

SOME LAELAPINE PARASITES OF AUSTRALASIAN MAMMALS (ACARI: DERMANYSSIDAE)

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ABSTRACT

Twenty-one species in six genera of laelapine mites, mostly from the Kimberley, Western Australia, are listed: *Mesolaelaps* (two species), *Haemolaelaps* (five), *Androlaelaps* (one), *Laelaps* (10, including four new ones from murine rodents: *L. elegans* from *Pseudomys* spp., *L. synnomus* from *Zyzyomys argurus*, *L. parameces* from *Conilurus penicillatus* and *L. angiodes* from *Z. woodwardi*), *Neolaelaps* (one) and *Trichosuroelaelaps* (two).

INTRODUCTION

This contribution to our knowledge of Western Australian ectoparasites collected by Dr F.S. Lukoschus, Catholic University, Nijmegen, treats the various laelapine mites from mammals (for completeness' sake, I have incorporated data from a few other slides, mostly with Western Australian Museum labels). Current papers on the group in Australia are more concerned with the fauna of the eastern states (Domrow 1973, 1977, 1979).

The term "holotrichous" refers to the setal condition in typical free-living dermanyssids (Evans & Till 1965, Evans 1969). Hosts are given after Ride (1970). Numbers in the 2-3000s are Dr Lukoschus' field numbers for the hosts. Depositories for mites are abbreviated: WAM Western Australian Museum, Perth; FMNH Field Museum of Natural History, Chicago; QIMR Queensland Institute of Medical Research, Brisbane; CU Catholic University, Nijmegen; ANIC Australian National Insect Collection, CSIRO, Canberra; MNK Museum für Naturkunde an der Humboldt-Universität, Berlin; RMNH Rijksmuseum van Natuurlijke Historie, Leiden; ZMH Zoologisches Institut und Zoologisches Museum der Universität, Hamburg.

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DESCRIPTION OF MATERIAL

Mesolaelaps australiensis (Hirst, 1926)

This species is widespread throughout Australia and adjacent territories (Domrow 1979). *Notomys alexis* and *Pseudomys nanus* are added to its equally wide range of hosts.

Hosts and Localities

On brindled bandicoot, *Isoodon macrourus* (Gould) (Marsupialia: Peramelidae) (3150), Port Warrender, W.A., 31.X.1976 (7 ♀♀). In WAM, FMNH, QIMR, CU.

On Tunney's rat, *Rattus tunneyi* (Thomas) (Rodentia: Muridae) (2679), Mount Hart, W.A., 10.IX.1976 (8 ♀♀). On *R. tunneyi* (3140), Port Warrender, 30.X.1976 (3 ♀♀, 1 ♂). In WAM, FMNH, QIMR, CU.

On spinifex hopping mouse, *Notomys alexis* Thomas (Muridae) (M12964), Wanjarri Nature Reserve, W.A., 8.I.1975, P. Lambert (1 ♀). In WAM.

On western chestnut native mouse, *Pseudomys nanus* (Gould) (Muridae) (3030), Mitchell Plateau, W.A., 20.X.1976 (1 ♀). In WAM.

On scale-tailed rat, *Melomys* sp. (Muridae) (3140, 3141), Port Warrender, 30.X.1976 (3 ♀♀). In WAM, FMNH, QIMR.

Mesolaelaps antipodianus (Hirst, 1926)

This species is common on bandicoots in east and south-east Australia, including Tasmania (Domrow 1963, 1977), but was previously unknown from *Isoodon auratus* and Western Australia. The specimen from *Antechinus macdonnellensis* is best regarded as a straggler. The dorsal shield of this species has not previously been described.

Female (**Fig. 1**): Dorsal shield 900-915 μm long, 670-690 μm wide; as characteristic (broadly drop-shaped, with truncate termen) as that of *M. sminthopsis* (Womersley) (see Domrow 1977); surface granulate, with very weak reticulate striae marginally from vertex to posterolateral angles; holotrichous (with 22 pairs of setae on podonotal portion, 17 on opisthonotal; J_4 widely set and J_5 displaced to termen, thereby leaving large quadrate expanse between their bases bare), lacking only one pair of pores (that behind j_4) of 22 pairs figured by Evans & Till (1965) for *Laelaps* Koch.

Hosts and Localities

On golden bandicoot, *Isoodon auratus* (Ramsay) (Marsupialia: Peramelidae) (M7181), Barrow Island, W.A., 29.V.1964, W.H. Butler (9 ♀♀). In WAM, FMNH, QIMR, CU.

On red-eared marsupial mouse, *Antechinus macdonnellensis* (Spencer) (Marsupialia: Dasyuridae) (M8938), Warburton Range, W.A., 6.VIII.1967, A.M. Douglas (1 ♀). In WAM.



Fig. 1: *Mesolaelaps antipodanus* (Hirst). Dorsal shield ♀. (All scales = 100 μ m.)

***Haemolaelaps casalis* (Berlese, 1887a)**

This widespread associate of vertebrates and their nests is known from the south-west Pacific and south-east Australia, but not from Western Australia (Womersley 1956, Wilson 1967, Domrow 1973). The question of its synonymy with *H. fenilis* (Mégnin) remains unresolved (Strandtmann 1963, Evans & Till 1966).

Host and Locality

On common rock rat, *Zyomys argurus* (Thomas) (Rodentia: Muridae) (3117), Port Warrender, W.A., 29.X.1976 (1 ♀). In WAM.

***Haemolaelaps marsupialis* (Berlese, 1910)**

This species is common on bandicoots in eastern Australia, including Tasmania (Keegan 1956, Domrow 1963), but was previously unknown from *Isoodon auratus* and Western Australia.

Host and Locality

On golden bandicoot, *Isoodon auratus* (Ramsay) (Marsupialia: Peramelidae) (M7181), Barrow Island, W.A., 29.V.1964, H.W. Butler (2 ♀♀). In WAM.

***Haemolaelaps domrowi* Womersley, 1958**

This species is common on bandicoots in New Guinea and eastern Australia, including Tasmania (Domrow 1961, 1979), but was not previously known from Western Australia. The deutonymph was previously unknown. The specimens from *Rattus tunneyi* are best regarded as stragglers.

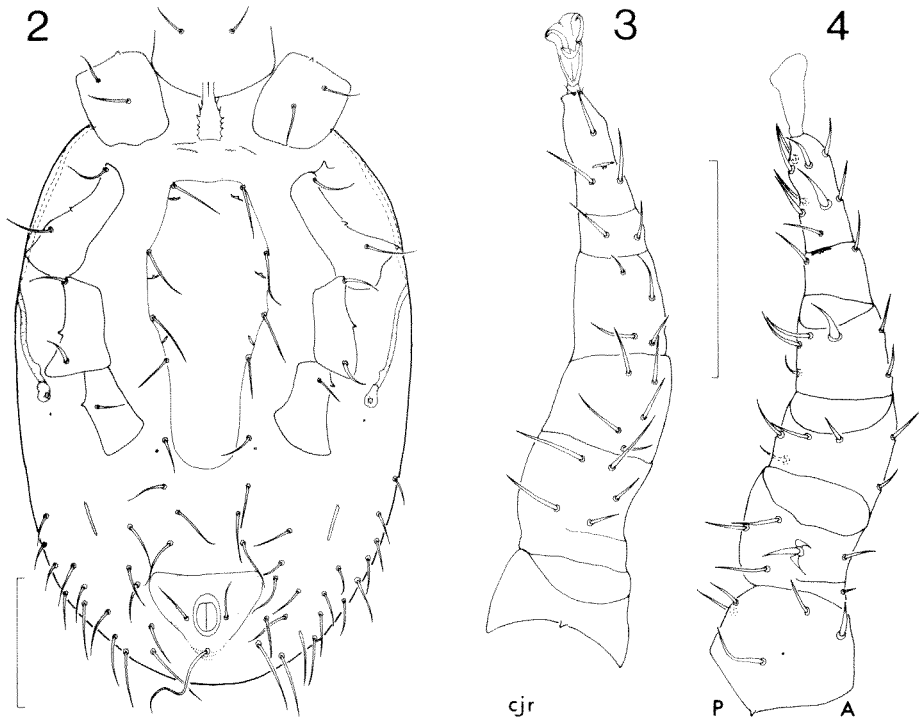
Femur II, even among the same series, may show seta *av* associated with a low, bilobed prominence. Correlated with this, seta *av* on genu-tibia II and *av*₂ on tarsus II may be flared basally.

Deutonymph (Figs 2-4): Freshly moulted and pale, but capitulum essentially as in ♀.

Dorsal shield 445-470 µm long, lateral margins not especially clear, but certainly incised between podonotal and opisthonotal portions. Dorsum otherwise as in ♀.

Some presternal striae spinulose. Sternogenital shield 215-225 µm long, 90-95 µm wide at level of second pair of sternal setae (*st*₂); posterior margin broadly ligulate; surface with a few reticulate striae anterolaterally; with usual four pairs of setae and three pairs of pores; genital setae (*g*) and pores free in adjacent cuticle. Anal shield 60-65 µm long, *ca* 80 µm wide. Ventral cuticle with about 20 pairs of setae of increasing length posteriorly. Venter otherwise as in ♀, except that poststigmatic pores are free in cuticle.

Leg setation holotrichous, predicting that of ♀ noted above [but note that Till (1963) found genu IV in Ethiopian species of *Androlaelaps* Berlese—to bear one additional seta (*pl*₂), *i.e.* 2-5/1-2].



Figs 2-4: *Haemolaelaps domrowi* Womersley. 2, Idiosoma dn (ventral). 3-4, Leg II dn (dorsal, and ventral and lateral).

Hosts and Locality

On brindled bandicoot, *Isoodon macrourus* (Gould) (Marsupialia: Peramelidae) (3150), Port Warrender, W.A., 31.X.1976 (12 ♀♀, 4 ♂♂, 1 dn, 1 pn). In WAM, FMNH, QIMR, CU.

On Tunney's rat, *Rattus tunneyi* (Thomas) (Rodentia: Muridae) (3112, 3140), Port Warrender, 29, 30.X.1976 (5 ♀♀, 1 ♂, 1 dn, 1 pn). In WAM, FMNH, QIMR, CU.

Haemolaelaps hattenae Domrow, 1963

The only known records of this species are from rat kangaroos: *Aepyprymnus rufescens* in Queensland and *Bettongia gaimardi* (Desmarest) in Tasmania (Domrow 1963, 1972a).

Hosts and Localities

On rufous rat kangaroo, *Aepyprymnus rufescens* (Gray) (Marsupialia: Macropodidae), Tooloom, N.S.W., 14.XI.1961, J.H. Calaby (2 ♀♀). In QIMR.

On brush-tailed rat kangaroo, *Bettongia penicillata* (Gray) (Macropodidae), Manjimup, W.A., 19.XII.1977, G. de Chaneet (1 ♀). In QIMR.

***Haemolaelaps quartus* Domrow, 1961**

The only known records of this species are from the rat kangaroo *Aepyprymnus rufescens* in S.E. Queensland and adjacent New South Wales (Domrow 1963, 1972a).

Hosts and Localities

On rufous rat kangaroo, *Aepyprymnus rufescens* (Gray) (Marsupialia: Macropodidae), Byfield, Q., 28.I.1964, R.K. Norton (1 ♀). On *A. rufescens*, Inkerman, 11 km S of Home Hill, Q., 16.VIII.1972, P. Ferris (4 ♀♀). In QIMR.

On brush-tailed rat kangaroo, *Bettongia penicillata* (Gray) (Macropodidae), Manjimup, W.A., 19.XII.1977, G. de Chaneet (1 ♀). In QIMR.

***Androlaelaps hermaphroditus* (Berlese, 1887b)**

This associate of vertebrates and their nests is widespread in the south-west Pacific and east Australia, but was previously unknown from Western Australia (Womersley 1956, Wilson 1967, Domrow 1977).

Host and Locality

On common rock rat, *Zygomys argurus* (Thomas) (Rodentia: Muridae) (3059), Mitchell Plateau, W.A., 22.X.1976 (1 dn). In WAM.

***Laelaps nuttalli* Hirst 1915**

This cosmopolitan species is widespread on many species of *Rattus*—including *R. tunneyi*—and *Melomys* in Australasia, but was previously unknown from Western Australia (Allred 1969, Marshall 1976, Ramsay 1977, Ramsay & Paterson 1977, Domrow 1979).

Hosts and Localities

On Tunney's rat, *Rattus tunneyi* (Thomas) (Rodentia: Muridae) (2679), Mount Hart, W.A., 10.IX.1976 (4 ♀♀). On *R. tunneyi* (3099, 3101, 3112), Mitchell Plateau, W.A., 28, 29.X.1976 (14 ♀♀, 20 ♂♂, 22 dn, 3 pn). On *R. tunneyi* (3116, 3140), Port Warrender, W.A., 29, 30.X.1976 (1 ♀, 2 ♂♂). In WAM, FMNH, QIMR, CU.

On scale-tailed rat, *Melomys* sp. (Muridae) (3140, 3141), Port Warrender, 30.X.1976 (33 ♀♀, 14 ♂♂, 4 pn). In WAM, FMNH, QIMR, CU.

Laelaps assimilis Womersley, 1956

This species is common on *Rattus fuscipes* and *R. lutreolus* (Gray) throughout their ranges (Domrow 1977). The following specimens are included for historical reasons.

Host and Locality

On southern bush rat, *Rattus fuscipes* (Waterhouse) (Rodentia: Muridae) (20359), Australia, 1869, S. de Hambourg (1 ♀, 1 dn). In RMNH.

Laelaps elegans sp. nov.

L. nuttalli Domrow, 1979 *partim* (1 ♀ from *Pseudomys gracilicaudatus*).

The original female I studied keyed out to *L. nuttalli* in Domrow (1965) and Allred (1969), despite small differences (e.g. seta *av* on coxa I basally expanded; outline of genitoventral shield extended posteriorly well beyond concave stria between third pair of usurped ventral setae, truncate rather than softly curved; anterior margin of anal shield concave). However, the long series now listed quickly showed that these differences in the female, subtle though they be, were not only constant, but also supported by a striking difference in the male: in the new species, the holovenral shield is so narrow behind coxae IV as to leave the metapodal shields well clear in the cuticle (fused into holovenral shield in *L. nuttalli*).

The normal hosts of the new species seem to be species of *Pseudomys* (the four specimens from *Rattus tunneyi* and *Zyzyomys argurus* are best regarded as stragglers). *L. nuttalli* is common in Australia on certain species of *Rattus*.

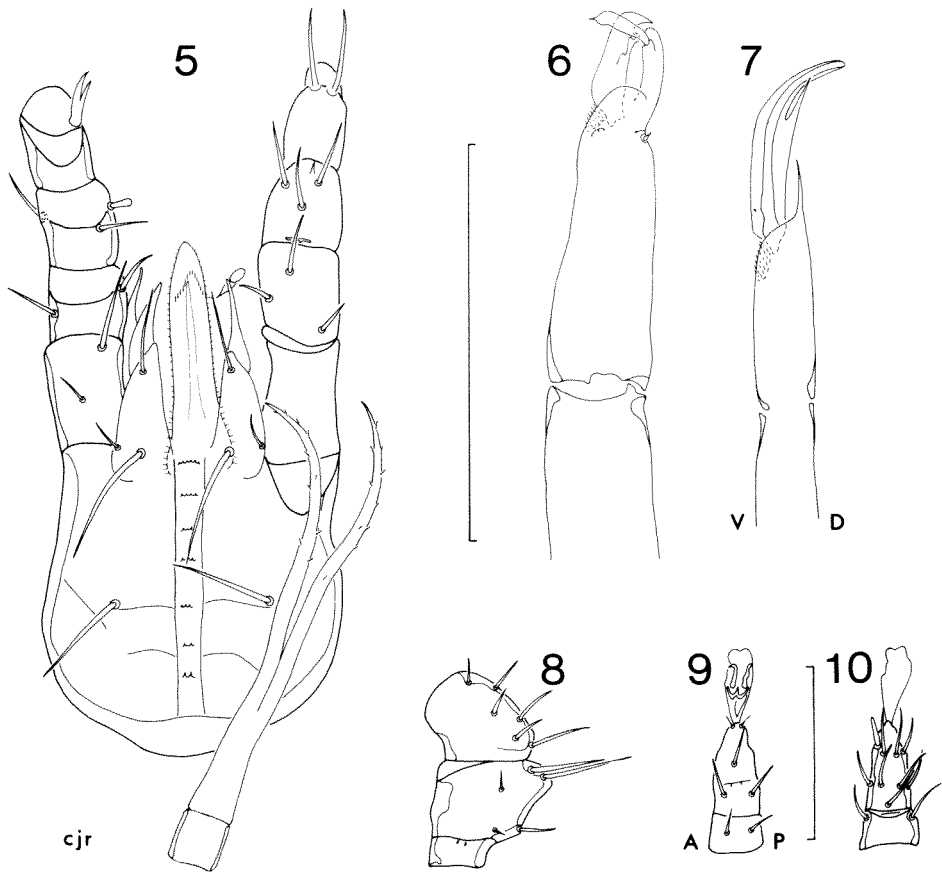
The new specific name is the Latin adjective *elegans* (fine, neat), and refers to seta *av* on coxa I.

A full description of the first new species will allow a briefer, comparative treatment of the other three.

Female (Figs 5-6, 8-14): Epistome a broad, hyaline, inverted U reaching to level of apices of palpal femora. Basis capituli longer than wide; setae *c* reaching beyond opposite edge of deutosternum (which bears seven short rows of denticles). Hypostome with setae $h_3 > h_1 > h_2$. Internal malae a ciliated median triangle flanked on either side by lobate process, cf. *Haemolaelaps ulysses* Domrow, 1961. Cornicles of normal length, but slender and weakly sclerotised. Salivary stylets present. Labrum hastate, spiculate marginally, grooved medially, Palpi holotrichous (trochanter-tibia 2.5.6.14, including two dorsodistal rods on tibia; tarsus with usual few slender ventral setae and cluster of terminal rods); claw bifid. Chelicerae 135-145 µm long overall, with digits occupying 20% of total length; shaft bearing usual setule, two pores and

small corona; fixed digit edentate, with pilus dentilis strongly inflated, apically spined, projecting outwardly between two external teeth on movable digit; latter also with one subterminal tooth on margin in addition to sharp tip.

Dorsal shield 450-505 μm long, 280-305 μm wide; ovate, evenly rounded in posterior third, with very narrow strip on margin pale; surface with reticulate striae; holotrichous (with 22 pairs of setae on podonotal portion, 17 on opisthonotal), with usual 22 pairs of pores [lyriform outside setae z_1 and Z_5 , others ranging from punctate to small crateriform; none with surrounding "window," *i.e.* obvious area of thinned cuticle, as in *L. hapaloti* Hirst, see Domrow (1973)]. Dorsal cuticle with about 13 pairs of setae of increasing length posteriorly.



Figs 5-10: *Laelaps elegans* sp. nov. 5, Capitulum and tritosternum ♀ (ventral, with true left palp dorsal). 6-7, Chelicerae ♀ and ♂ (dorsoexternal). 8, Femur-genu I ♀ (dorsal). 9-10, Tarsus II ♀ (dorsal, and ventral and lateral).

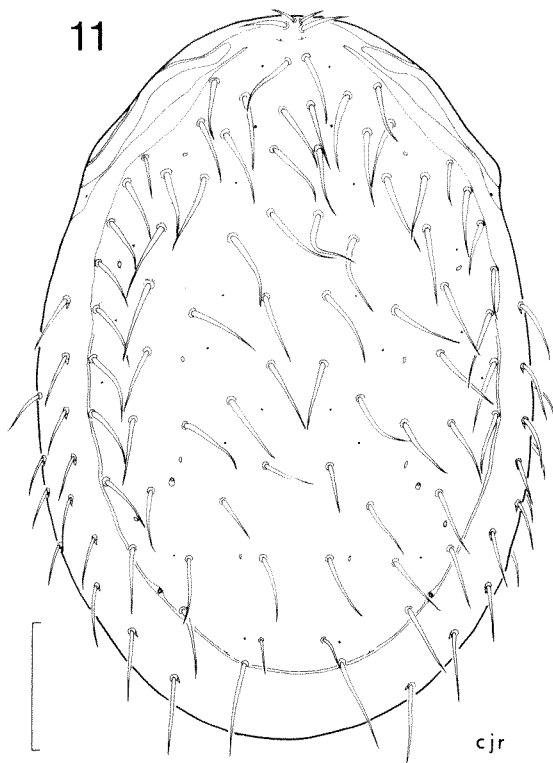
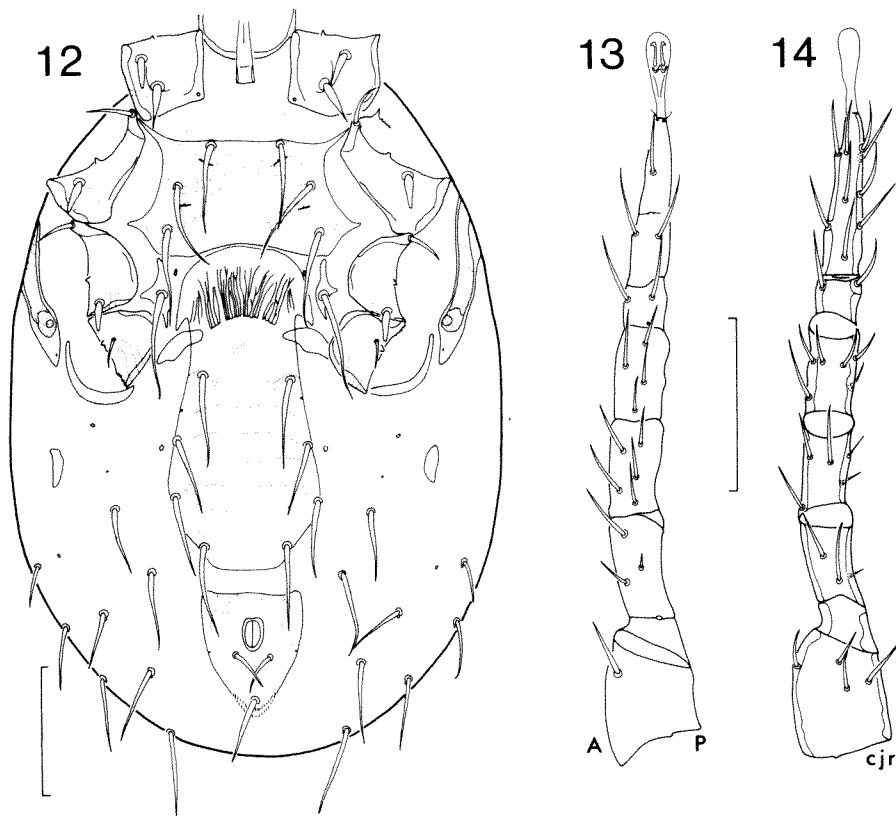


Fig. 11: *Laelaps elegans* sp. nov. Idiosoma ♀ (dorsal, seta S_3 absent on right-hand side).

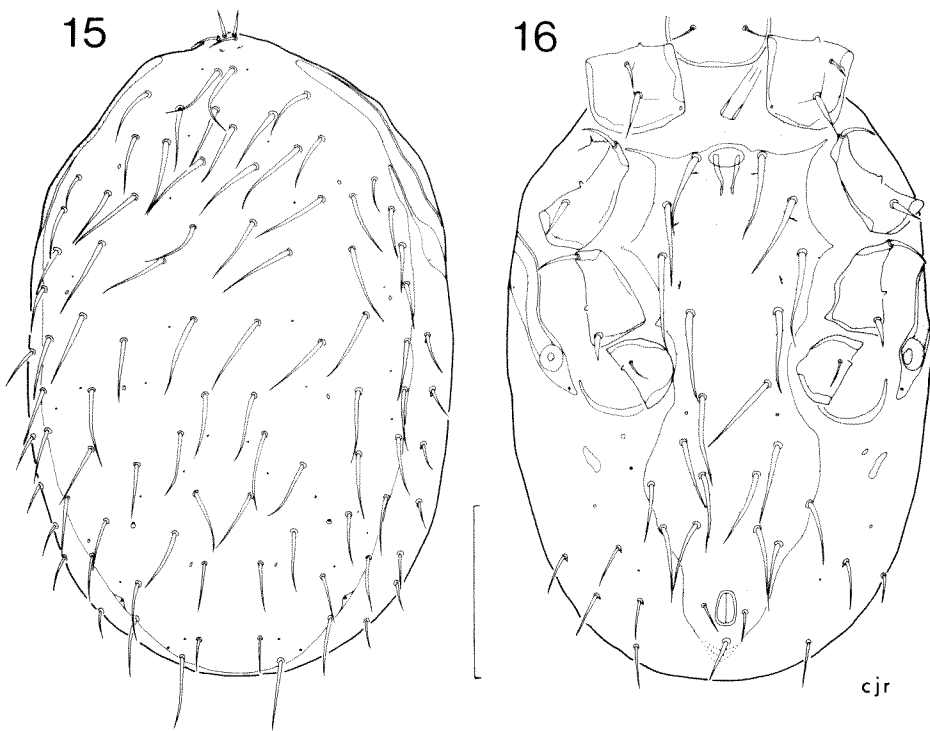
Tritosternum with base unarmed; laciniae slender, lightly ciliated. Presternal area with transverse striae. Sternal shield shorter in midline (70-75 μm) than wide at level of second pair of sternal setae (st_2) (120-130 μm); anterior margin straight, posterior margin slightly concave; surface with reticulate striae; with usual three pairs of sternal setae ($st_{1,3}$) and two pairs of sternal pores. Metasternal setae (mst) set on metasternal shields whose posterior points project freely from cuticle, metasternal pores free in cuticle. Genitoventral shield elongate, only slightly expanded behind coxae IV, much longer behind genital setae (g) (140-150 μm) than maximum width (110-120 μm); posterior margin distinctly drawn out behind third pair of usurped ventral setae (v_3), truncate; surface with transverse striae; with usual four pairs of setae ($g, v_{1,3}$) and pair of genital pores; operculum rayed, supported by genital apodemes between coxae IV, reaching forward in even curve to posterior margin of sternal shield. Anal shield longer in midline (85-95 μm , including cribrum) than maximum width (70-75 μm); anterior margin slightly concave; surface with reticulate striae marginally; with usual

pair of adanal setae (*aa*), postanal seta (*pa*) and pair of anal pores (*aa* barely reaching insertions of stronger *pa*). Metapodal shields present. Ventral cuticle with some paired plaquettes and pores, and about eight pairs of setae of increasing length posteriorly. Peritremes reaching forward almost to level of anterior margins of coxae I; peritrematic shields fused vertically to dorsal shield, but free posteriorly of crescentic expodal shields IV.

Leg setation holotrichous, with one exception: genu IV with one additional seta (*pl*₂), i.e. 2-5/1-2 as often in *Laelaps*, e.g. *L. echidninus* Berlese. Coxae with a few short striae; I with *av* somewhat swollen basally, attenuate distally; I-III with *pv* strengthened and blunt, i.e. spur-like (II also with small spinose process on anterodorsal margin). Femora I-II with both *ad*₁ and *pd*₁ elongate. Genua I with *pd*₃ and II with *pd*₂ elongate. Tarsi II-III with *al*₁ spur-like, but not to extent of *pv* on coxae I-III. Tarsus I with dorsodistal sensory islet.



Figs 12-14: *Laelaps elegans* sp. nov. 12, Idiosoma ♀ (ventral). 13-14, Leg IV ♀ (dorsal, and ventral and lateral).



Figs 15-16: *Laelaps elegans* sp. nov. Idiosoma ♂ (dorsal and ventral).

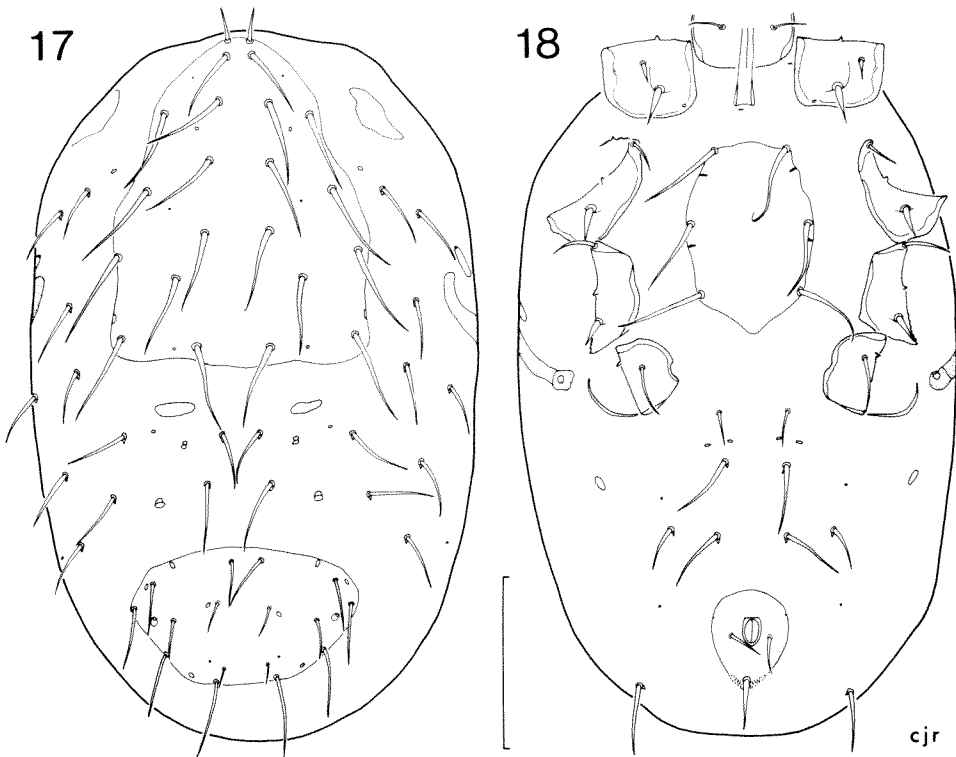
Male (**Figs 7, 15-16**): Capitulum as in ♀, except for secondary sexual characters of chelicerae. Fixed digit obsolescent. Spermatodactyl occupying 45% of total length (105-115 μm overall), almost obliterating movable digit.

Dorsal shield with reticulate striae as in ♀, 345-400 μm long, 210-235 μm wide. Dorsal cuticle with about six pairs of subequal setae.

Venter as in ♀, except as follows. Holoventral shield 290-330 μm long, with ventral portion only slightly expanded behind coxae IV (95-115 μm wide), bearing usual five pairs (at times 5/4) of ventral setae, but leaving metapodal shields quite free in cuticle. Ventral cuticle with about four pairs of subequal setae. Peritrematic shields fused humerally to dorsal shield.

Legs as in ♀, except as follows. Coxae I with *pv* almost setiform, sharp-tipped, II-III with *pv* sharp-tipped. Genu II with *pd*₂ hardly elongate. Tarsi II-III with *al*₁ sharp-tipped.

Protonymph (**Figs 17-18**): Capitulum as in ♀, except as follows. Palpi holotrichous (trochanter-tibia 1.4.5.12, including two dorsodistal rods). Chelicerae 85-105 μm long.



Figs 17-18: *Laelaps elegans* sp. nov. Idiosoma pn (dorsal and ventral).

Podonotal shield 170-200 μm long, 135-155 μm wide (larger specimens presumably prefemale); sinuous laterally, shallowly trilobate posteriorly; surface with reticulate striae; holotrichous (with 11 pairs of setae), with five pairs of obvious pores. Opisthotal shield 70-80 μm long, 110-130 μm wide; slightly rounded anteriorly, three-sided posteriorly; surface with reticulate striae; holotrichous (with eight pairs of setae), with six pairs of distinct pores. Three pairs of mesonotal shieldlets present. Dorsal cuticle holotrichous (with five pairs of podonotal setae and six opisthotal), with some paired plaquettes and pores.

Venter as in ♀, except as follows. Sternal shield 95-110 μm long, 65-80 μm wide; slightly convex laterally, angulate posteriorly; surface with reticulate striae; with usual three pairs of setae and two pairs of pores. Anal shield 50-60 μm long, 35-45 μm wide; with minimal striae. Ventral cuticle with five pairs of setae, anteriormost pair shortest. Peritremes abbreviated, falling short of anterior margins of coxae III, with peritrematic shields in two fragments on dorsum (these representing two dorsal expansions of entire shields in ♀ in Fig. 11).

Leg setation holotrichous, with one exception: genu IV with one additional seta (pl_1), i.e. 1-4/0-1. Setae as in ♂ (including pv on coxae I-III, ad_1 and pd_1 on femora I-II, pd_2 on genua I-II, and al_1 on tarsi II-III).

Hosts and Localities

On western chestnut native mouse, *Pseudomys nanus* (Gould) (Rodentia: Muridae) (3004, 3007, 3014, 3029, 3030, 3039, 3040, 3045, 3048, 3050, 3051, 3054, 3062, 3065, 3091, 3092, 3093, -), Mitchell Plateau, W.A., -, 18-25.X.1976 (holotype ♀, allotype ♂, 83 paratype ♀♀, 73 paratype ♂♂, 131 morphotype pn). In WAM (including holotype 79/1434, and allotype 79/1435), FMNH, QIMR, CU.

On Forrest's native mouse, *Pseudomys forresti* (Thomas) (3063), Mitchell Plateau, 22.X.1976 (3 ♀♀, 1 pn, not types). In WAM, FMNH, QIMR, CU.

On eastern chestnut native mouse, *Pseudomys gracilicaudatus* (Gould), 98 km NW of Bundaberg (24°31'S, 151°28'E), Q., 10.I.1975, A.C. & J.F. Robinson (1 ♀, not a type). In ANIC.

On Tunney's rat, *Rattus tunneyi* (Thomas) (Muridae) (3140), Port Warrender, W.A., 30.X.1976 (1 ♂, not a type). In WAM.

On common rock rat, *Zyzomys argurus* (Thomas) (Muridae) (2809), Brooking Springs, W.A., 29.IX.1976 (1 ♂, not a type). On *Z. argurus* (3037), Mitchell Plateau, 20.X.1976 (2 ♀♀, not types). In WAM, FMNH, QIMR.

Laelaps synnomus sp. nov.

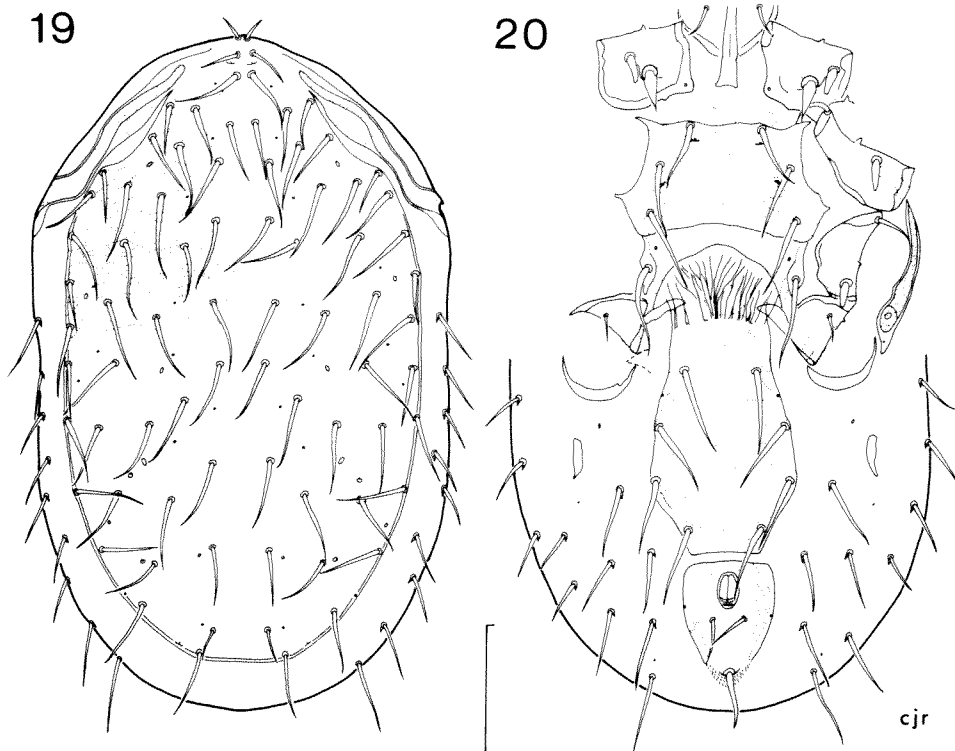
Accepting that both setae on coxa I are spur-like, the new species keys out near *L. wasselli* Domrow both in Domrow (1965) and Allred (1969). Apart from its much smaller size (dorsal shield 460-505 µm long in *L. synnomus*, 735-755 µm in *L. wasselli*), the new species is further separable from *L. wasselli* by the extended posterior margin and narrower proportions of the genitoventral shield (ratio L/B 1.15 v. 1.00).

The normal host seems to be *Zyzomys argurus*. The two specimens from *Rattus tunneyi* are best regarded as stragglers. *L. wasselli* is restricted to *Hydromys chrysogaster* Geoffroy (Muridae).

The new specific name is the Greek adjective συννομος (feeding together, gregarious), and refers to the presence on *Zyzomys* of other species of *Laelaps*.

Female (Figs 19-20): Chelicerae 130-135 µm long, with digits occupying 20% of length; movable digit with only two external teeth in addition to sharp tip. Capitulum otherwise as in *L. elegans*.

Dorsal shield 460-505 µm long, 250-305 µm wide (smallest specimens pale and freshly moulted); not so roundly ovate as in *L. elegans*. Dorsum otherwise as in *L. elegans*, except that cuticle bears only about nine pairs of setae.



Figs 19-20: *Laelaps synnomus* sp. nov. Idiosoma ♀ (dorsal and ventral).

Sternal shield 75-80 μm long, 125-135 μm wide. Genital shield 125-140 μm long, 105-125 μm wide. Anal shield 85-95 μm long, 65-85 μm wide; anterior margin ever so slightly convex medially. Venter otherwise as in *L. elegans*, except that cuticle bears about 10 pairs of setae.

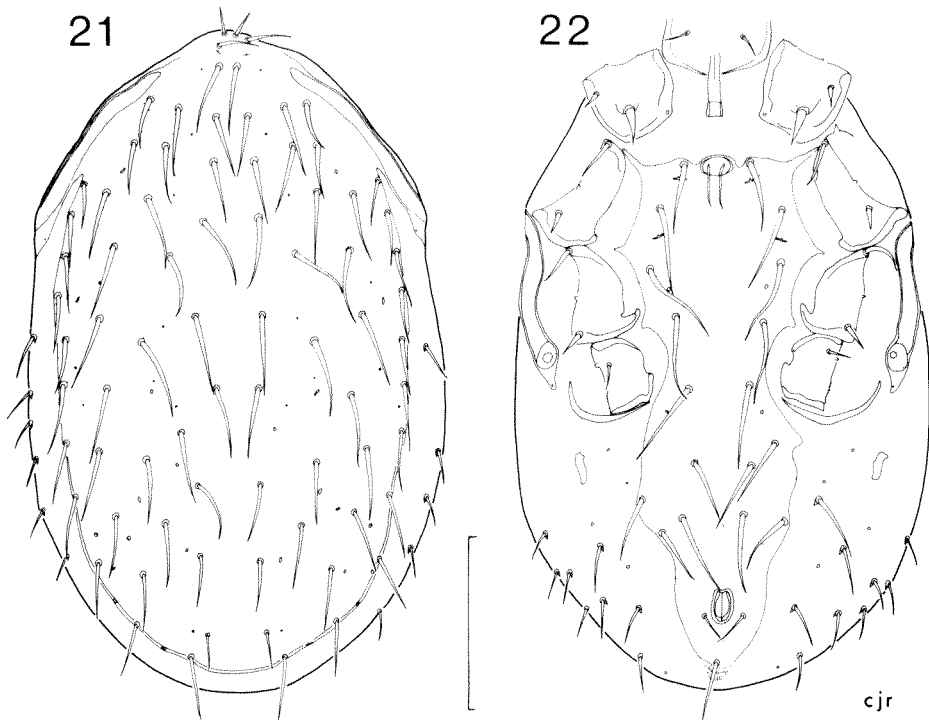
Leg setation as in *L. elegans*, except as follows. Coxa I with *av* a spur in shape of arrow-head, with short terminal filament that is almost invariably snapped off (as is case in *L. wasselli*). Tarsi II-III with *al*₁ strengthened, but still sharp-tipped.

Male (**Figs 21-22**): Chelicerae 105-110 μm long, with spermatodactyl occupying 45% of length. Capitulum otherwise as in *L. elegans*.

Dorsal shield 360-375 μm long, 200-210 μm wide. Dorsum otherwise as in *L. elegans*.

Holovenral shield 305-320 μm long, 95-105 μm wide; ventral portion normally with five pairs of setae. Venter otherwise as in *L. elegans*, except that cuticle bears about eight pairs of setae.

Leg setation as in ♀, except that *pv* on coxae I-III is sharp-tipped.



Figs 21-22: *Laelaps synnomus* sp. nov. Idiosoma ♂ (dorsal and ventral, former with seta J_2 absent on right-hand side, latter with setae on ventral portion of holovenral shield irregular on both sides, i.e. one absent on left-hand side and one free in adjacent cuticle on right-hand side).

Protonymph (Figs 23-24): Capitulum holotrichous; otherwise as in ♀. Chelicerae 80-90 μm long.

Podonotal shield 170-190 μm long, 145-155 μm wide. Opisthonotal shield 75-90 μm long, 115-130 μm wide; anterior margin more strongly arched than in *L. elegans*. Dorsum otherwise as in *L. elegans*.

Sternal shield 100-115 μm long, 75-85 μm wide. Anal shield 55-65 μm long, 40-45 μm wide. Venter otherwise as in *L. elegans*.

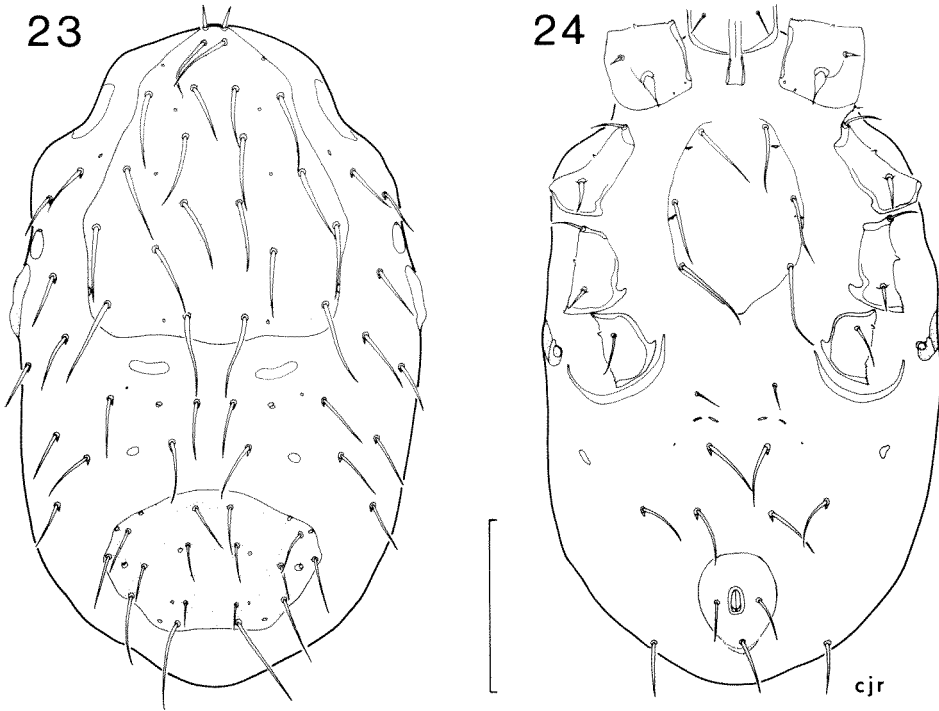
Legs holotrichous, with one exception: genu IV 1-4/0-1; otherwise as in ♂.

Hosts and Localities

On common rock rat, *Zygomys argurus* (Thomas) (Rodentia: Muridae) (3100, 3105, 3119, 3122, 3138, 3146, 3155, 3156), Port Warrender, W.A., 28-31.X.1976 (holotype ♀, allotype ♂, 8 paratype ♀♀, 4 paratype ♂♂, 4 morphotype pn). On *Z. argurus* (2655), Napier Downs, W.A., 2.IX.1976 (1 ♀, not a type). On *Z. argurus* (2697, 2703, 2710), Mount Hart, W.A., 12, 14.IX.1976 (3 ♀♀, 1 pn,

not types). On *Z. argurus* (3060), Mitchell Plateau, W.A., 22.X.1976 (1 ♀, not a type). In WAM (including holotype 79/1505, and allotype 79/1508), FMNH, QIMR, CU.

On Tunney's rat, *Rattus tunneyi* (Thomas) (Muridae) (3114, 3127), Port Warrender, 29-30.X.1976 (1 ♀, 1 pn, not types). In WAM, FMNH.



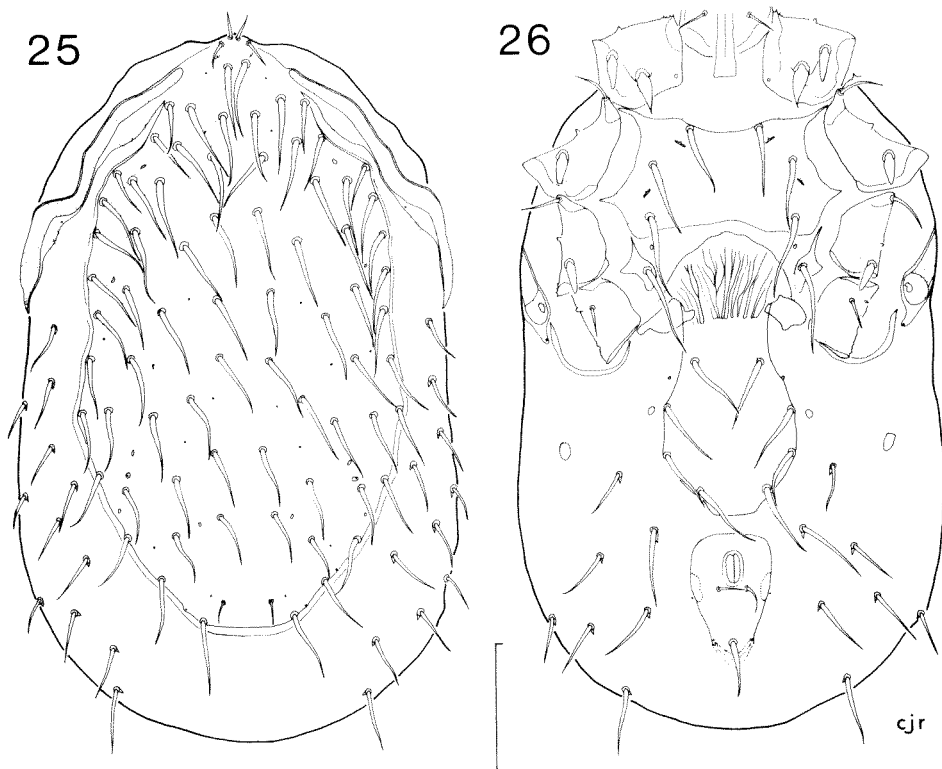
Figs 23-24: *Laelaps synnomus* sp. nov. Idiosoma pn (dorsal and ventral).

***Laelaps parameces* sp. nov.**

This new species also keys out near *L. wasselli*, but is at once separable by the differing outlines of all four major idiosomatal shields [the dorsal shield of *L. wasselli* was figured by Domrow (1963)]. Thus, the dorsal shield of the new species is tapered and truncate at the termen, the sternal excavated anteriorly, the genital extended posteriorly and the anal elongated.

The new specific name is the Greek adjective παραμηκης (of a longish shape), and refers to the dorsal shield.

Female (**Figs 25-26**): Chelicerae 135-140 μm long, with digits occupying 22% of length; otherwise as in *L. synnomus*. Capitulum otherwise as in *L. elegans*, except that labrum is more slender, *i.e.* evenly tapering.



Figs 25-26: *Laelaps parameces* sp. nov. Idiosoma ♀ (dorsal and ventral).

Dorsal shield 445-480 μm long, 235-255 μm wide; shaped somewhat differently from that of *L. elegans*, i.e. parallel-sided, tapering to truncate termen, with paler marginal strip more pronounced (cf. *Laelaps* sp. nov. Domrow, in preparation, from *Pogonomys* spp. in Papua New Guinea). Dorsum otherwise as in *L. elegans*, except that some smaller pores on dorsal shield appear to be lacking.

Sternal shield 70-75 μm long, 135-140 μm wide; anterior margin shallowly excavated between *st*₁. Genital shield 115-125 μm long, 95-105 μm wide. Anal shield 100-110 μm long, 60-65 μm wide, more elongate than in *L. elegans*; anterior margin weakly convex; *aa* falling well short of *pa*. Venter otherwise as in *L. elegans*.

Leg setation as in *L. synnomus*.

Male (**Figs 27-28**): Chelicerae 110 μm long, with spermatodactyl occupying 40% of length. Capitulum otherwise as in *L. elegans*.

Dorsal shield 360-375 μm long, 180-185 μm wide. Dorsum otherwise as in ♀ , except that pale marginal strip on dorsal shield is less distinct and cuticle bears only about six pairs of setae.

Holovenral shield 315-335 μm long, 85-90 μm wide. Venter otherwise as in ♀ , except that cuticle bears only about six pairs of setae.

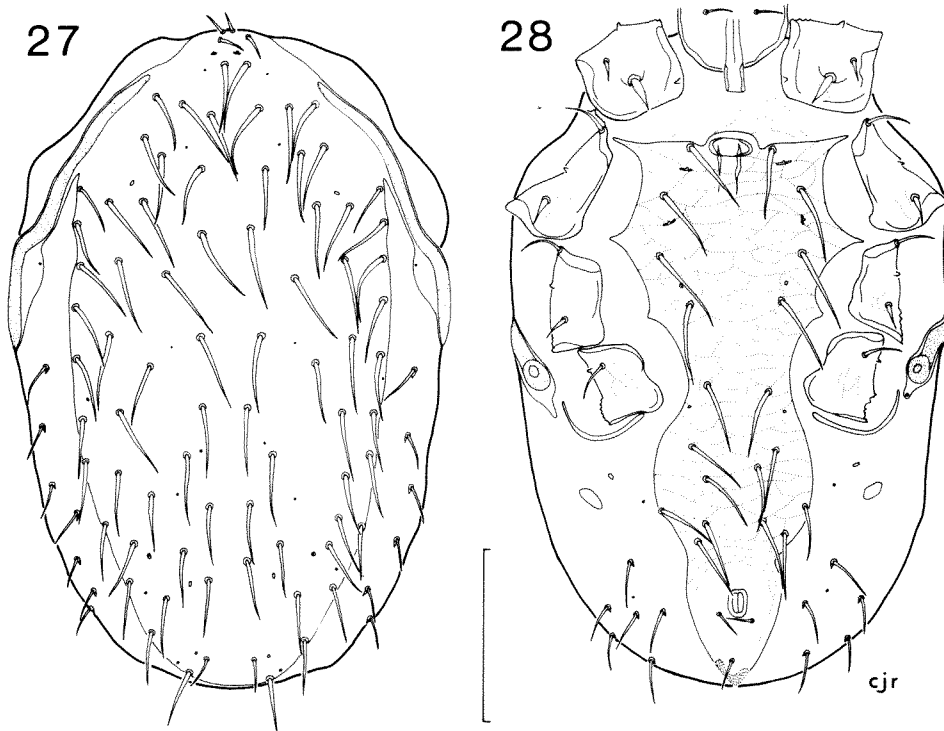
Leg setation as in ♀ , except that *pv* on coxae I-III is slightly attenuate distally.

Protonymph (Figs 29-30): Capitulum holotrachous; otherwise as in ♀ . Chelicerae 85-105 μm long.

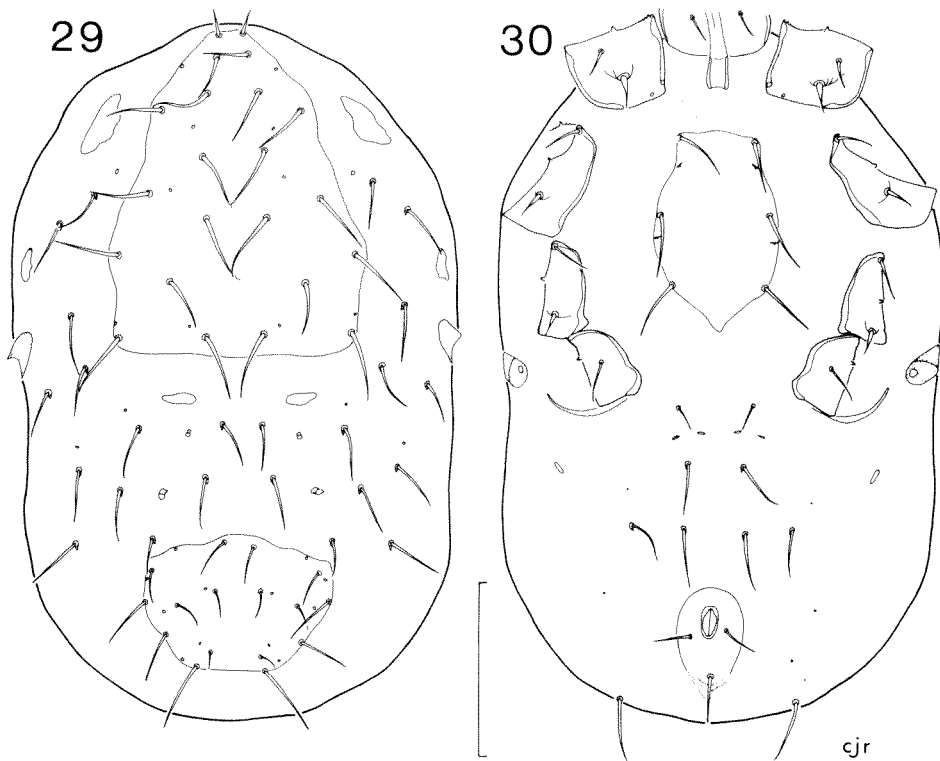
Podonotal shield 165-195 μm long, 150-155 μm wide. Opisthonotal shield 70-85 μm long, 95-115 μm wide. Dorsum otherwise as in *L. elegans*.

Sternal shield 110-120 μm long, 70-75 μm wide. Anal shield 60-70 μm long, 40 μm wide. Peritremes very short, barely reaching level of insertions of *pv* on coxae III. Venter otherwise as in *L. elegans*.

Legs holotrachous, with one exception: genu IV 1-4/0-1; otherwise as in ♂ , except that *pv* on coxae I-III is even more attenuate distally.



Figs 27-28: *Laelaps parameces* sp. nov. Idiosoma ♂ (dorsal and ventral, former with seta *px*₂ displaced on right-hand side).



Figs 29-30: *Laelaps parameces* sp. nov. Idiosoma pn (dorsal and ventral).

Host and Locality

On brush-tailed tree rat, *Conilurus penicillatus* (Gould) (Muridae) (3098, 3110, 3111, 3115, 3123, 3159), Port Warrender, W.A., 28, 29, 31.X.1976 (holotype ♀, allotype ♂, 28 paratype ♀♀, 4 paratype ♂♂, 7 morphotype pn). In WAM (including holotype 79/1511, and allotype 79/1512), FMNH QUMR, CU.

Laelaps angiodes sp. nov.

Although *L. angiodes* also keys out near *L. wasselli*, it more resembles the novelty just described (*L. parameces*) in the proportions of the four major idiosomatal shields. These effects, however, are exaggerated in *L. angiodes*, especially the tapering of the dorsal, and the excavation of the sternal, shields.

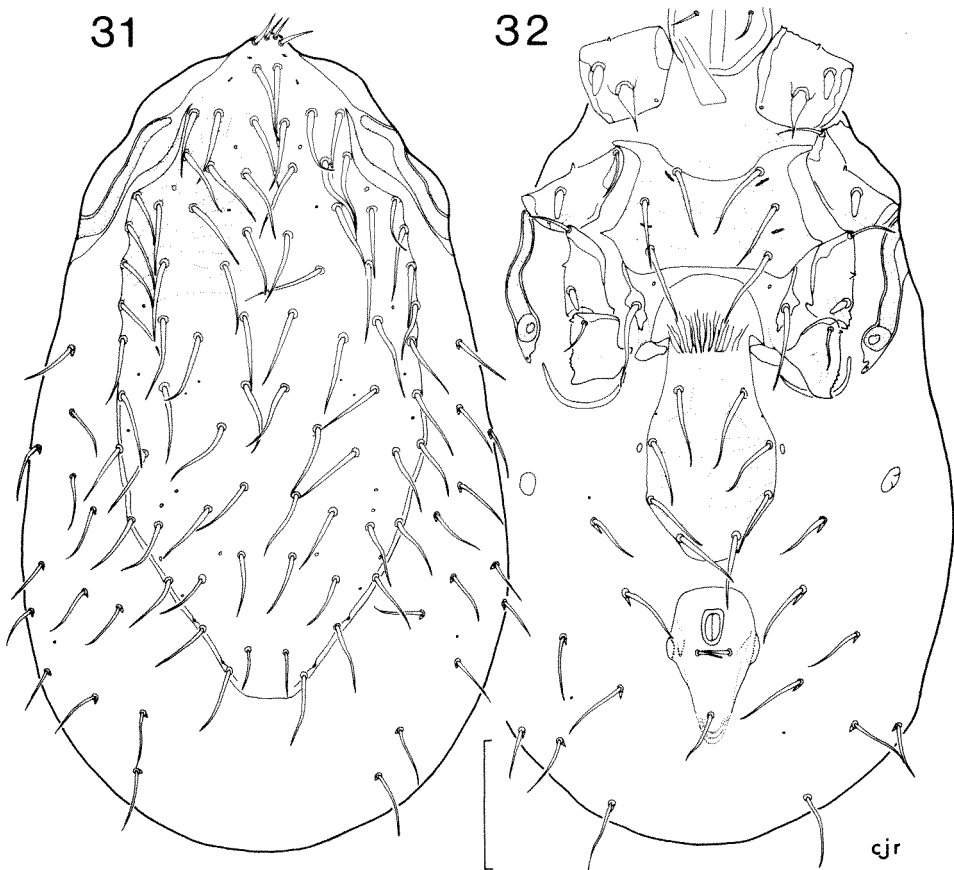
The normal host seems to be *Zyzomys woodwardi*. The four specimens from *Rattus tunneyi*, *Z. argurus* and *Conilurus penicillatus* are best regarded as stragglers.

The new specific name is the Greek adjective ἀγγειώδης (like a vessel, hollow), and refers to the anterior margin of the sternal shield.

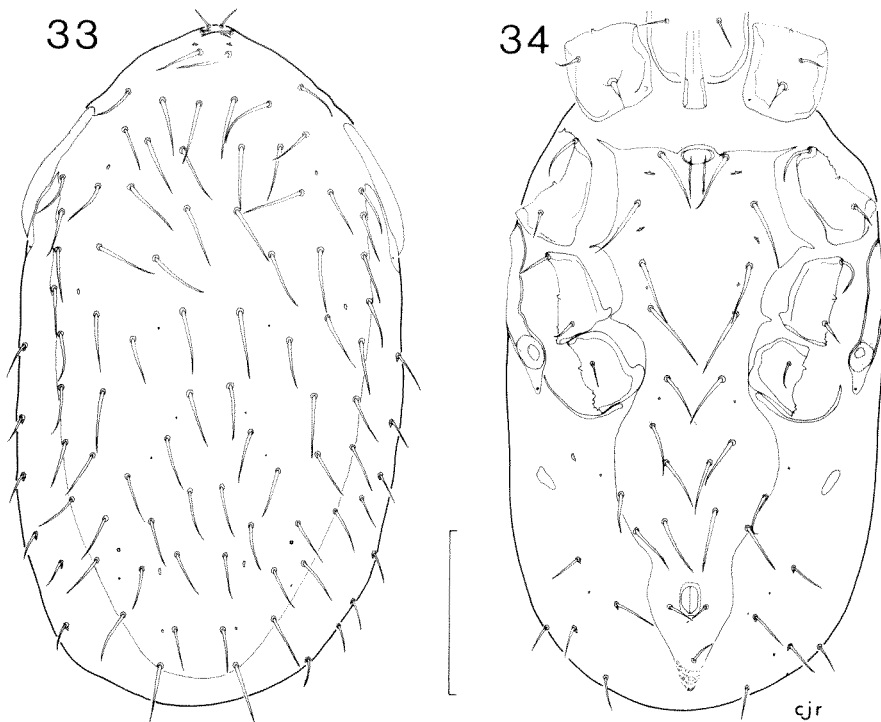
Female (Figs 31-32): Chelicerae 135-150 μm long, with digits occupying 22% of length; otherwise as in *L. synnomus*. Capitulum otherwise as in *L. parameces*.

Dorsal shield 475-510 μm long, 230-255 μm wide; elongation, posterior tapering and truncation more exaggerated than in *L. parameces*. Dorsum otherwise as in *L. parameces*.

Sternal shield 60-70 μm long, 130-135 μm wide, as in *L. parameces*, except that anterior margin is more strongly excavated. Genital shield 125-135 μm long, 95-105 μm wide. Anal shield 115-125 μm long, 60-65 μm wide, a little more modified than in *L. parameces*. Venter otherwise as in *L. parameces*.



Figs 31-32: *Laelaps angiodes* sp. nov. Idiosoma ♀ (dorsal and ventral, former with seta px_2 absent on left-hand side).



Figs 33-34: *Laelaps angiodes* sp. nov. Idiosoma ♂ (dorsal and ventral).

Leg setation as in *L. parameces*, except that *pv* on coxae I-III is rather more parallel-sided.

Male (**Figs 33-34**): Chelicerae 115 μm long, with spermatodactyl occupying 37% of length. Capitulum otherwise as in *L. elegans*.

Dorsal shield 240 μm long, 195 μm wide. Dorsum otherwise as in *L. parameces*.

Holoventral shield 335 μm long, 95 μm wide. Venter otherwise as in *L. parameces*.

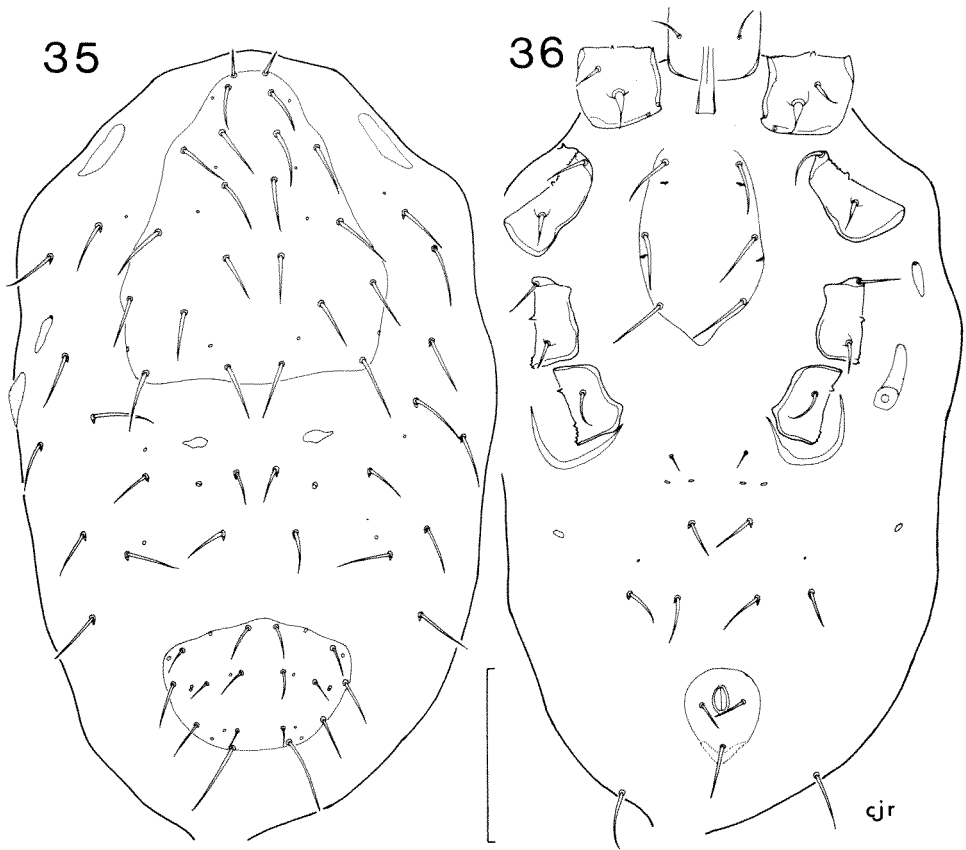
Leg setation as in ♀, except that *pv* on coxae I-III is virtually setiform.

Protonymph (**Figs 35-36**): Capitulum holotrichous; otherwise as in ♀. Chelicerae 90-105 μm long.

Podonotal shield 170-185 μm long, 140-150 μm wide. Opisthonotal shield 70-80 μm long, 95-105 μm wide. Dorsum otherwise as in *L. elegans*.

Sternal shield *ca* 120 μm long, 65-80 μm wide. Anal shield 55-60 μm long, 35-40 μm wide. Venter otherwise as in *L. parameces*.

Legs holotrichous, with one exception: genu IV 1-4/0-1; otherwise as in ♂.



Figs 35-36: *Laelaps angiodes* sp. nov. Idiosoma pn (dorsal and ventral).

Hosts and Localities

On Woodward's rock rat, *Zyromys woodwardi* (Thomas) (Rodentia: Muridae) (3120, 3142, 3144), Port Warrender, W.A., 29-30.X.1976 (holotype ♀, allotype ♂, 39 paratype ♀♀, 9 morphotype pn). In WAM (including holotype 79/1521, and allotype 79/1522), FMNH, QIMR, CU.

On Tunney's rat, *Rattus tunneyi* (Thomas) (Muridae) (3116), Port Warrender, 29.X.1976 (1 ♂, 1 pn, not types). In WAM.

On common rock rat, *Zyromys argurus* (Thomas) (3037), Mitchell Plateau, W.A., 20.X.1976 (1 pn, not a type). In WAM.

On brush-tailed tree rat *Conilurus penicillatus* (Gould) (Muridae) (3111), Port Warrender, 29.X.1976 (1 ♀, not a type). In WAM.

Laelaps aella Domrow, 1973

This species was previously known from two closely related species of *Pseudomys* in Queensland, the Northern Territory and Western Australia: *P. gracilicaudatus* and *P. nanus* (Domrow 1979). The specimen from *Macroglossus lagochilus* is clearly a straggler.

Hosts and Locality

On western chestnut native mouse, *Pseudomys nanus* (Gould) (Rodentia: Muridae) (3004, 3007, 3025, 3045, 3046, 3048, 3055, 3062, 3064, 3091), Mitchell Plateau, W.A., 18, 19, 20, 21, 22, 25.X.1976 (18 ♀♀). In WAM, FMNH, QIMR, CU.

On Forrest's native mouse, *Pseudomys forresti* (Thomas) (3063), Mitchell Plateau, 22.X.1976 (1 ♀). In WAM.

On native mouse, *Pseudomys* sp. (3038, 3093), Mitchell Plateau, 20, 25.X.1976 (8 ♀♀). In WAM, FMNH.

On northern blossom bat, *Macroglossus lagochilus* Matschie (Chiroptera: Pteropodidae) (3020), Mitchell Plateau, 19.X.1976 (1 ♀). In WAM.

Laelaps rothschildi Hirst, 1914

This species, though common on many species of *Melomys* and *Uromys* in New Guinea and north-east Australia (Domrow 1977, 1979), was previously unknown from Western Australia.

Host and Locality

On scale-tailed rat, *Melomys* sp. (Rodentia: Muridae) (3141, 3151), Port Warrender, W.A., 30, 31.X.1976 (28 ♀♀). In WAM, FMNH, QIMR, CU.

Laelaps pammorphus Domrow, 1973

This species was previously known from two species of *Zyzomys* in Queensland, the Northern Territory and Western Australia: *Z. argurus* and *Z. woodwardi* (Domrow 1979). The specimens from rodents other than *Zyzomys* are best regarded as stragglers; those from bats certainly are.

Hosts and Localities

On common rock rat, *Zyzomys argurus* (Thomas) (Rodentia: Muridae) (2632, 2637, 2638, 2639, 2640, 2641, 2643, 2644, 2645, 2647, 2653, 2654, 2655, 2662, 2665, 2669), Napier Downs, W.A., 30, 31.VIII, 1, 2, 3, 4.IX.1976 (68 ♀♀,

21 ♂♂). On *Z. argurus* (2693, 2694, 2697, 2698, 2701, 2710, 2712), Mount Hart, W.A., 11, 12, 14.IX.1976 (12 ♀♀, 1 ♂). On *Z. argurus* (2721, 2726, 2733, 2734, 2736, 2737, 2738, 2792, 2793, 2794), Beverley Springs, W.A., 18, 19, 22.IX.1976 (43 ♀♀, 14 ♂♂). On *Z. argurus* (2802, 2803, 2804, 2810, 2812, 2814, 2816, 2817, 2818, 2834, 2837, 2851, 2852, 2854, 2857, 2864, 2885, 2912), Brooking Springs, W.A., 28, 29, 30.IX, 2, 4.X.1976 (83 ♀♀, 48 ♂♂). On *Z. argurus* (3015, 3037, 3052, 3053, 3060, 3083, 3084, 3087), Mitchell Plateau, W.A., 19, 20, 21, 22, 24.X.1976 (35 ♀♀, 9 ♂♂). On *Z. argurus* (3100, 3104, 3105, 3108, 3119, 3122, 3124, 3138, 3143, 3144, 3146, 3147, 3154, 3155, 3156, 3164, 3165), Port Warrender, W.A., 28, 29, 30, 31.X, 2.XI. 1976 (67 ♀♀, 18 ♂♂). In WAM, FMNH, QIMR, CU.

On Woodward's rock rat, *Zyomys woodwardi* (Thomas) (3144), Port Warrender, 30.X.1976 (1 ♀). In WAM.

On Tunney's rat, *Rattus tunneyi* (Thomas) (Muridae) (3114), Port Warrender, 29.X.1976 (1 ♂). In WAM.

On brush-tailed tree rat, *Conilurus penicillatus* (Gould) (Muridae) (3149), Port Warrender, 31.X.1976 (1 ♀). In WAM.

On western chestnut native mouse, *Pseudomys nanus* (Gould) (Muridae) (3054), Mitchell Plateau, 21.X.1976 (1 ♀). In WAM.

On native mouse, *Pseudomys* sp. (3038), Mitchell Plateau, 20.X.1976 (2 ♀♀). In WAM, FMNH.

On scale-tailed rat, *Melomys* sp. (Muridae) (3141), Port Warrender, 30.X.1976 (2 ♀♀). In WAM.

On house mouse, *Mus musculus* Linnaeus (Muridae) (2808, 2841), Brooking Springs, 28, 29.IX.1976 (1 ♀, 1 ♂). In WAM.

On northern mastiff bat, *Tadarida jobensis* (Miller) (Chiroptera: Molossidae) (2727), Beverley Springs, 18.IX.1976 (1 ♀). In WAM.

On little bat, *Eptesicus pumilus* (Gray) (Chiroptera: Vespertilionidae) (2739), Beverley Springs, 19.IX.1976 (1 ♀). In WAM.

On black flying fox, *Pteropus alecto* Temminck (Chiroptera: Pteropodidae) (2805, -), Brooking Springs, 28, 29.IX.1976 (3 ♀♀, 2 ♂♂). In WAM, FMNH, QIMR, CU.

On northern blossom bat, *Macroglossus lagochilus* Matschie (Pteropodidae) (3013), Mitchell Plateau, 19.X.1976 (1 ♀, 1 ♂). In WAM.

Laelaps hapaloti Hirst, 1931

This species, though common on the genus *Notomys* in the drier parts of Queensland, Victoria, South Australia and Central Australia (Domrow 1973),

was previously unknown from Western Australia. The deutonymph is newly described. It is a disappointment that the first mite I have seen from the rare *Notoryctes typhlops* is only a straggler.

Adult: Dorsal shield showing following individual variation, cf. Domrow (1963, 1973): from *N. alexis*, ♀ normal; one ♂ with z_6 absent on one side, other ♂ with z_6 and S_5 absent on one (same) side; from *Notomys* sp., ♀ with z_6 absent on one side; from *Notoryctes*, ♀ with z_6 absent on one side, and z_6 and s_4 on other.

Deutonymph (Figs 37-38): Capitulum, as far as can be seen, as in ♀.



Fig. 37: *Laelaps hapaloti* Hirst. Idiosoma dn (dorsal).

Dorsal shield calculated to be 790 μm long, 415 μm wide; parallel-sided (uncinced), but tapered to short, transverse termen; surface with reticulate striae; hypotrichous (with 22 pairs of setae on podonotal portion, $s_{1,2}$ and $r_{2,4}$ actually free in adjacent cuticle; 15 on opisthonotal, $px_{2,3}$ lacking), with at least some of 22 pairs of pores commonly seen in *Laelaps*, but, while two pairs in

front of S_{4-5} are distinct, it cannot be seen in this pale, freshly moulted specimen whether they are accompanied by "windows." Dorsal cuticle with many pairs of short setae.



Fig. 38: *Laelaps hapaloti* Hirst. Idiosoma dn (ventral).

Presternal area striate. Sternogenital shield elongate, 390 μm long, 135 μm wide; sides subparallel, irregular posteriorly; surface with reticulate striae; with usual four pairs of setae and three pairs of pores; genital setae and pores free in adjacent cuticle. Anal shield 90 μm wide (length unavailable because cribrum turns onto dorsum). Ventral cuticle with many pairs of setae, longer midventrally and posteriorly. Venter otherwise as in ♀ , except that post-stigmatic pores are free in cuticle.

Legs as in ♀ , except that al_1 on tarsi II-III is sharp-tipped.

Hosts and Localities

On spinifex hopping mouse, *Notomys alexis* Thomas (Rodentia: Muridae) (M12964), Wanjarri Nature Reserve, W.A., 8.I.1975, P. Lambert (1 ♀, 2 ♂♂, 1 dn). In WAM.

On Mitchell's hopping mouse, *Notomys mitchellii* (M8155), Lake Bidy, W.A., 18.IV.1969, M. Hartley (1 ♀). In WAM.

On marsupial mole, *Notoryctes typhlops* (Stirling) (Marsupialia: Notoryctidae) (M7711), Warburton Range, W.A., 1968, T. Carr (1 ♀). In WAM.

***Neolaelaps spinosus* (Berlese, 1910)**

This species is widespread on bats of the genus *Pteropus* (Pteropodidae) in S.E. Asia and Australasia (Domrow 1961, 1973, Wilson 1967, Prasad 1974). The specimen is clearly a straggler, cf. Bhattacharyya (1971).

Host and Locality

On grassland scale-tailed rat, *Melomys littoralis* Lönnberg (Muridae), Capsize Creek, 80 km S of Moreton Telegraph Office, Cape York Peninsula, Q., 19.VII.1964, K. Keith (1 ♀). In QIMR.

***Trichosurolaelaps emanuelae* Domrow, 1958**

These specimens, from the original host genus, are included for historical reasons. See also Domrow (1977).

Host and Locality

On spiny bandicoot, *Echymipera* sp. (Marsupialia: Peramelidae) (13056), Stephansort (= Bogadjim), ex-German New Guinea, 25.V.1904, P. Preuss (1 ♀, 1 ♂). In MNK.

***Trichosurolaelaps marra* Domrow, 1972b**

These specimens, from one of the original hosts, are included for historical reasons. See also Domrow (1977). Immatures were previously unknown.

Deutonymph: Capitulum as in ♀, with fully developed chelicerae.

Dorsal shield 435 µm long, 230 µm wide, not incised laterally between podonotal and opisthonotal portions; texture not wholly clear, but with some reticulate striae vertically, humerally and posterolaterally; setation as in ♀,

but s_1 , r_{2-5} and s_6 free in adjacent cuticle. Dorsal cuticle with about 16 pairs of setae, all bladed, except one longer pair subposteriorly.

Sterno-genital complex as in *T. crassipes* Womersley, see Domrow (1979); measurements unavailable because of fracture. Venter otherwise as in ♀, except as follows. Ventral cuticle with about 10 pairs of slightly bladed setae. Peritremes as in ♂.

Legs predicting those of ♀.

Protonymph: Capitulum with palpal trochanter-genu holotrichous (*i.e.* 1.4.5, *cf.* hypotrichous 2.4.5 in dn).

Dorsum as in *T. crassipes*, granted setae on opisthonotal cuticle are 6.5 in one specimen and 5.5 in other (*cf.* holotrichous 6.6). Podonotal shield 250 µm long, 200 µm wide. Opisthonotal shield *ca* 125 µm long, 60 µm wide.

Venter as in *T. crassipes*.

Leg setation as in *T. crassipes*.

Host and Locality

On sugar glider, *Petaurus breviceps* Waterhouse (Marsupialia: Petauridae) (T663), Australia, 29.XI.1913, Vosseler (1 ♂, 1 dn, 2 pn). In ZMH, QIMR.

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