



RESEARCH COMMUNICATION

Hosts of the immature stages of the rhinoceros tick, *Dermacentor rhinocerinus* (Acari, Ixodidae)

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ABSTRACT

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The collection of the immature stages of *Dermacentor rhinocerinus* from host animals is described for the first time. These are the bushveld gerbil (*Tatera leucogaster*), from which larvae and nymphs were collected, the red veld rat (*Aethomys crysophilus*), from which a larva was collected, and the Natal multimammate rat (*Mastomys natalensis*), from which a nymph was collected. The rodents were examined in a nature reserve in which there are white rhinoceroses (*Ceratotherium simum*).

Keywords: *Dermacentor rhinocerinus*, Ixodidae, immature stages, rodent hosts

The adults of *Dermacentor rhinocerinus* parasitize both white and black rhinoceroses (*Ceratotherium simum* and *Diceros bicornis*) in Africa from Eritrea, Sudan, Ethiopia and Somalia in the north-east; Kenya, Uganda, the Democratic Republic of Congo, Tanzania, Malawi and Zambia in the eastern and central regions; Angola and Namibia in the west to Zimbabwe, Mozambique and South Africa in the south (Theiler 1962; Keirans 1993). It is, however, doubtful whether rhinoceroses and *D. rhinocerinus* still occur in all these regions. Although nymphs and adults have been collected from rodent nests, implying that these animals may play a role in the tick's life cycle (Clifford & Anastos 1964), neither larvae nor nymphs have been collected from a host animal. In fact the larvae themselves were until recently unknown (Keirans 1993).

Adult *D. rhinocerinus* quest for hosts from the vegetation, but the immature stages do not appear to do so. With the exception of February 1999 and February and March 2000, when rain made sampling impossible, free-living ticks have been collected since January 1999 by monthly drag-sampling the vegetation of the unfenced Nwaswitshaka experimental burn-plots in the south-west of the Kruger National Park, Mpumalanga Province, South Africa. There are several white rhinoceroses in this region and during spring and summer adult *D. rhinocerinus* can be collected manually from tall, thick grass stems alongside roads and paths (Keirans 1993) and from the shorter grass around rhinoceros middens. Adult ticks have also been collected in the Park from two white rhinoceroses which had died from injuries sustained in fights (Knapp, Krecek, Horak & Penzhorn 1997), one of these approximately 10 km north-east of the burn-plots (Keirans 1993).

Larvae of *D. rhinocerinus* were present in each month's drag-samples during the period November 1999 to June 2000, but whereas a total of 10 086 larvae belonging to several species were collected during this time, only 21 of these were *D. rhinocerinus* (Table 1). A similar phenomenon is evident for the larvae of *Haemaphysalis leachi* and *Rhipicephalus simus*. Although adults of both these ticks were

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present on the vegetation, no larvae were collected (Table 1). It would thus appear that the larvae, and probably also the nymphs of these three species quest for hosts from the base of grass tufts or from the soil surface. Consequently their collection by drag-sampling would be less likely than that of other species that quest from higher up on the vegetation. Such low questing sites imply that the larvae of these ticks utilize small mammals as hosts, a fact that has been confirmed for both *H. leachi* and *R. simus* (Norval & Mason 1981; Norval 1984).

The Mthethomusha Game Reserve (25°29'S, 31°17'E) is administered and managed for the local community by the Mpumalanga Parks Board. It is approximately 7 200 ha in extent and located immediately south-west of the Kruger National Park in Mpumalanga Province. The two reserves are separated by a railway track that is fenced along either side. Surveys to determine the presence of tuberculosis in this reserve necessitated the killing of a number of animals, and to make the most use of the material available ectoparasites were collected from the carcasses. During March 1999, 38 rodents belong-

ing to seven species were examined in this way, and five were infested with immature *D. rhinoceros* (Table 2). The common names that we have used for the rodent hosts are based on those suggested by Corbet & Hill (1991), and the scientific nomenclature on that of Wilson & Reeder (1993). We have listed the animals in the same sequence as that given by the latter authors.

Three of the four bushveld gerbils examined were infested and harboured a total of three larvae and two nymphs. A single red veld rat harboured a larva and a Natal multimammate rat a nymph. It would thus appear as if bushveld gerbils are the preferred hosts of the immature stages of *D. rhinoceros*.

Although we were unable to examine any elephant shrews (*Elephantulus* spp.) we feel that these animals might also prove to be good hosts of the immature stages of *D. rhinoceros*. This presumption is supported by the collection in north-eastern Democratic Republic of the Congo of a single female tick from a nest inhabited by a macroscelid (Clifford & Anastos 1964), thus implying that the preceding nymph stage had successfully engorged on this ani-

TABLE 1 Ticks collected from the vegetation of the Nwaswitshaka burn-plots, Kruger National Park from November 1999 to June 2000

Tick species	No. of ticks collected				
	Larvae	Nymphs	Males	Females	Total
<i>Amblyomma hebraeum</i>	7 624	5	0	0	7 629
<i>Amblyomma marmoreum</i>	456	1	0	0	457
<i>Boophilus decoloratus</i>	1 227	0	0	0	1 227
<i>Dermacentor rhinoceros</i>	21	0	0	0	21
<i>Haemaphysalis leachi</i>	0	0	239	261	500
<i>Haemaphysalis zumpti</i>	0	0	1	0	1
<i>Rhipicephalus appendiculatus</i>	291	2	0	0	293
<i>Rhipicephalus evertsi evertsi</i>	230	0	0	0	230
<i>Rhipicephalus simus</i>	0	0	20	21	41
<i>Rhipicephalus zambeziensis</i>	237	4	0	1	242
Total	10 086	12	260	283	10 641

TABLE 2 *Dermacentor rhinoceros* collected from rodents in the Mthethomusha Game Reserve, Mpumalanga Province

Rodent species	No. examined (No. infested)	No. of ticks collected		
		Larvae	Nymphs	Total
Bushveld gerbil (<i>Tatera leucogaster</i>)	4 (3)	3	2	5
Red veld rat (<i>Aethomys chrysophilus</i>)	10 (1)	1	0	1
Namaqua rock mouse (<i>Aethomys namaquensis</i>)	6 (0)	0	0	0
Single-striped mouse (<i>Lemniscomys rosalia</i>)	1 (0)	0	0	0
Multimammate mouse (<i>Mastomys coucha</i>)	10 (0)	0	0	0
Natal multimammate rat (<i>Mastomys natalensis</i>)	6 (1)	0	1	1
Angoni vlei rat (<i>Otomys angoniensis</i>)	1 (0)	0	0	0

mal. In South Africa the rock elephant shrew (*Elephantulus myurus*) is the preferred host of the immature stages of *Ixodes rubicundus*, *Rhipicentor nuttalli* and *Rhipicephalus warburtoni* (Fourie, Horak & Van Den Heever 1992; Du Toit 1993; Walker, Keirans & Horak 2000), and we consider that there is a fair likelihood that it may also be for those of *D. rhinocerinus*.

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