

## A new species of *Hypoaspis* (Acarina: Laelapidae) associated with funnel-web spiders (Araneae: Hexathelidae)

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**Abstract** – *Hypoaspis barbarae* sp. nov. (Acarina: Laelapidae) is described from Australian Funnel-web Spiders of the genera *Hadronyche* and *Atrax*.

### INTRODUCTION

The mite family Laelapidae (Mesostigmata) includes many species that are parasitic on vertebrates, as well as others that are free-living, or have varying degrees of association with arthropods. The majority of arthropod-associated species are found in the Hypoaspidinae Vitzhum. This subfamily is usually considered to comprise the genera *Hypoaspis* Canestrini, 1884 sens. lat., and *Pseudoparasitus* Oudemans, 1902, with approximately 200 and 50 described species respectively. The description of new Australian species of *Hypoaspis* is made difficult by the lack of consensus as to what defines this genus and what separates it from other closely related genera. However, as pointed out by Evans and Till (1966) and Tenorio (1982), resolution of the existing confusion in this genus must begin with detailed morphological examination of a variety of species from all over the world, combined with studies of ecological factors such as host associations and symbiotic relationships. Little is known about extra-Palaeartic species in this group and the addition of Australian forms will certainly broaden the concept of the genus. A study is currently underway to produce a phylogenetic classification of hypoaspidines, both free-living and arthropod associated, in order to test some of the hypotheses underlying the placement of species into subgenera and genera in this group.

The association of laelapid mites with mygalomorph spiders has already been documented with the discovery of *Ljunghia* Oudemans, 1932, in Australia and Indonesia (Domrow 1975). Mites of this genus are reported to be obligate parasites of spiders. Five species of *Ljunghia* are recorded from Australasia (Welbourn and Young 1988). These include *L. bristowi* (Finnegan, 1933) on *Liphistius malayanus* Abraham (Liphistiidae) from Malaysia, *L. hoggi* Domrow, 1975, from *Aganippe subtristis* Pickard-Cambridge (Mygalomorphae) in Australia, *L. pulleini*

Womersley, 1956, on *Selenocosmia stirlingi* Hogg (Mygalomorphae) and *Aname* sp. (Mygalomorphae) from Australia, *L. rainbowi* Domrow, 1975, on an unidentified spider in Australia, *L. selenocosmiae* Oudemans, 1932, from *Selenocosmia javanensis* (Walckenaer) from Indonesia (Sumatra), and *L. minor* Fain, 1989, on *S. javanensis* from Indonesia (Java). A further association of laelapids with mygalomorph spiders has been made with the description of *Androlaelaps pilosus* Baker, 1992, from *Macrothele calpeiana* (Walckenaer).

This paper describes a laelapid mite of the genus *Hypoaspis* which is found in close association with two genera of Funnel-web Spiders (*Atrax* and *Hadronyche*). Such an association is new for this genus but adds to the collection of laelapid genera and species associated with mygalomorph spiders. The addition of this Australian species with its interesting host association expands our knowledge of this ecologically diverse genus.

Abbreviations: ANIC, Australian National Insect Collection, CSIRO, Canberra. The notation used for the dorsal shield setae is that of Lindquist and Evans (1965) and for the leg setae is that of Evans (1963).

### SYSTEMATICS

#### Genus *Hypoaspis* Canestrini

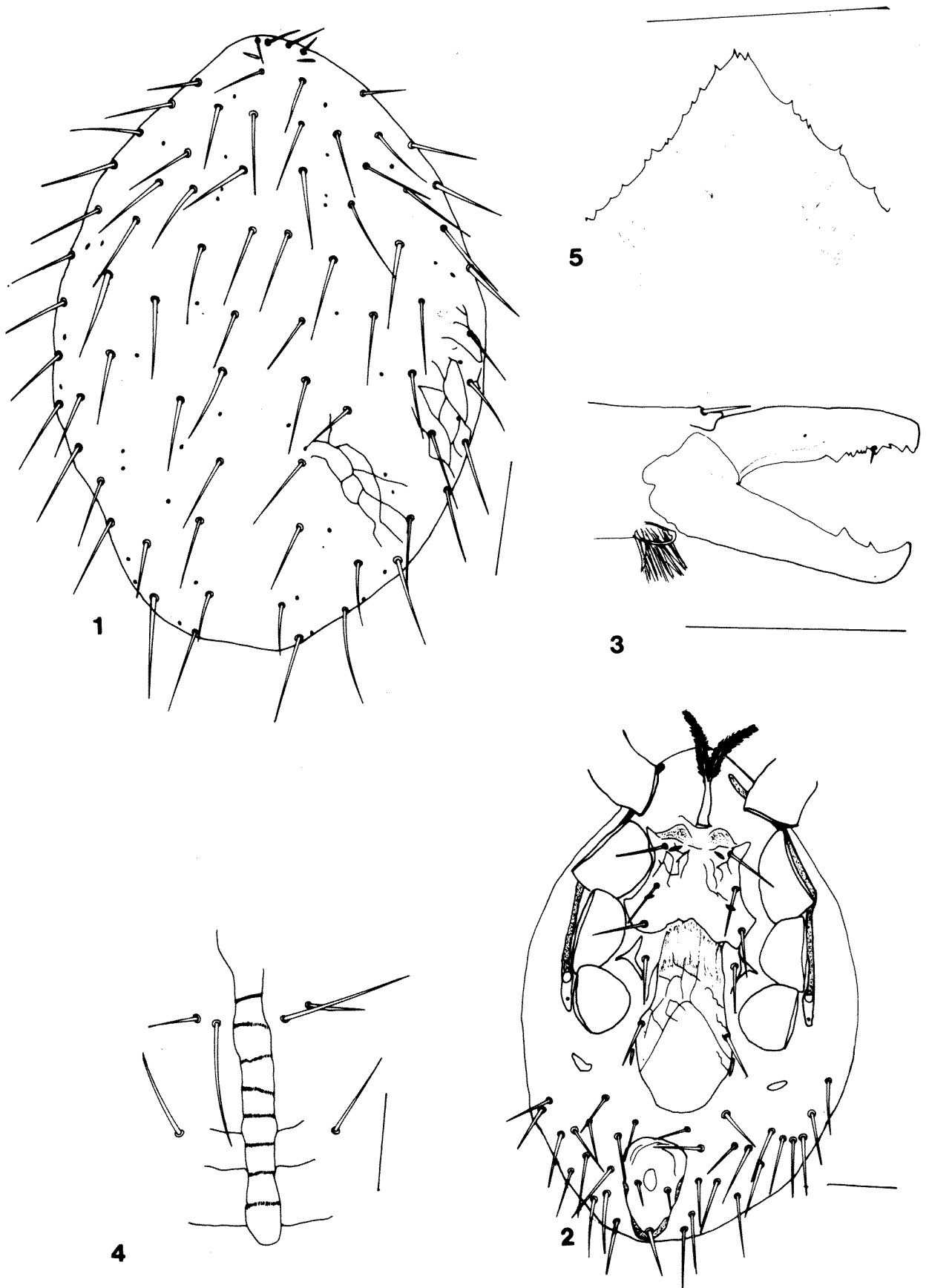
*Hypoaspis* Canestrini 1884: 1569, 1594; Van Aswegen and Loots, 1970: 170; Evans and Till, 1979: 202; Karg, 1979: 66; Karg, 1982: 233; Tenorio, 1982: 259.

#### Type species

*Gamasus krameri* Canestrini and Canestrini, 1881, by subsequent designation of Berlese, 1904.

#### Diagnosis

Dorsal shield of adult entire, oval, with 34–40



Figures 1–5 *Hypoaspis barbarae* sp. nov., ♀: 1, dorsal shield; 2, ventral idiosoma; 3, chelicera; 4, hypostome; 5, epistome. Scale bar = 100  $\mu$ m (Figs 1, 2), 50  $\mu$ m (Figs 3–5).

pairs of setae; sternal shield of female with 3 pairs of setae and 2 pairs of pores; genital shield tongue-shaped, with 1 pair of setae; anal shield with 3 setae; peritrematal shield free posteriorly, extending anteriorly beyond coxa I; tibia I with 13 setae (2 3/2 3/1 2) and tibia IV with 10 (2 1/1 3/1 2); tritosternum well developed, with 2 pilose laciniae; chelicerae chelate/dentate, movable digit bidentate in female, unidentate in male, pilus dentilis short, setiform, dorsal seta and fissure present on fixed digit; palp tarsal claw 2 or 3 tined; sternal, genital, anal, endopodal shields of male all fused to form holovenal shield; spermatodactyl grooved, free distally.

*Hypoaspis barbarae* sp. nov.

Figures 1–7

**Material Examined**

*Holotype*

♀, Australian Capital Territory, Australia, on funnel-web spider of the genus *Hadronyche*, March 1993, D. Rowell (ANIC).

*Paratypes*

**Australia: Australian Capital Territory:** 15♀, 2♂, 5 deutonymphs, same data as holotype. **New South Wales:** 8♀, Sydney, on funnel-web spider of the genus *Atrax*, 1992, other details unknown (ANIC).

**Description**

*Female*

Dorsal shield (Fig. 1): length 644–741 µm, maximum width 452–526 µm (n=7), oval, covering entire body; posterior margin rounded, with distinct polygonal ornamentation throughout. Podonotal portion of dorsal shield with 22 pairs of setae; opisthonotal portion with 15 pairs of setae; shield with 18 pairs of pores; all setae fine, smooth, pointed. Setae and pores distributed as in figure 1. Setae Px and supernumerary Jx absent.

Ventral idiosoma (Fig. 2): presternal area with weak granular ornamentation. Sternal shield with weak polygonal ornamentation throughout; anterior margin indistinct, posterior margin well defined, concave, posterior corner of sternal shield at level of anterior region of coxa III. Shield with 3 pairs of setae and 2 pairs of slit-like pores; seta st1 long, reaching past insertion of st2; st2 long, reaching past insertion of st3. Metasternal setae and pores in soft integument mediad of narrow endopodal plates. Genital shield widely separated from anal shield, longer than wide, with maximum width slightly greater than minimum width, with inverted V-shaped marking and curved transverse

lines, and 1 pair of setae; narrow platelets flanking shield. External metapodal plates oval. Anal shield elongate, triangular; post-anal seta smooth and pointed, longer than para-anal setae. Opisthogastric integument behind coxae IV with ca 16 pairs of smooth pointed setae. Peritremes extending anteriorly beyond coxa I, peritrematal shield distally free, extending posteriorly beyond the stigma, with post-stigmatal pore.

Gnathosoma: fixed digit of chelicera approximately same length as movable digit, with 9–10 pointed teeth and terminal hook, pilus dentilis long, setiform, dorsal seta fine and pointed. Movable digit with 2 teeth and terminal hook (Fig. 3). Hypostome with 6 or 7 heavily denticulate ridges, more than 10 teeth per ridge (Fig. 4), hypostomal setae 3 longer than hyp 2. Margin of epistome triangular, denticulate throughout (Fig. 5). Palp with normal 2–5–6–14 chaetotaxy, palp trochanter with anterior ventral seta similar in length to posterior ventral seta, palp genu with seta all spiniform, al2 longer than al1, palp tarsal claw 2-tined. Corniculi 20 – 30 µm long. Internal malae slender, fringed, triangular.

Legs: legs I and IV longer than legs II and III. Chaetotaxy: Leg I: Coxa 0 0/1 0/1 0, trochanter 1 0/2 1/1 1; femur 2 3/1 2/3 2; genu 2 3/2 3/1 2; tibia 2 3/2 3/1 2, Leg II: Coxa 0 0/1 0/1 0; trochanter 1 0/1 0/2 1; femur 2 3/1 2/2 1; genu 2 3/1 2/1 2; tibia 2 2/1 2/1 2; tarsus 3 3/2 3/2 3+mv, md. Leg III: Coxa 0 0/1 0/1 0; trochanter 1 0/1 0/2 1; femur 1 2/1 1/0 1; genu 2 2/1 2/1 1; tibia 2 2/1 1/1 1; tarsus 3 3/2 3/2 3 + mv, md. Leg IV: Coxa 0 0/1 0/0 0; trochanter 1 0/2 0/1 1; femur 1 2/1 1/0 1; genu 2 2/1 3/0 1; tibia 1 1/1 3/1 2; tarsus 3 3/2 3/2 3 + mv, md. All leg setae fine, smooth, pointed. Pre-tarsi I–IV each with pair of sclerotised claws, broad membranous pulvillus, and pair of fine setiform opercula.

*Male*

Dorsal shield: structure and chaetotaxy as in female.

Ventral idiosoma (Fig. 6): holovenal shield complete, not incorporating oval metapodal shields, with faint polygonal ornamentation throughout, not fused to peritrematal shield; first pair of sternal setae on holovenal shield, shield with 10–11 pairs of setae, variation in number of setae due to irregular margins in ventri-anal region, post-anal seta and 6 pairs of pores.

Gnathosoma: fixed digit of chelicera edentate, with 1 low irregular ridge, pilus dentilis short, robust. Movable digit monodentate; spermatodactyl anteriorly directed, fused to movable digit for most of its length slightly, longer than movable digit (Fig. 7).

Legs: unarmed, chaetotaxy as in female.

### Etymology

This species is named in honour of Dr Barbara York Main, without whom the Australian mygalomorphs would be poorly known and much maligned.

### Relationships

In the classification of Karg (1982), *H. barbarae* would belong to the *aculeifer* species group of *Hypoaspis* (*Geolaelaps*) (epistome denticulate, dorsal shield setae setiform and uniform in length, genital shield not enlarged, peritremes normal, opisthonotal area of dorsal shield not narrow). The absence of Px setae laterad to J3 and J4 distinguishes the new species from most of this

group. *H. barbarae* is most similar to *H. blattae* Strong and Halliday, 1994, *H. ruggi* Strong and Halliday, 1994, and *H. rosei* Strong and Halliday, 1994. These mites are found in close association with Australian burrowing cockroaches of the genera *Geoscapheus* Tepper, *Macropanesthia* Saussure and *Neogeoscapheus* Roth. *H. barbarae* is easily distinguished from *H. blattae* and *H. rosei* because it lacks the Px setae on the dorsal shield, thus having only 15 pairs of opisthonotal pairs of dorsal setae compared with their 17 pairs. *H. ruggi* is a much smaller species with a total of only 34 pairs of long dorsal setae. *H. barbarae* differs from the similar *H. vanpletzeni* Van Aswegen and Loots, 1970, by being much larger (644–741µm vs 380µm), having the metasternal setae inserted in unsclerotised integument and not on the endopodal shields (Van Aswegen and Loots 1970) and by lacking spine-like setae on femur II and trochanter IV. *H. barbarae* is also similar to *H. atomaria* Berlese, 1916 (400µm), but has 37 pairs of dorsal setae rather than 38 pairs.

### Discussion

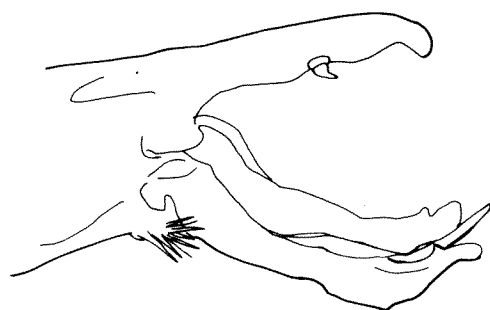
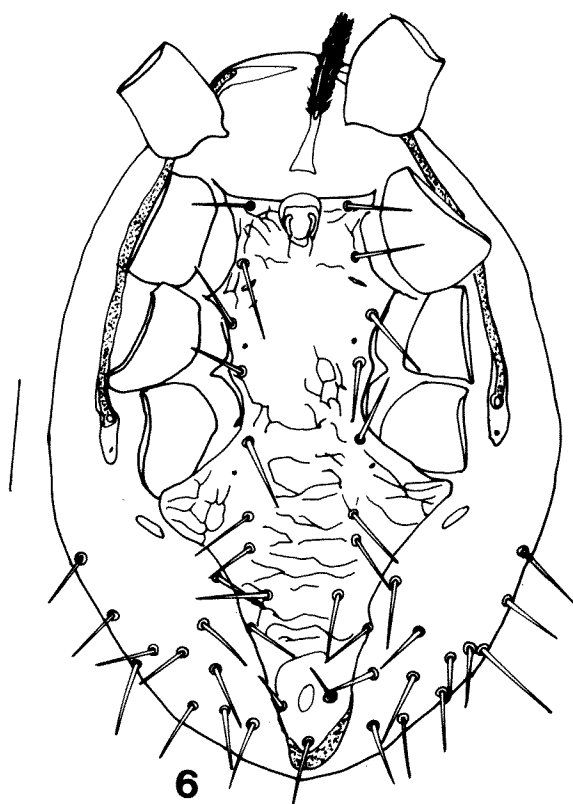
As noted above, *Hypoaspis* includes many arthropod and burrow associates and I have found *Hypoaspis barbarae* in association with mygalomorph spiders. These mites do not appear to be obligate parasites of spiders as they can live and reproduce away from their hosts. In laboratory cultures they fed on the acarid mite *Tyrophagus putrescentiae* (Schrank). They move around on their hosts and are not attached to any particular part of their host's body, unlike *Ljunghia*, which has been reported as fixed to the legs of preserved museum specimens of their host (Fain 1989). Furthermore, *H. barbarae* is morphologically quite similar to *Hypoaspis* species associated with burrowing beetles and cockroaches, and many of the similarities may be adaptations to living on burrowing animals, or may reflect a close phylogenetic relationship.

### ACKNOWLEDGEMENTS

I would like to thank Drs D. Rowell and D. Walter and Mr P. Grostal for bringing these mites to my attention. The manuscript has also benefited from the comments of Drs R.B. Halliday, P.J. Gullan and A.D. Austin.

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Figures 6–7 *Hypoaspis barbarae* sp. nov., ♂: 6, ventral idiosoma; 7, chelicera. Scale bar = 100 µm (Fig. 6), 50 µm (Fig. 7).

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