SHORT NOTES

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THE OCCURRENCE OF THE ARTHROPOD ENDOPARASITE, *RAILLIETIELLA NAMIBIENSIS* (PENTASTOMIDA: CEPHALOBAENIDA), IN THE LUNGS OF AGAMID LIZARDS OF WINDHOEK, NAMIBIA

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Pentastomid arthropods are obligate endoparasites found in the respiratory systems of reptiles, birds and mammals (Meglitsch, 1972; Riley *et al*., 1985). A single intermediate host, usually an insect, is present in their life-cycle (Meglitsch, 1972). Lavoipierre & Rajamanickam (1973), for example, showed that the life-cycle can be completed experimentally with the cockroach *Periplaneta americana* as intermediate host.

During a study of the reproductive biology of the lizard species *Agama aculeata aculeata* and *Agama planiceps planiceps* in Windhoek, Namibia (Heideman, 1992), a new pentastomid species was discovered in their lungs. The species, *Raillietiella namibiensis*, was recently described by Riley & Heideman (1998). Following its discovery, the lungs of all lizards collected monthly from 1987 to 1990 for the reproductive study were also routinely examined for the pentastomid.

Agama a. aculeata is widely distributed throughout sandveld areas in semi-desert and savannah biomes of southern Africa, while *A. p. planiceps* is found only in rocky outcrops in semi-desert and arid savannah areas in Namibia (McLachlan, 1981; Branch, 1988). Both are common around Windhoek (22°34'S; 17°06'E), which lies in the seasonal tropics at an altitude of ca. 1725 m above sea-level, in a cool steppe region.

The prevalence and abundance of the pentastomid in males and females of each species were calculated using the definitions of Margolis *et al.* (1982), while the parasite's dispersion was determined according to the definition of Anderson & Gordon (1982). Prevalence refers to the number of infected hosts as a percentage of the total number of hosts examined. Abundance, on the other hand, is the total number of pentastomids found in a sample divided by the number of hosts examined. The number of parasites per host, the parasitaemia, was also calculated for each sex. The dispersion of the parasite in each sex was calculated by expressing the mean parasitaemia as a ratio to its variance. Snout-vent length (SVL) of the lizard specimens examined was compared using Student's *t*-test. Pearson's correlation analysis was used to test for a significant relationship between parasitaemia and SVL. All analyses were carried out using the computer programme STATISTICA 5.1 (StatSoft Inc., USA) with the significance level for all tests set at P=0.05. All lizard specimens were eventually deposited in the Namibia National Museum, Windhoek.

Snout-vent length of *A. a. aculeata* males was significantly greater than that of females (94.5 mm vs. 88.5 mm, t=2.192, df=255, P<0.05), while *A. p. planiceps* males and females did not differ significantly (97.6 mm vs. 94.6 mm, t=1.34, df=257, P > 0.05). No significant difference in SVL was found when comparing the males of the two species (t=0.91, df=264, P>0.05), but SVL of *A. p. planiceps* females was significantly greater than that of *A. a. aculeata* females (t=3.57, df=248, P<0.001).

The prevalence of *R. namibiensis* in *A. a. aculeata* males and females was almost identical, perhaps suggesting a similar degree of contact with the vector(s) of the parasite and a similar likelihood of infection (Table 1). In *A. p. planiceps*, on the other hand, prevalence of the parasite in females was almost twice that in males (Table 1), suggesting either greater contact between females and the vector(s) of the parasite or greater resistance to infection among males. Interspecific differences between corresponding sexes may have similar explanations, but such hypotheses remain to be tested in follow-up studies. The prevalence of *R. namibiensis* in the two lizard species studied here was lower than that reported for pentastomids in other lizard species. For example, Pence & Selcer (1988) reported a 44% prevalence of *Raillietiella frenatus* in the Mediterranean gecko, *Hemidactylus tursicus*, in Texas, while Riley *et al.* (1988) reported figures ranging from 19.8% to 32% for *Raillietiella teagueselfi*. The dispersion factor of less than 1 in all cases reflects the uneven distribution of *R.*

TABLE 1. *Raillietiella namibiensis* infection of *Agama aculeata aculeata* and *Agama planiceps planiceps* males and females in Windhoek, Namibia. Parasitaemia is given as the mean ±1 SD; N=total sample examined; n=number of infected specimens.

	A. a. aculeata		*A. p. planiceps*	
	Males	Females	Males	Females
N	138	119	128	131
Prevalence	16.7%	16.8%	12.5%	23.7%
Abundance	2.4	1.4	0.6	1.3
Parasitaemia	14.4± 14.9 (n=23)	8.2± 10.56 (n=20)	5.1± 5.10 (n=16)	5.5± 5.52 (n=31)
Dispersion	0.06	0.07	0.2	0.2

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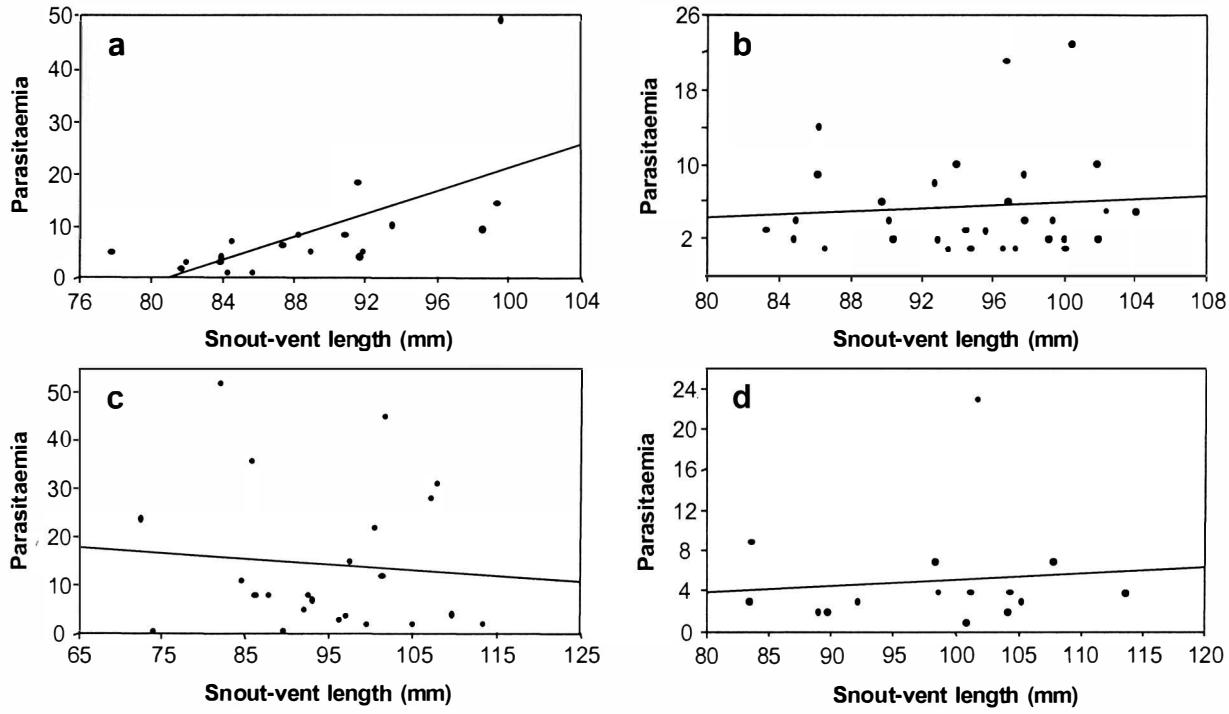

FIG 1. The number (parasitaemia) of *Raillietiella namibiensis* in the lungs of agamid lizards from Windhoek, Namibia and the snout-vent lengths of the lizards: (a) female *Agama aculeata aculeata*; (b) female *Agama planiceps planiceps*; (c) male *A. a. aculeata*; (d) male *A. p. planiceps*. Fitted linear regressions: (a) parasitaemia = 1.09xSVL-88.85 (P<0.001); (b) parasitaemia = 0.083xSVL-2.41 (N.S.); (c) parasitaemia = -0.12xSVL+26.01 (NS); (d) parasitaemia = 0.063xSVL -1.077 (NS).

namibiensis among its hosts. The abundance of the parasite in males and females of the two *Agama* species was low in all cases and showed no consistent pattern (Table 1).

Parasitaemia in relation to lizard SVL is shown in Fig. 1. A significant positive correlation was found between the number of parasites per host and SVL only in *A. a. aculeata* females (R = 0.959, $P < 0.001$). It could be hypothesized that larger (older) females have higher infection levels than smaller (younger) individuals because they have had longer exposure to potential infection. However, the absence of such a relationship in the rest of the lizards does not support this hypothesis in general. The reasons for the observed differences in prevalence, abundance and parasitaemia may lie in differences in the host species' and sexes' diets, habitats or behaviours. *Agama a. aculeata* lives in sandy areas, whereas *A. p. planiceps* lives on rocks. Further investigation of these differences is thus required.

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