

## *Ixodiphagus hookeri* Howard, 1907 (Hymenoptera: Encyrtidae) in the brown dog tick *Rhipicephalus sanguineus* Latreille, 1806 (Acari: Ixodidae) in Venezuela

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### Abstract

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Nymphs of the ixodid tick *Rhipicephalus sanguineus* were found naturally infected by the tiny wasp *Ixodiphagus hookeri*. The parasitism resulted in the death of the host ticks, as cause of ingestion of abdominal host tissues by the wasps. This fact confirms the potential role of the encyrtid in controlling ticks affecting man and animals. This report describes for the first time the presence of *I. hookeri* in the dog tick *R. sanguineus* in Venezuela.

**Additional key words:** biological control, integrated pest management, veterinary.

### Resumen

CORONADO A. 2006. *Ixodiphagus hookeri* Howard, 1907 (Hymenoptera: Encyrtidae) en la garrapata del perro *Rhipicephalus sanguineus* Latreille, 1806 (Acari: Ixodidae) en Venezuela. ENTOMOTROPICA 21(1):61-64.

Ninfas de *Rhipicephalus sanguineus* fueron encontradas naturalmente parasitadas por microhimenópteros de la especie *Ixodiphagus hookeri*. El parasitismo causó la muerte de las ninfas por destrucción de los órganos abdominales, confirmando el rol potencial de este encírtido en el control de garrapatas de importancia Médico-Veterinaria. Este reporte describe por primera vez la presencia de *I. hookeri* en la garrapata del perro *R. sanguineus* en Venezuela.

**Palabras clave adicionales:** control biológico, manejo integrado de plagas, veterinaria.

### Introduction

Ectoparasites affecting dogs in Venezuela comprise fleas, lice, flies causing myiasis, blood-sucking flies, mites, and ticks. This later group includes mainly the species *Rhipicephalus sanguineus*. Other species, such as *Amblyomma cajennense* (F.), *A. maculatum* Koch, *A. ovale* Koch, *Anocentor nitens* (Neumann), and the tropical cattle tick *Boophilus microplus* Canestrini have been found parasitizing dogs although in lesser extent than *R. sanguineus* (Guerrero 1996; Klober 2001).

Besides causing anemia in their hosts, the importance of *R. sanguineus* in the country relies on its role as vector of the well known pathogens *Babesia canis*

(Piana y Galli-Valerio), *Ehrlichia canis* (Donatien and Lestoquard) and *Hepatozoon canis* (James).

Control of the dog tick in Venezuela is accomplished through the use of chemical compounds such as organophosphorous, synthetic pyrethroids, and amidine, varying in results with major or minor success. Use of OP, for instance, has shown a poor efficacy, even in higher doses than those recommended by the makers (Coronado and Mujica 1998). Side effects dealing with the use of chemical compounds have promoted the search of tick control approaches other than use of acaricides.



Figures 1-2. 1. *Ixodiphagus hookeri* adult. 2. *Rhipicephalus sanguineus* nymph.

In the environment, ticks have to face several constraints like climate and natural enemies. The most important natural enemies of ticks include pathogens, predators and parasites. Pathogens affecting ticks include viruses, bacteria, fungi, and protozoan; some of them cause diseases in their host mammals also. Some arthropods like ants, beetles and spiders consume both unengorged and engorged ticks, accounting for losses in nature (Sonenshine 1993).

The presence of parasites affecting ticks has been demonstrated by several workers (Cooley and Kohls 1933; Bishopp 1934; Alfeev 1940; Cobb 1942; Smith and Cole 1943; Stafford et al. 1996; Hu and Hyland 1997). One species of hymenopterans, the tiny wasp *Ixodiphagus hookeri*, parasitizes ixodid ticks. The wasp female oviposits inside a tick, mainly engorged larvae or unengorged nymphs, providing a sure source of food for the hymenopteran larvae. Once emerged, the larva of the wasp begins to feed from the tick tissues, causing its death. The impact of *I. hookeri* on tick populations has deserved the attention of several workers (Cooley 1928; Cooley and Kohls 1933; Stafford et al. 2003). The extent of the damage caused by *I. hookeri* on tick populations depends on the number of tick parasitoids.

### Material and Methods

Both immature and adult stages of the tick *Rhipicephalus sanguineus* were collected from

naturally infested dogs in Barquisimeto City (lat 10°06'35" N, long 69°31'27" W), during the course of a campaign against animal rabies. The former objective was to evaluate the prevalence of the hemoparasitic protozoan *Hepatozoon canis* in dogs of that city, through the tick hemolymph smear method. Thin blood smears were performed from each animal also. The ticks were collected manually and placed in a single glass tube for each sampled animal. In the laboratory, the adult females were placed individually in small glass tubes cotton plugged and kept at 26-27 °C and RH 85% in glass chambers. The nymphs were kept under the same conditions but at 37° C. Those conditions were suitable to the survival of the ticks off the hosts.

Information related to each animal was collected during the vaccination procedure, building up a database for further analysis.

### Results and Discussion

A total of fifty-four dogs were examined: 85.2% of them were parasitized by the tick *R. sanguineus*, with an average of 2.3 ticks per dog. A total number of 7 nymphs, 55 engorged females and 63 males were collected from those animals. A two-year male Pekingese dog showed the second higher infestation: five nymphs, three females and four males were picked up from it. Four out of five nymphs were infested with a very tiny wasp (Figure 1), which emerged from their hosts through a hole opened at the end

of abdomen (Figure 2). Almost all internal organs had disappeared and the body of the ticks appeared translucent. Like many others microhymenopterans do, the tiny wasps ingest the internal organs of their hosts, mostly the digestive and the excretory organs in case of affecting nymphs. This behaviour accounts for the death of the ticks, which is a desirable effect in terms of pest control.

The tiny wasp *I. hookeri* has been evaluated in its role as natural enemy of some species of hard ticks, such as *Amblyomma variegatum* (F.), *Dermacentor variabilis* (Say), *Ixodes scapularis* Say, *I. ricinus* (L.), *I. persulcatus* Schulze and *Rhipicephalus appendiculatus* Neumann. Mass release of *I. hookeri* has been performed in several places in USA, Kenya and the former Soviet Union with variable results (Alfeev 1940; Mwangi et al. 1997; Smith et al. 1946).

The actual role of *I. hookeri* in controlling *R. sanguineus* in the present study is unknown, although the presence of a parasitoid capable to reduce the tick population must be taken into consideration in an integrated pest management program.

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