* that individual flies frequently probed many times and took no blood or only a small quantity yet on these occasions transmission occurred. Jenni et al. (1980) and Roberts (1981) reported that trypanosome infected *Glossina* probed more frequently and fed more voraciously than uninfected control flies although Moloo (1983) was unable to confirm differences in behaviour between infected and uninfected *Glossina.* Jenni et al. (1980) demonstrated an association between mechanoreceptors in the labrum of *Glossina* and *T. brucei;* this was subsequently demonstrated by scanning and transmission electron microscopy for *T. congolense* and *T. vivax* (Molyneux, 1980; Livesey et al., 1980; Thévenaz and Hecker, 1980).

Rhodnius prolixus either naturally or experimentally infected with *T. rangeli* was reported to have difficulty feeding when heavy salivary gland infections were present (Grewal, 1956; Tobie, 1961; D'Alessandro and Mandel, 1969). These authors report that infected bugs fed significantly less frequently than uninfected ones. No evidence has been produced as far as we are aware to explain the reasons for this behaviour of infected triatomine bugs.

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This study reports our attempts to confirm these earlier observations and explain the mechanism for observed differences in behaviour of uninfected and *T. rangeli* infected bugs in a comparative study.

Fourth and fifth instar nymphs and adults of *Rhodnius prolixus* and *R. robustus* were derived from a colony of the Faculty of Science, University of Los Andes, Venezuela. Eleven infected bugs, 7 *R. prolixus* and 4 *R. robustus* as well as 48 uninfected bugs (25 *R. prolixus* and 23 *R. robustus*) were used. These were maintained at 25° C, and starved for 21 days prior to the experiment.

Bugs with salivary gland infections by *T. rangeli* were detected using the method of salivation on glass slides (Añez, 1980). Bugs with confirmed infection were placed individually in 3.5×1.5 cm plastic vials and covered with gauze, until they were used in the probing experiment.

A probing experiment was carried out individually with each of the 48 uninfected and the 11 *T. rangeli*-infected bugs. The bug was allowed to feed freely for up to 30 min on an uninfected mouse held inside a plastic net restrainer and placed in a 600 ml plastic beaker. The number of probes was recorded by direct observation using a manual counter. The quantity of blood taken was estimated visually.

To determine the statistical significance of the differences between uninfected and *T. rangeli*-infected bugs, a student t-test for two independent samples was used.

The number of probes of infected bugs prior to engorgement of refusing to feed, varied from 2 to 28 times (average 13 times) within the 30 min period that food was offered. Uninfected bugs probed on average twice before engorging, with a range of 1 to 5 probes. Engorgement usually occurred within 11 min of contact with the mouse.

These observations on the feeding behaviour of *Rhodnius* with salivary gland infections of *T. rangeli*, revealed that the infected bugs probed more frequently and for longer periods than uninfected ones. The difference between infected and controls was highly significant ($p < 0.0005$).

Differences were also observed in the quantity of blood ingested in the two experimental groups. While all the uninfected controls engorged, in the group infected with *T. rangeli*, 7 of 11 bugs tested took "normal" amounts of blood (64%), 2 a small meal (18%) and 2 no blood at all (18%). It is of interest to note that the 2 bugs which did not take any blood probed 12 and 28 times and a high parasitaemia was detected in each of the two mice bitten by them.

It can be assumed, therefore, that as a result of more frequent probing by infected bugs the chances of transmission of *T. rangeli* to mammalian hosts is increased and infection can be produced by the probing of bugs which do not take a bloodmeal.

Although more investigations are required to establish why and at what stage in the life-cycle of *T. rangeli* infected bugs change their feeding habits and what proportion of an infected population is affected, this work demonstrates

that *T. rangeli* has a marked effect on feeding behaviour of triatomine bugs inducing a more frequent probe on the vertebrate host. The physiological mechanisms involved in this phenomenon also require elucidation.

Acknowledgments

We are indebted to Professor D. H. Molyneux for his criticism of the manuscript, and Miss Irlanda Marquez for typing the paper. The financial support of the Universidad de Los Andes is grateful acknowledged.

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