

AUSTRALIAN MUSEUM SCIENTIFIC PUBLICATIONS

Hunt, Glenn S., 1985. Taxonomy and distribution of *Equitius* in eastern Australia (Opiliones: Laniatores: Triaenonychidae). *Records of the Australian Museum* 36(3): 107–125. [19 April 1985].

doi:10.3853/j.0067-1975.36.1985.340

ISSN 0067-1975

Published by the Australian Museum, Sydney

nature culture **discover**

Australian Museum science is freely accessible online at
www.australianmuseum.net.au/publications/
6 College Street, Sydney NSW 2010, Australia



Taxonomy and Distribution of *Equitius* in Eastern Australia (Opiliones: Laniatores: Triaenonychidae).

GLENN S. HUNT

Education Section, Australian Museum, P.O. Box A285,
Sydney South, N.S.W., 2000

ABSTRACT. The genus *Equitius* is revised. *Jenolanicus* Roewer, 1915, *Monacanthobunus* Roewer, 1915, *Monoxyomma* Pocock, 1903 and *Rydrusa* Roewer, 1931 = new synonyms of *Equitius* Simon, 1880. Three new combinations are established: *E. altus* (Forster, 1955) (*Jenolanicus*), *E. spinatus* (Pocock, 1903) (*Monoxyomma*) and *E. tambourineus* (Roewer, 1921) (*Jenolanicus*). Four new synonymies are proposed: *Jenolanicus armatus* Roewer, 1915 and *Monacanthobunus continentalis* Roewer, 1915 = *E. doriae* Simon, 1880; *E. affinis* Roewer, 1923 and *Rydrusa armata* Roewer, 1931 = *E. tambourineus* (Roewer, 1921). Three new species are described: *E. formidabilis*, *E. montanus* and *E. richardsae*. A key to all seven species is given.

Discontinuous mountain blocks and major river valleys are seen as factors influencing the present distribution of species in south-eastern Australia. An isolated cave population of *E. altus* is noted.

HUNT, GLENN S., 1985. Taxonomy and distribution of *Equitius* in eastern Australia (Opiliones: Laniatores: Triaenonychidae). Records of the Australian Museum 36: 107-125.

Keywords: Taxonomy, *Equitius*, Opiliones, eastern Australia, speciation, cavernicolous

Equitius is the dominant harvestman genus inhabiting moist forest and woodland in the coastal ranges and plains of south-eastern Australia, from southern Queensland (latitude 27°S) to the Shoalhaven River, N.S.W. (latitude 35°S). Its species are perhaps the commonest large arachnids to be found under logs on the forest floor, but the importance of the genus has not previously been recognised because of failure by authors to recognise the taxonomic unity of these species.

Materials and Methods

Type material of all nominal species has been examined and reassessed. The following abbreviations have been used to indicate the present location of material examined:

AM	The Australian Museum, Sydney
ANIC	Australian National Insect Collection, Canberra
BM	British Museum (Natural History), London
MCSN	Museo Civico di Storia Naturale, Genoa
PM	Muséum National d'Histoire Naturelle, Paris
MV	Museum of Victoria, Melbourne
NHRMS	Naturhistoriska Riksmuseet, Stockholm
NMS	NaturMuseum Senckenberg, Frankfurt am Main
UQ	University of Queensland, Entomology Dept., Brisbane

Terminology closely follows that of Forster (1954). Tergal areas 1-5 are abbreviated to TA1, TA2, etc. Methods of measuring specimens follow Hunt (1979).

Male dimorphism has been noted in all species of *Equitius* except *E. formidabilis* where only small samples are available. The phenomenon is described in detail elsewhere (Hunt, 1979). Form A males, which exhibit normal development of secondary sexual characteristics, are used for the description of males. Form B males show incomplete development of secondary sexual characteristics in body size, robustness of pedipalps and in the size and nature of certain spines on the pedipalps. Form B are not described here as inclusion would make each species description unduly long and complex. The specific status of these males can be determined from male genitalic characters which are the same as in Form A males, or by their presence in a large series of specimens in which the identity of Form A males and females has been determined.

Family Triaenonychidae Soerensen, 1886
Subfamily Triaenonychinae Pocock, 1903
Tribe Triaenonychini Pocock, 1903

Genus *Equitius* Simon, 1880

Equitius Simon, 1880: 100. — Roewer, 1915: 110, 1923: 606.
Type-species: *Equitius doriae* Simon.

Monoxyomma Pocock, 1903: 444. — Roewer, 1915: 111, 1923: 608. — Hickman, 1958: 64. n.syn. Type-species: *Monoxyomma spinatum* Pocock.

Jenolanicus Roewer, 1915: 90, 1923: 598. n.syn. Type-species: *Jenolanicus armatus* Roewer.

Monacanthobunus Roewer, 1915: 103, 1923: 603. n.syn. Type-species *Monacanthobunus continentalis* Roewer.

Rydrusa Roewer, 1931: 171. n.syn. Type-species *Rydrusa armata* Roewer.

Diagnosis. Anterior margin of carapace armed above with variable number of spines or tubercles. Eyemound rising short distance behind anterior margin, armed with strong suberect spine. Scutal groove present mesially; groove between TA4 and TA5 discernible, other tergal grooves indistinct. TA1–4 with mesial pair of spines or tubercles which tend to form a row with smaller granules placed more laterally. Spines on TA3 largest, usually very long. Spines on TA1–2 subequal or either pair larger. Spines on TA4 more widely spaced. TA5 and free tergites each with row of tubercles or granules. Tergal region of scute in Form A males and most Form B males with mesial saddle-like stripe of pigmentation; female with continuous band of pigment in each tergal area across width of scute. Each sternite with row of granules; genital operculum essentially smooth; spiracles partly obscured by bridging tubercles on coxa 4. Chelicera without proximal boss on first segment. Pedipalp femur with proximoventral trifold spine strongly developed in Form A males, less so in Form B males and females; large midventral spine at 0.3–0.5 distance along ventral surface, either smaller or larger than the more proximal spine; dorsal surface usually with row of 4–5 mesial spines and row of 2–5 smaller prolateral spines; prolateral surface of femur and patella both with distal pair of strong spines. Legs: ventral surface of coxa 1 with pair of prodistal spines joined at their bases, and with 2 strong spines and 4 tubercles arising more proximally; femora without large spines or tubercles; calcaneus of metatarsi much shorter than astragalus, that of leg 1 of male with ventral notch. Tarsal formula (distitarsal segments in parentheses): males 4–6(2), 8–15(3), 4, 4; females 3(1), 7–15(3), 4, 4. Penis of simple form; fused ventral plates separated by small distal notch, each plate with 1 superior and 5–6 inferior setae; dorsal plate without deep apical cleft; glans simple, spatulate apically, greater part not enclosed by plates.

Comments. Simon (1880) erected the genus *Equitius* and described *E. doriae*, the type-species, from the Blue Mountains of New South Wales. His unillustrated Latin description referred to the characteristic spine on the eyemound, the ventral notch in metatarsus 1 of the male and the mesial pair of long spines on TA3, but failed to mention the much smaller mesial spines also present on TA1.

Simon's paper appears to have been overlooked by Pocock (1903) when he erected the then monotypic genus *Monoxyomma*. Pocock's excellent description of the type-species, *M. spinatum* Pocock from Hillgrove, near Armidale, northern N.S.W., included most of the

characteristic features of *Equitius*. He illustrated the male genitalia, though, unfortunately, not the distinctive pedipalp. He also referred to the presence of the ventral notch on metatarsus 1 of the male by an oblique reference, "protarsus of first (leg) modified as in *Acumontia Majori*". This was noted by Roewer (1915) in his reference to the calcaneus of *M. spinatum* as being ventrally 'ausgebuchtet'; he did not comment on the significance of the notch in pointing to a relationship between *Equitius* and *Monoxyomma*, but instead put emphasis on tarsal segmentation as a generic character. The specimen described by Pocock has 6 segments in the tarsus of leg 1. Roewer (1923) and Forster (1955) used this as a key character to separate *Monoxyomma* from *Equitius*. However, 6 tarsal segments appear to be unusual in *M. spinatum*; in a recent collection of 7 males from the type locality, 2 have 6 segments in tarsus 1 on one side of the body and 5 on the other, while the remainder have 5 segments in both first tarsi. Furthermore, in many populations of *E. doriae*, the number can vary from 4–6. Hickman (1958) found similar variability in many Tasmanian harvestmen. Because of similarities between the holotypes of *M. spinatum* and *E. doriae* in the structure of the male genitalia and pedipalp, *Monoxyomma* must be placed in synonymy with *Equitius*.

While the type-species of *Monoxyomma* must be placed in *Equitius*, the same is not true for two species from Queensland subsequently assigned to *Monoxyomma*. Roewer (1921) described *M. manicatum* Roewer and placed it in this genus on superficial characters, including the presence of more than 5 segments in tarsus 1. Forster (1955) redescribed this species from Roewer's specimens and also described a closely related species, *M. rotundum*. As Forster's figures show, the structure of the male genitalia of both species is unlike that figured by Pocock for *M. spinatum*. These two species also differ markedly from *M. spinatum* in the spination of the pedipalp, in the absence of the ventral notch in metatarsus 1 of the male, and in the absence of spines along the front of the carapace. I consider that these two species should be placed in a new genus together with some undescribed species ranging from northern Queensland to southern N.S.W.

Hickman (1958) placed two new Tasmanian species, *M. cavaticum* and *M. silvaticum*, in *Monoxyomma*, although the males of these also lack the ventral notch in metatarsus 1. The male genitalia are very similar to that of *Equitius*, differing mainly in the presence of a deeply cleft dorsal plate and a marked proximal concavity directed basally in the ventral plates. These species appear to be closely related to the mainland genus *Holonuncia* Forster, but differ in the absence of the metatarsal notch. I consider that they should be placed in a new genus together with *Monacanthobunus tasmanicus* (see below) and some undescribed species from Tasmanian caves.

Roewer (1915) erected the genus *Jenolanicus* for a new species, *J. armatus* from Jenolan Caves, N.S.W.

The type is a female, although Roewer mistakenly identified it as a male. Like females of *Equitius*, it has 3 segments in tarsus 1 and lacks the metatarsal notch. It is not surprising therefore, considering the emphasis he placed on tarsal segmentation as a generic character, that Roewer erected a new genus for this 'male'.

Additional confusion resulted from Simon's (1880) failure to note the mesial pair of spines on TA1 and TA2 of *Equitius*. Roewer (1915, 1921) and Forster (1955) incorrectly used this supposed absence as a further character to separate *Jenolanicus* from *Equitius* when describing *J. armatus*, *J. tambourineus* and *J. altus*. Examination of the scute, pedipalp and penis in a large series of both sexes of *J. armatus*, from its type locality, has shown that this species is a synonym of *E. doriae*. Hence *Jenolanicus* must be synonymised and its three species assigned to *Equitius*.

The genus *Monacanthobunus* was erected by Roewer (1915) largely on the basis of tarsal segmentation and in it he placed two new species, *M. continentalis* and *M. tasmanicus*. The type-species, *M. continentalis*, was described from a single male from Bathurst, N.S.W. The holotype is very similar to *E. doriae* in penis and pedipalp structure (c.f. Figs 3A, C; 5I, J). I regard it as a synonym of *E. doriae*, and hence *Monacanthobunus* becomes a synonym of *Equitius*. *Monacanthobunus tasmanicus* belongs in the same new genus as *Monoxyomma cavaticum* and *M. silvaticum*.

Roewer (1931) erected the monotypic genus *Rydrusa* for the species *R. armata* Roewer. The holotype possesses distinctively large spines on TA1 and in other respects, such as spination of the body and pedipalp, is similar to *E. tambourineus*. In his diagnosis of *Rydrusa*, Roewer stated that the genus differs from *Equitius* and *Jenolanicus* by its 4-segmented tarsus 1 and the presence of large mesial spines on TA1. The unreliability of the former character has been discussed (some specimens of *E. tambourineus* examined have 4 segments in tarsus 1). While regarding the second

character, Roewer did not specify the large size of spines in his descriptions of *J. tambourineus* (1921) and *E. affinis* (1923) although they are unquestionably large in both type specimens. *Rydrusa* is therefore synonymised with *Equitius*; *R. armata* falls as a synonym of *E. tambourineus* as does *E. affinis*.

Equitius is closely related to *Holonuncia* Forster with which it partly overlaps in distribution. Males of both genera possess genitalia of similar general structure, but in *Holonuncia* the dorsal plate of the penis has a deep apical cleft, while the fused ventral plates have a marked proximal concavity directed basally. Unlike *Equitius*, the eyemound of *Holonuncia* is unarmed or bears only a tubercle, and there are also differences in the spination of the pedipalp. Like *Holonuncia*, *Equitius* is closely related to the Tasmanian species placed by Hickman (1958) in the genus *Monoxyomma* as mentioned above. The Tasmanian species *Paranuncia gigantea* Roewer is also closely related to *Equitius*, but differs in the penis having a very long dorsal plate with a deep apical cleft, and in having only three inferior setae on each ventral plate. Thus *Equitius*, *Holonuncia*, Hickman's Tasmanian species currently placed in *Monoxyomma*, *Monacanthobunus tasmanicus* and *P. gigantea* form a closely related group of genera distributed along coastal eastern Australia from southern Queensland to Tasmania. The undescribed genus to include the two species of *Monoxyomma* from Queensland is quite distinct and not closely related to this group.

The seven species (including three n.spp. described below) currently recognised as belonging in *Equitius* may be distinguished by the following key. Females, and to some extent Form B males of certain species, may be difficult to distinguish on external key characters, but where this can be done 'M + F' is given in parentheses. Where only Form A males can be distinguished, 'A' is given in parentheses. The specific identity of Form B males can be readily verified by examination of the genitalia.

Key to Species of *Equitius*

1. Each anterior corner of carapace with large laterally directed spine above coxa 2 (M + F).....*E. tambourineus*
— Anterior corners without such a spine (M + F)..... 2
2. Lateral margin of scute usually with large, laterally directed spine above coxa 3 (M + F); dorsal plate of penis apically bifid, terminating well below superior setae (M).....*E. richardsae* n.sp.
— Margin of scute (M + F) and dorsal plate of penis (M) without such structures
..... 3
3. Second spine on proventral margin of pedipalp tarsus larger than other tarsal spines (M + F); fused ventral plate of penis longer than wide in ratio of c. 2:1 (M).....*E. formidabilis* n.sp.
— Tarsal spines not so developed (M + F); fused ventral plates with ratio length to width <1.5:1 (M)..... 4
4. Spine in prodistal corner of pedipalp tibia, and spine immediately proximal to it, very strong and strongly curved towards the tarsus (A); distal process on trifid spine of pedipalp femur very small or lacking (M + F).....*E. montanus* n.sp.

- Pedipalp spines not so developed.....5
- 5. Ratio length of second cheliceral segment to length of scute $>0.48:1$ (A) or $0.45:1$ (F); penis with glans broad basally, c. 0.75 width of fused ventral plates (M).....*E. altus*
- Ratio second segment of chelicera to length of scute $<0.48:1$ (A) or $0.45:1$ (F); glans not so broad basally (M).....6
- 6. Midventral spine on pedipalp femur usually much longer than more proximal retroventral spine, and spine in prodistal corner of pedipalp tibia usually very weak (A); dorsal plate of penis attenuated and narrower than base of glans (M).....*E. doriae*
- Midventral spine on pedipalp femur similar in length to, or shorter than, more proximal retroventral spine, and spine in prodistal corner of pedipalp tibia relatively strong (A); dorsal plate of penis as wide as or wider than base of glans and usually terminating in a narrow apical process (M).
.....*E. spinatus*

Equitius doriae Simon, 1880
Figs 1;2;3A-C;5;13A;14A

Equitius Doriae Simon, 1880: 101.
Equitius doriae. — Roewer, 1915: 110, 1923: 607.
Jenolanicus armatus Roewer, 1915: 81, 1923: 598. n.syn.
Monacanthobunus continentalis Roewer, 1915: 103, 1923: 603.
n.syn.

Type material. Simon (1880) based his description of *E. doriae* on a series of six specimens and indicated the source of material examined as 'Musée de Genes; obligeamment communiqué par M. le marquis J. Doria'. He did not state that he had selected a holotype, but deposited a single specimen (Form A male) in PM. It bears the label:

'3304- *Equitius doriae* E.S., TYPE

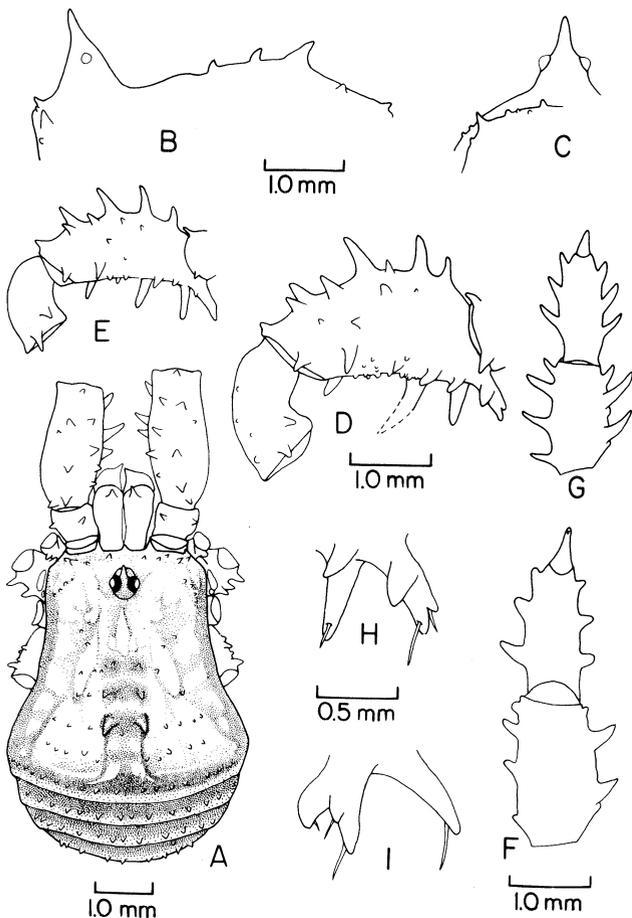


Fig. 1. *Equitius doriae* Simon; male: A-D, F, H-I; female: E, G. A, dorsum showing body colour pattern; B, lateral profile of scute; C, anterior profile of eyemound; D - E, prolateral view of pedipalp femur and patella; F - G, ventral view of pedipalp tibia and tarsus; H - I, proximoventral trifold spine on pedipalp femur; H, prolateral; I, posterior. In this and subsequent figures comparable structures are marked by a single scale bar e.g. B and C, D and E, F and G, H and I.

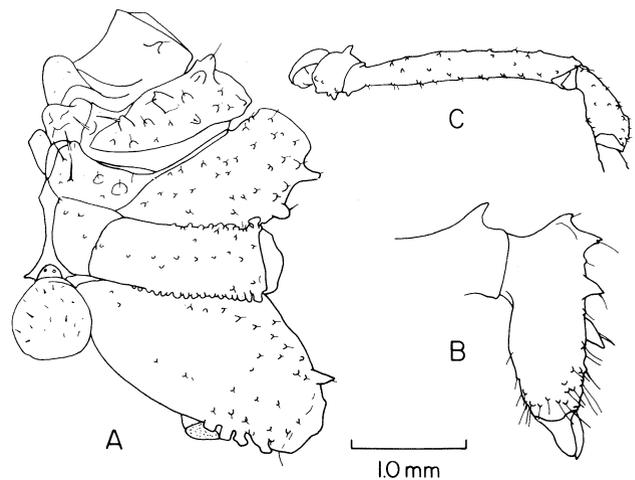


Fig. 2. *Equitius doriae* Simon, male. A, coxo-sternal region (left side); B, retrolateral view chelicera second segment; C, retrolateral view trochanter, femur and patella of leg 1.

Blue Mountains, New Sth. Wales (Doria coll.)'

The remaining five specimens, including a male which I have examined, are all in the same tube in MCSN, with 2 labels:

'*Equitius doriae* Sim.

Blue Mountains N.S. Wales
racc. L.M. D'Albertis 1873'.

'*Equitius doriae* Sim tipo.

Simon, C.R. Ent. Belg. XXIII, 1880'.

Accordingly, all specimens should be regarded as syntypes. The PM male has been selected as the lectotype, the MCSN specimens as paralectotypes.

LECTOTYPE. ♂ (here designated): Blue Mountains, N.S.W. (type locality), 1873, L.M. D'Albertis (specimen from Doria Collection), reg. no. 3304, PM.

PARALECTOTYPES: Blue Mountains, N.S.W., 1873, L.M. D'Albertis, MCSN (1 male and 4 other specimens).

Additional material (in AM unless otherwise stated). New South Wales: Bathurst, holotype male of *Monacanthobunus continentalis* Roewer, no. 1035, NMS; Jenolan Caves, holotype female of *Jenolanicus armatus* Roewer, no. 1026, NMS; McKeown's Valley, Jenolan; Mt Victoria, no. 1039, NMS; Mt Victoria, large series in AM; Mt Coricudgy, E. of Rylstone; Mt Coriaday, N. of Mt Coricudgy; Mt Wilson; Mt Irvine; Mt Tomah; Bilpin area; Kurrajong Heights; Newnes Prison Camp area; Lithgow area; Black Range, E. of Jenolan State Forest; Jenolan State Forest; Boyd Plateau (several localities); Kanangra Walls; Mt Shivering, E. of Mt Werong; Wombat Pinch, S. of Mt Werong; Mt Werong pluviometer; Tuglow Hole Mtn, N. of Gurnang State Forest; Gurnang State Forest; Blenheim State Forest, near Oberon; Sunny Corner State Forest, near Kirkconnell; Mt Lambie; Mt Winborndale, N. of Sunny Corner; Mt Canobolas via Orange.

Description. The following redescription is based on the lectotype male in PM and, from the Mt Victoria population, Form A males which show close resemblance to the lectotype. Females of this population are also described. Interpopulational variations show a regional pattern and are outlined separately below.

MALE. *Measurements* (mm) lectotype: scute length 4.22, width 4.24; carapace length 2.06, width 2.92; genital operculum length 0.66, width 0.64; chelicera length, first segment 1.35, second 1.84, total 3.19.

	Troch.	Fem.	Pat.	Tib.	Met.	Tar.	Total
Leg 1	0.74	2.76	1.14	2.17	2.67	1.46	12.38
Leg 2	0.85	3.75	1.36	3.27	3.87	3.17	18.55
Leg 3	0.77	3.05	1.07	2.43	2.02	1.55	13.84
Leg 4	0.94	3.68	1.25	3.17	4.43	2.06	17.85
Pedipalp	0.63	2.78	1.68	1.99	-	1.69	9.79

Ranges (mm): length scute 3.91–4.85; length of leg 4 femur 3.51–4.27; length of pedipalp femur 2.27–3.10.

Colour: dorsal pattern of male from Mt Victoria population as in Fig. 1A. Background colour of scute orange-brown with areas of dark-brown to black pigmentation. Dark-brown bars in TA1–4 restricted to mesial saddle, that on TA5 continuous. Free tergites darker than scute. Chelicerae and pedipalps yellow-orange with dark-brown reticulations. Background colour of legs yellowish but largely obscured by dark-brown to black pigmentation.

Body (Fig. 1A–C): eyemound rising short distance

behind anterior margin of carapace (Fig. 1B), spine moderately long, eye-level c. 0.5 total eyemound height. Viewed anteriorly, lateral edge of eyemound steeply sloping immediately below eyes (Fig. 1C). Anterior margin with 1 prominent spine above each pedipalp coxa and several small tubercles (Fig. 1B,C). Mesial pair of spines on TA2 usually slightly larger than those of TA1. Size and general distribution of other spines, tubercles and granules as in Fig. 1A,B. Coxo-sternal region as in Fig. 2A.

Chelicerae (Figs 1A;2B): first segment short; proportion second segment to scute length 0.44. Second segment with 4 dorsal spines (Fig. 2B) and many setose granules.

Pedipalps (Fig. 1A,D,F,H,I): proportion femur to scute length 0.55–0.60; proportion femur dorsoventral thickness to length 0.47–0.54. Coxa with small distal spine on ventral surface. Trochanter with 3 strong spines: proventral, prodorsal and retroventral. Femur with 5 mediodorsal spines and with row of 3–4 spines more prolaterally (Fig. 1A,D). Ventral surface with a large, proximal, backwardly directed, unevenly trifid spine (Fig. 1D,H) consisting of a main axis and a large proximal and small distal process. Proximal process directed forward forming an angle with the main axis when viewed laterally (Fig. 1H). Posterior view as in Fig. 1I. Retroventral margin of ventral surface with 3 strong spines: first placed immediately distal to trifid spine; second almost midway along surface (termed 'midventral spine' in subsequent descriptions), very strong and curved distad; third weakest and placed in distal half. Proventral margin in proximal half with 3 small spines distal to trifid spine. Prolateral surface with 2 strong distal spines, tip of more proximal spine reaching to below level of ventral surface when viewed laterally. Prolateral surface with other smaller spines and denticles (Fig. 1D), retrolateral surface essentially smooth. Patella with 2 strong prolateral spines (Fig. 1D). Prolateral margin of tibia with 2 prominent spines and small tubercles in distal corner (Fig. 1F, right side). Retrolateral margin with 2 large spines, and small tubercle in proximal and distal corners (Fig. 1F). Pro- and retrolateral margins of tarsus with 3 spines (Fig. 1F). Proportion tarsus breadth to length c.1.20.

Legs (Figs 1A; 2A,C): proportion femur leg 4 to scute length 0.84–0.93. Ventral view of coxae shown in Fig. 2A. Spinination of retrolateral surface of coxa 2 and prolateral surface of coxa 4 as in Figs 1A, 2A. Coxae 2–4 with numerous granules tending to form rows (Fig. 2A). Trochantera with a few small tubercles, femora with small granules only (Fig. 2C). Ventral notch in calcaneus of leg 1 deep, proximal edge with a small mound before sloping steeply into notch (Figs 13A, 14A). Tarsal formula 4–6, 8–14, 4, 4.

Penis (Fig. 3A–C): shape of fused ventral plates and arrangement of setae as in Fig. 3A,B but both subject to variation (Fig. 5). Dorsal plate (Fig. 3C) relatively long, slender and gently tapering to apex, much narrower than base of glans, apex rounded and reaching

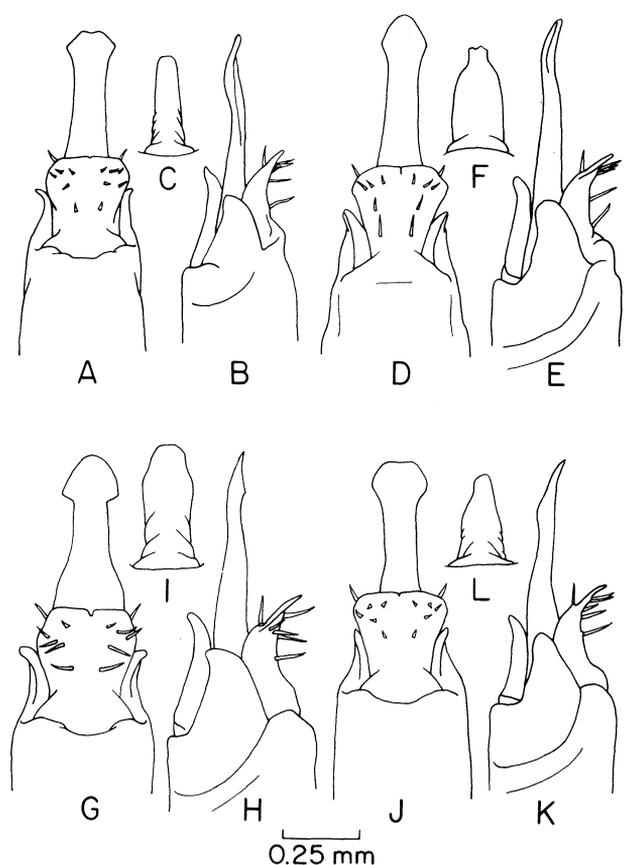


Fig. 3. Distal part of male genitalia of *Equitius* spp: A-C, *E. doriae* Simon; D-F, *E. spinatus* (Pocock), ex Hillgrove; G-I, *E. altus* (Forster); J-L, *E. spinatus* (Pocock), ex Barrington Tops. A, D, G, J ventral; B, E, H, K lateral; C, F, I, L dorsal plate.

level of superior setae on ventral plate. Lateral plates short, not reaching level of apex of dorsal plate. Glans tapering slightly from base, apex spatulate.

FEMALE (Mt Victoria Population). *Measurements* (mm): scute length 4.15, width 3.85; carapace length 1.72, width 2.56; genital operculum length 0.59, width 0.66; chelicera length, first segment 1.28, second 1.65, total 2.93.

	Troch.	Fem.	Pat.	Tib.	Met.	Tar.	Total
Leg 1	0.41	2.22	0.63	1.87	2.16	1.24	8.94
Leg 2	0.57	3.26	0.84	2.93	3.27	2.89	13.86
Leg 3	0.48	2.64	0.55	2.12	2.64	1.56	9.99
Leg 4	0.57	3.42	0.80	2.71	3.88	1.65	13.03
Pedipalp	0.43	2.05	1.17	1.27	-	1.38	6.30

Differs from Form A male in: pedipalp less robust (c.f. Fig. 1E, D); trifold spine on femur and its proximal process less strong (Fig. 1E); midventral spine on femur relatively weak; proximal retroventral and distal pro- and retroventral spines on tibia relatively long (Fig. 1G). Tarsal formula: 3, 7-13, 4, 4.

Variations. The following important variations from the lectotype and males of the Mt Victoria population have been noted. Scute length 3.71-5.07 mm; proportion pedipalp femur length to scute length 0.53-0.70; leg 4 femur length to scute length 0.72-1.01.

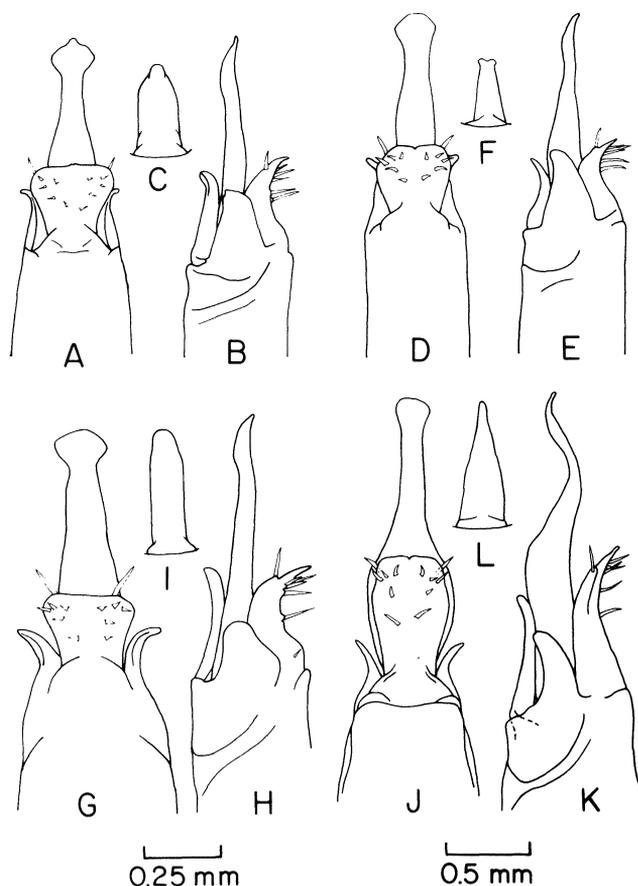


Fig. 4. Distal part of male genitalia of *Equitius* spp: A-C, *E. tambourineus* (Roewer); D-F, *E. richardsae* n.sp.; G-I, *E. montanus* n.sp.; J-L, *E. formidabilis* n.sp. A, D, G, J ventral; B, E, H, K lateral; C, F, I, L dorsal plate.

Populations collected from rainforest or semirainforest (Mt Coriaday, Mt Coricudgy, Mt Wilson, Mt Irvine, Mt Tomah and Kurrajong Heights) tend to have the following: midventral spine on pedipalp femur often relatively small, of similar size to more proximal retroventral spine, but large in some individuals; proximal process of trifold spine usually large and parallel to main axis (but not parallel in Kurrajong Heights population); spines in distal corners of pedipalp tibia slightly longer; the most proximal dorsal spine along pedipalp femur often lacking; both prodistal spines on pedipalp femur often not reaching level of ventral surface when viewed laterally. In the Mt Canobolas population proximal process of trifold spine large and parallel to main axis. The Oberon, Gurnang State Forest, Tuglow Hole Mountain and Mt Werong populations tend to have 4 rather than 5 segments in tarsus 1 and somewhat shorter spines on the eyemound and TA3. Minor variations occur in the structure of the penis (Fig. 5). Usually each ventral plate has 5 inferior setae, but the Lithgow specimen of Fig. 5 has 5 on the left side and 6 on the right, whilst the Mt Wilson specimen has 6 on both plates. This type of variation appears to be typical of *Equitius* spp. The shape of the ventral plate also varies, for in the Mt Victoria specimen illustrated it is relatively narrow near its base, but in

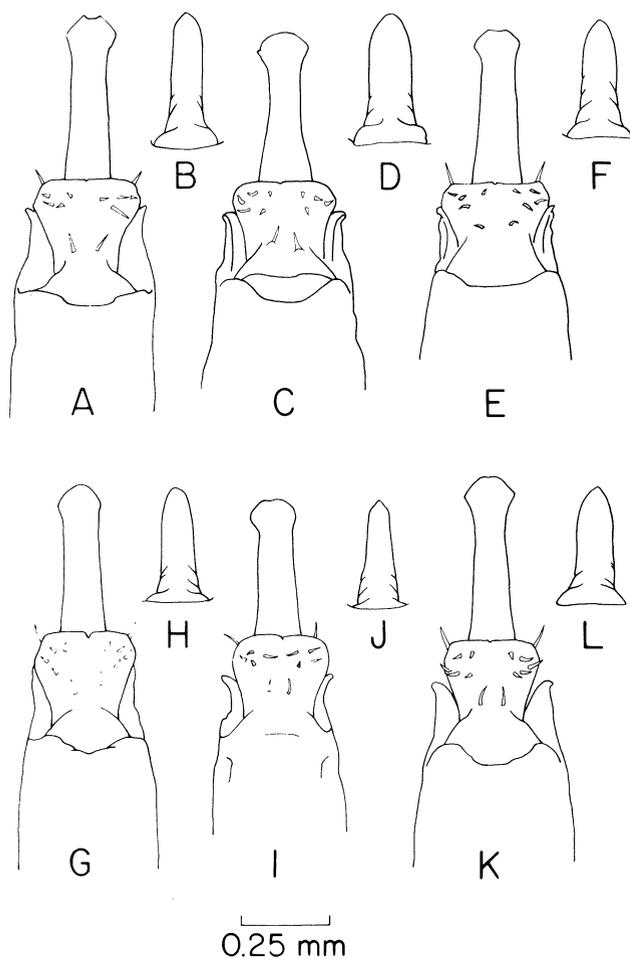


Fig. 5. Variation in distal part of male genitalia, *Equitius doriae* Simon. A-B, ex Mt Victoria; C-D, ex Lithgow; E-F, ex Jenolan Caves; G-H, ex Oberon; I-J, holotype *Monacanthobunus continentalis* Roewer; K-L, ex Mt Wilson. A, C, E, G, I, K ventral; B, D, F, H, J, L dorsal plate.

others examined from the population it is relatively wide. The size and shape of the dorsal plate varies slightly, but in all cases is relatively elongate and narrower than the base of the glans.

Distribution. N.S.W., in mountain and plateau country north of Goulburn and south of the Hunter River, with an outlier population at Mt Canobolas, near Orange. Most common in rainforest, wet sclerophyll forest, or snow-gum woodland.

Comments. Roewer (1915) redescribed *E. doriae* from a male and a female collected at the foot of Mt Townsend, N.S.W.; he did not examine the syntypes. This locality is in the Snowy Mountains, over 100 kilometres south of other known records of *Equitius*. No specimens labelled as *E. doriae* from this locality have been located in NMS but 2 males labelled as follows have been examined.

'*Equitius doriae* Simon
1 ♂, 1 ♀. N.S. Wales, Mt Victoria
Roewer det. 1914 No. 1039'.

The registration number indicates this is the material Roewer (1915) described and that the Mt Townsend record is an error (Hunt, 1979). The specimens (Roewer

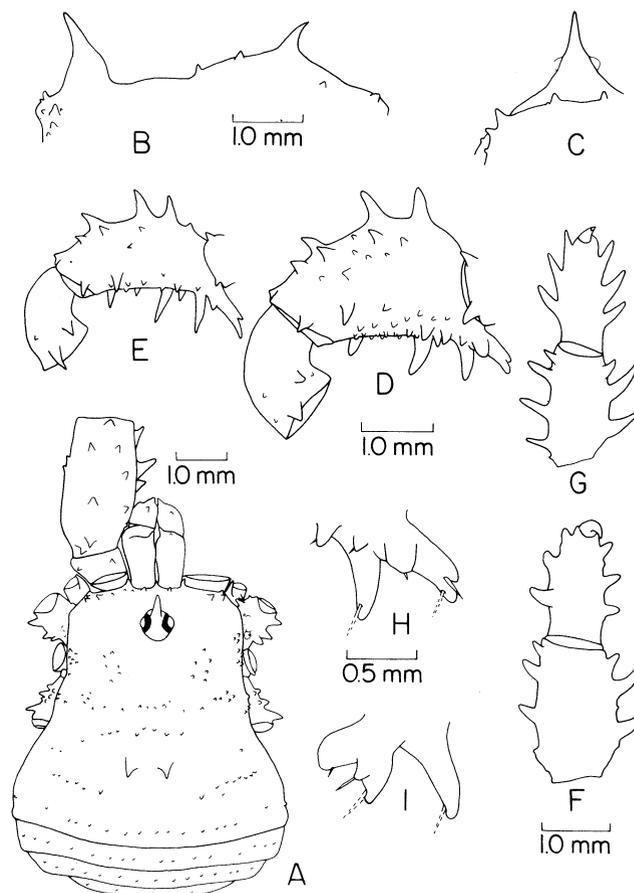


Fig. 6. *Equitius spinatus* (Pocock); male: A-D, F, H-I; female: E, G. A, dorsum; B, lateral profile of scute; C, anterior profile of eyemound; D-E, prolateral view of pedipalp femur and patella; F-G, ventral view of pedipalp tibia and tarsus; H-I, Iproximoventral trifold spine on pedipalp femur: H, prolateral; I, posterior.

coll. No. 302/1) identified as belonging to *E. doriae* by Roewer (1931) belong to *E. tambourineus*. The three males and three females identified in the same paper as *E. doriae* and said to be housed in PM (Coll. Simon No. 18082) cannot be located.

Equitius doriae appears to be most closely related to *E. spinatus*, but differs from it in the shape of the dorsal plate of the penis and in the strength of the midventral spine on the pedipalp femur. The structure of the pedipalp of *E. doriae* closely resembles that of *E. richardsae* but the latter differs in penis structure with a short, apically bifid dorsal plate.

Equitius spinatus (Pocock), 1903, n.comb
Figs 3D-F, J-L; 6; 13B-C

Monoxyomma spinatum Pocock, 1903: 445 and plate XI. —
Roewer, 1915: 112, 1923: 608.

Type material. HOLOTYPE ♂: Hillgrove, N.S.W., 1894, R. Broom, BM.

Additional material (in AM unless otherwise stated). New South Wales: Hillgrove; Narrow-Neck saddle, S. of Hillgrove; Brissey State Forest, E. of Yarowitch; Upper Tia River at crossing of Nowendoc Rd; Black Sugarloaf, Nowendoc-Walcha Rd; Mountain Creek, 42 km N. of Gloucester;

Barrington Tops (UQ and AM); Tubrabucca, Barrington Tops; Pacific Hwy, 10 km S. of Kempsey; Carrai Bat Cave area; Carrai Plateau (UQ); Wittittrin, W. of Kempsey; Corner Pacific and Oxley Hwy, Wauchope; Wilson River Flora Reserve via Wauchope; O'Sullivan's Gap Flora Reserve via Bulahdelah; Smiths Lake and Boolambayte Lake, via Bulahdelah.

Description. The following redescription is based on the holotype male and further material from type locality.

MALE: As in *E. doriae* except as set out below.

Measurements (mm) holotype: scute length 5.05, width 4.98; carapace length 2.38, width 3.56; genital operculum missing but measurements for male from same locality with scute length 5.15 are length 0.79, width 0.85; chelicera length, first segment 1.43, second 2.18, total 3.61.

	Troch.	Fem.	Pat.	Tib.	Met.	Tar.	Total
Leg 1	0.80	3.55	1.30	2.82	3.56	1.83	13.14
Leg 2	0.95	5.13	1.57	4.53	5.83	2.88	20.89
Leg 3	0.91	4.15	1.35	3.08	4.38	2.27	16.14
Leg 4	1.06	5.35	1.61	3.94	6.56	2.75	21.27
Pedipalp	0.84	3.37	1.98	1.94	-	2.05	10.17

Ranges (mm): length scute 4.88–5.07, length leg 4 femur 4.77–5.35, length pedipalp femur 3.04–3.37.

Colour: orange-brown with reddish and brown markings; free tergites darker; chelicerae and pedipalps orange with reddish-brown reticulations; legs yellowish with dark-brown markings.

Body (Fig. 6A–C): large, scute wide, eyemound spine long, eye-level *c.* 0.35 total eyemound height (Fig. 6B). Viewed anteriorly, lateral edge of eyemound sloping gradually from immediately below eyes (Fig. 6C). Mesial pair of tubercles on TA1 and TA2 relatively much smaller than those on TA3.

Pedipalps (Fig. 6A,D,F,H,I): proportion femur length to scute length 0.62–0.67; femur robust, proportion of dorsoventral thickness to length *c.* 0.59. Dorsum of femur rising more abruptly from articulation with trochanter. Midventral spine only marginally larger than more proximal retroventral spine. Tips of 2 distal spines on prolateral surface not reaching level of ventral surface when viewed laterally. Spines in both distal corners of tibia relatively well developed.

Legs: very long, proportion leg 4 femur to scute length 0.98–1.06. Calcaneus of leg 1 more robust; ventral notch deep and with steep proximal slope, mound on proximal edge prominent (Fig. 13B). Tarsal formula: 4–6, 9–15, 4, 4.

Penis (Fig. 3D–F): shape of fused ventral plates and arrangement of setae as in Fig. 3D,E, both subject to variation. Dorsal plate (Fig. 3F) broad, wider than base of glans; sides subparallel in proximal half, but beyond tapering to a short apical process reaching level of superior setae.

FEMALE. Differs from male in same respects as does that of *E. doriae*. Tarsal formula: 3, 7–13, 4, 4.

Variations. Scute length 3.85–5.07 mm. Proportion pedipalp femur length to scute length 0.58–0.68; leg 4

femur length to scute length 0.76–1.07. Most populations, particularly that from O'Sullivan's Gap, are more melanic than the Hillgrove population. At both Hillgrove and Barrington Tops the proximal process on the trifid spine of the pedipalp femur forms an angle with the main axis of the spine whilst in other populations it is subparallel to the main axis, though there are occasional individuals in which it forms an angle. In the Hillgrove population, there are usually 4 dorsal spines along the pedipalp femur, though some individuals have 5. In most other populations 5 is usual, though at Wittittrin near Kempsey 4 seems usual. In most populations the normal number of segments in tarsus 1 is 5, but in the Barrington Tops, Nowendoc and Upper Tia River populations this is usually 4. The Hillgrove populations differ from most others in having relatively long legs. The notch in the calcaneus of leg 1 is less pronounced in the Mountain Creek population. At present, none of these variations are regarded as consistent or important enough to erect separate species.

The dorsal plate of the penis figured by Pocock (1903) is slightly bifid as in *E. richardsae* but this condition has not been noted in other males from the type locality.

The populations mentioned above are at present grouped as *E. spinatus* because of basic similarities in the structure of the penis. They occur in a variety of habitats from rainforest to snow-gum woodland, with altitude ranging from sea level to 1,600 m. They also cover a wide geographic area with the type locality at the northern known limit. Therefore, it is possible that some of the populations may prove to be separate species.

Distribution. N.S.W., north of the Hunter River and south of the Hastings River, generally in mountain and plateaux country but also in low-lying moist habitats near coast. The northern-most record is Hillgrove.

Comments. *Equitius spinatus* shows affinities with several species, perhaps because of its relatively generalised morphology without any remarkable modifications. In overall penis structure it resembles *E. tambourineus*, *E. montanus* and *E. doriae*, but differs from the last two in having a broad dorsal plate terminating in a narrow apical process, and from *E. tambourineus* in the general shape of the glans apex. Externally, it shows a general similarity to *E. montanus* including the very deep notch on metatarsus 1, but the latter species differs in the structure of the trifid spine on the pedipalp femur and the prolateral spines on the pedipalp tibia.

Equitius altus (Forster). 1955, n.comb.

Figs 3G–I;7;13D;14B

Jenolanicus altus Forster, 1955: 394.

Type material. HOLOTYPE and 1 PARATYPE male: N.S.W. Barrington Tops, Jan 1925, C. Barrett, MV. Paratype is here designated as belonging to *E. spinatus*.

Additional material (all in AM). New South Wales:

Barrington Tops; Tubrabucca, Barrington Tops; Lister Park via Upper Allyn; Bald Knob area, via Upper Allyn; Big Gum Tree Reserve, SW of Kew; Carrai Bat Cave, W. of Kempsey.

Description. The following redescription is based on the Holotype and further material collected at the Barrington Tops area.

MALE. As in *E. doriae* except as set out below.

Measurements (mm) holotype: scute length 5.02, width 4.45; carapace length 2.45, width 3.55; genital operculum missing; chelicera length, first segment 1.87, second 2.67, total 4.54.

	Troch.	Fem.	Pat.	Tib.	Met.	Tar.	Total
Leg 1	0.63	3.44	1.04	2.75	3.37	1.74	12.97
Leg 2	0.81	4.75	1.35	4.30	5.28	4.15	20.64
Leg 3	0.80	3.77	1.28	3.02	3.90	2.16	14.93
Leg 4	0.95	4.60	1.11	3.85	5.90	2.55	18.98
Pedipalp	0.63	3.46	2.12	2.07	-	2.20	10.48

Ranges (mm): length scute 5.02–5.32, length leg 4 femur 4.60–5.13, length pedipalp femur 3.46–3.70.

Colour: pattern of scute as in Fig. 7A.

Body (Fig. 7 A–C): very large. Eyemound high and relatively narrow when viewed laterally (Fig. 7B); eye-level *c.* 0.35 total eyemound height. Viewed anteriorly, lateral edge of eyemound slopes gradually immediately below eyes (Fig. 7C). Mesial pair of tubercles on TA1 and TA2 small and about equal in size; mesial spines on TA3 long.

Chelicerae: very long; proportion second segment to scute length *c.* 0.53.

Pedipalp (Fig. 7A,D,F,H,I): relatively long; proportion femur to scute length 0.67–0.72; proportion femur dorsoventral thickness to length 0.54–0.58. Femur with 4 mediodorsal spines (Fig. 7A,D). Shape of proximoventral trifid spine as in Fig. 7D,H,I; proximal process strong. Midventral spine similar in size to more proximal retroventral spine. Tips of 2 distal spines on prolateral surface failing to reach level of ventral surface when viewed laterally (Fig. 7D). The most distal ventral spine just proximal to distal spines on prolateral surface.

Legs: proportion leg 4 femur to scute length 0.89–0.97. Proximal side of ventral notch in calcaneus of leg 1 not sloping steeply, of similar degree to distal side; proximal mound small (Figs 13D; 15B). Tarsal formula: 5–6, 12–16, 4, 7.

Penis (Fig. 3G–I): ventral plates more rounded when viewed ventrally, apical notch prominent, setae strong. Dorsal plate long, apex reaching beyond level of base of superior setae, wide though not as wide as base of glans, narrowing subproximally and slightly widening subdistally. Glans very wide basally and *c.* 0.75 width of ventral plates, narrowing quickly subapically before expanding into a markedly spatulate apex.

FEMALE. Chelicerae relatively shorter than male but otherwise differs from male in same respects as does that of *E. doriae*. Tarsal formula: 3, 10–12, 4, 4.

Variations. Specimens from the Carrai Bat Cave

population are less pigmented and have attenuated legs, proportion leg 4 femur length to scute length for 2 measured males 1.18 and 1.24. Otherwise, individuals resemble the surface form.

Distribution. N.S.W., apparently disjunct. Subtropical and temperate rainforest in the Upper Allyn–Barrington Tops area, north of Hunter Valley; subtropical rainforest in Big Gum Tree Reserve, SW of Kew; cavernicolous population in Carrai Bat Cave W. of Kempsey.

Comments. *Equitius altus* resembles *E. spinatus* in external appearance, but is much larger. It differs from *E. spinatus* in having relatively long chelicerae and a notch in metatarsus 1 without a steep proximal slope. It differs from all species in details of penis structure. The specific name '*altus*' is something of a misnomer, for *E. spinatus* is the more common species at high altitude on Barrington Tops. *E. altus* occurs, almost to the exclusion of *E. spinatus*, in *Nothofagus* beech forest and subtropical rainforest at lower altitudes.

Known surface populations appear to have comparatively localised distributions in the Barrington Tops area and in the Big Gum Tree Reserve area 120 km to the ENE. The Carrai Bat Cave population is situated about 140 km to the NE of Barrington Tops and about 90 km NW of Big Gum Tree. (*E. spinatus* appears to occupy most of the intervening country). Although the Carrai population is possibly a relict, restricted to this cave or caves in the area, the possibility remains that surface populations will be found. Apart from moderate depigmentation and attenuation of the legs, typical of a cavernicole, no other important differences from the surface form were noted. The status of the cave form may be better understood when its biology is investigated and if more extensive collecting reveals other cave or surface populations.

Localised sympatry between *E. altus* and *E. spinatus* has led to some taxonomic confusion. Forster (1955) believed that the male specimen he designated as the paratype of *E. altus* could represent a Form B male, and hence may have been the first record of male dimorphism in Australia. In fact, this specimen is a Form A male of *E. spinatus*. Forster's (1955) measurements appear to have been made on this paratype and not the holotype as implied in his paper. Interestingly, although Forster wrongly identified male dimorphism in the specimens available to him, both species are now known to have Form A and Form B males.

Equitius tambourineus (Roewer), 1921, n.comb.

Figs 4A–C; 8; 13E; 14C

Jenolanicus tambourineus Roewer, 1921: 5. — Forster 1955: 392.

Equitius affinis Roewer, 1923: 607. n.syn.

Rydrusa armata Roewer, 1931: 171. n.syn.

Type material. HOLOTYPE ♀: Mt Tamborine, Queensland, *c.* 1920, Mjöberg, Roewer coll. no. 4761, NHRMS.

Additional material (in AM unless otherwise indicated).

Queensland: Winton, holotype male of *E. affinis*, Roewer coll. no. 303(2), NMS and holotype male of *Rydrusa armata* (not female as stated by Roewer (1931)), Roewer coll. no. 1291/33, NMS; Tamborine, UQ; Mt Lamington; Mt Superbus via Boonah, UQ; Bald Mtn via Emu Vale, UQ.

New South Wales: Upper Coopers Creek, and Coopers Creek, via Huonbrook; N.S.W. (no other data), Roewer coll. no. 302/1, NMS (wrongly identified by Roewer (1931) as *E. doriae*).

'Süd-Australien': no other data, Roewer coll. 5369/40, NMS.

Description. The following redescription is based on the holotypes of *J. tambourineus* and *E. affinis* and on further material from the type locality, Mt Tamborine.

MALE. As in *E. doriae* except as set out below.

Measurements (mm) (Holotype male of *E. affinis*): scute length 4.15, width 3.92; carapace length 1.87, width 2.88; genital operculum length 0.61, width 0.59; chelicera length, first segment 1.24, second 1.90, total 3.14.

	Troch.	Fem.	Pat.	Tib.	Met.	Tar.	Total
Leg 1	0.52	2.45	0.70	1.98	2.53	1.46	9.64
Leg 2	0.63	3.66	0.95	3.35	4.07	3.22	15.88
Leg 3	0.55	2.90	0.70	2.31	3.11	1.57	11.14
Leg 4	0.55	3.73	0.80	2.86	4.40	2.09	14.43
Pedipalp	0.44	2.67	1.65	1.65	-	1.64	8.05

Ranges (mm): length scute 3.43–3.85, length leg 4 femur 3.57–3.81, length pedipalp femur 2.23–2.69.

Colour: pattern of dorsum as in Fig. 8A, reticulations on pedipalps more melanic than in most populations of *E. doriae*.

Body (Fig. 8A–C): small; eyemound rising just behind anterior margin of carapace but sloping more gradually than in *E. doriae* (Fig. 8B); spine very long with eyelevel c. 0.30 total eyemound height (Fig. 8B). Viewed anteriorly, lateral edge of eyemound sloping gradually below eyes (Fig. 8C). Spines arranged on dorsum as in Fig. 8A, very strongly developed in comparison with *E. doriae*. Prominent, laterally directed spine near anterior corner of carapace above coxa 2; small spine on lateral margin above coxa 3. Mesial pair of spines on TA3 very long, mesial pair of spines on TA1 very strong, those on TA2 much shorter. Spines on posterior margin of scute and on each free tergite very strong.

Chelicerae: distal half of first segment robust.

Pedipalps (Fig. 8A,D,F,H,I): femur relatively long and robust; proportion femur dorsoventral thickness to length 0.52–0.59. Femur with 4 mediadorsal spines, with 2–3 spines placed more prolaterally (Fig. 8A,D). Midventral spine only slightly larger than more proximal retroventral spine. On prolateral surface, tips of 2 distal spines not reaching level of ventral surface when viewed laterally (Fig. 8D).

Legs: long, ratio femur 4 to scute length 0.98–1.04. Ventral notch on metatarsus 1 not deep and without conspicuous mound on proximal edge (Figs 13E; 14C). Calcaneus very short, <0.25 astragalus length. Tarsal

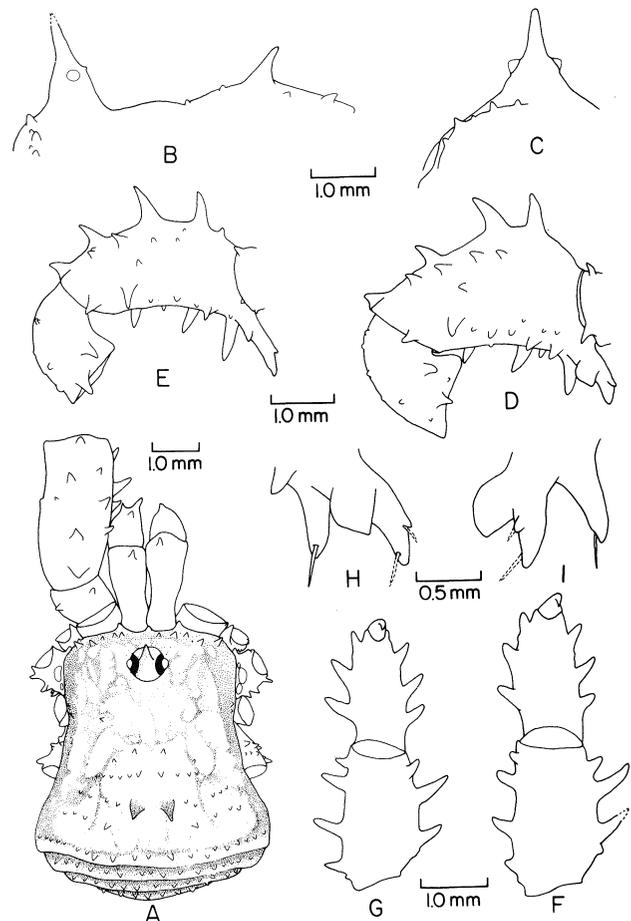


Fig. 7. *Equitius altus* (Forster); male: A–D,F,H–I; female: E, G. A, dorsum showing body colour pattern; B, lateral profile of scute; C anterior profile of eyemound; D–E, prolateral view of pedipalp femur and patella; F–G, ventral view of pedipalp tibia and tarsus; H–I, proximoventral trifid spine on pedipalp femur: H, prolateral; I, posterior.

formula 4–5, 11–12, 4, 4:

Penis (Fig. 4A–C): shape of fused ventral plates and arrangement of setae as in Fig. 4A,B, but both subject to minor variation. Dorsal plate (Fig. 4C) as broad as base of glans, sides subparallel but distally tapering rapidly to an apical process. Glans narrow subapically, apex markedly spatulate (Fig. 4A).

FEMALE. **Measurements** (mm) holotype: scute length 3.24, width 3.26; carapace length 1.54, width 2.38; genital operculum length 0.55, width 0.55; chelicera length, first segment 0.84, second 1.50, total 2.34.

	Troch.	Fem.	Pat.	Tib.	Met.	Tar.	Total
Leg 1	0.55	2.05	0.80	1.76	2.12	1.13	8.41
Leg 2	0.73	3.19	1.13	2.89	3.44	2.82	14.20
Leg 3	0.73	2.49	0.87	2.01	2.73	1.54	10.37
Leg 4	0.80	3.31	1.02	2.53	3.92	1.68	13.26
Pedipalp	0.44	1.91	1.15	1.17	-	1.24	5.91

Differs from male as does that of *E. doriae*. Tarsal formula: 3, 9–11, 4, 4.

Variations. Scute length 3.43–4.11 mm. In the Bald Mountain population, at the western extent of the known range of *E. tambourineus*, the mesial spines on

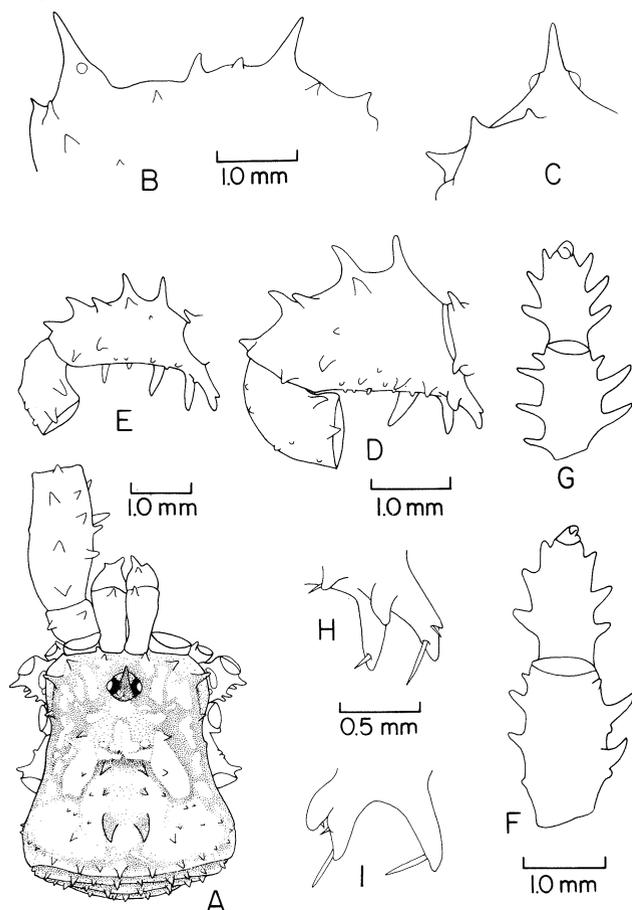


Fig. 8. *Equitius tambourineus* (Roewer), male: A-D, F, H-I; female: E, G. A, dorsum showing body colour pattern; B, lateral profile of scute; C, anterior profile of eyemound; D - E, prolateral view of pedipalp femur and patella; F - G, ventral view of pedipalp tibia and tarsus; H - I, proximoventral trifid spine on pedipalp femur: H, prolateral; I, posterior.

TA1 are nearly equal in size to those on TA2.

Distribution. Coastal ranges northwards from Richmond River, N.S.W., to Mt Tamborine, S.E. Queensland. Western-most record Mt Superbus, via Boonah, Queensland (the records from Winton, in the semi-arid region of Queensland, are probably in error).

Comments. Roewer (1923) described *E. affinis* from a single male ostensibly collected at Winton in western Queensland. This male was compared with males of *E. tambourineus* collected from the type locality. Both possess a penis and pedipalp of similar structure and have the highly characteristic strong spines on the margins of the carapace above coxa 2 and on TA1 (the latter overlooked by Roewer in his description of *E. affinis*). *Equitius affinis* must therefore be regarded as a synonym of *E. tambourineus*.

Both *E. tambourineus* and the geographically adjacent *E. richardsae* show unusual development of spines along the lateral margin of the carapace above coxae 2 and 3 respectively, suggesting a possible relationship. The difference in location of the strong spines may be due to a difference in some growth gradient in this part of the body. The genitalia of the

latter species, however, is quite distinctive. *Equitius tambourineus* and *E. richardsae* apparently occur sympatrically in the Bald Mountain area, south-east Queensland.

Equitius tambourineus resembles *E. spinatus* in penis structure, especially in the shape of the dorsal plate. Many populations of *E. spinatus* also have larger spines on TA1 than TA2. *Equitius tambourineus* can be readily distinguished from all other species by the large spines on the lateral margin of the carapace above coxa 2 and the very large mesial spines on TA1.

Equitius richardsae n.sp.

Figs 4D-F; 9; 13F

Type material. HOLOTYPE ♂: Dorrigo National Park, Dorrigo, N.S.W., subtropical rainforest, 30 August 69, G.S. Hunt, AM, No. KS 6484.

PARATYPES (collected G.S. Hunt, in AM except as indicated). New South Wales: Dorrigo National Park, subtropical rainforest, 30 August 69, ♀, KS 6485; Dorrigo-Ebor Rd, 26 km W. of Dorrigo, subtropical rainforest, 30 August 69, 1 ♂, 6 ♀, KS 6486-7; Gibraltar Range National Park, W. of Grafton, subtropical rainforest, 11 January 70, 2 ♂, 3 ♀, KS 6488; same data, 1 ♂, 1 ♀, ANIC; same locality (in earth bank), c. 1975, M.R. Gray, 1 ♂, KS 6500; 4 km W. of Nambucca Heads, wet sclerophyll, 10 January 81, 1 ♂, 1 ♀, KS 6489; Bruxner Park, via Coffs Harbour, subtropical rainforest 15 April 68, G. Monteith, 2 ♂, 4 ♀ UQ; Mt Lindesay via Woodenbong, subtropical rainforest, 14 January 81, 1 ♂, KS 6490; Tooloom Scrub via Woodenbong, 26-27 February 68, B. Cantrell, 5 ♂, 6 ♀, UQ.

Queensland: Bald Mountain, via Emu Vale, 17-22 May 69, B. Cantrell 2 ♂, 1 ♀, UQ.

Additional material. New South Wales: Raspberry Rd, via Jeogla, subtropical rainforest, 1 November 69; Jeogla area, cnr Kempsey Road & Forest Road, wet sclerophyll, 4 January 80.

Description. MALE. As in *E. doriae* except as set out below.

Measurements (mm) holotype: scute length 4.30, width 3.92; carapace length 1.76, width 2.06; genital operculum length 0.66, width 0.64; chelicera length, first segment 1.39, second 1.90, total 3.29.

	Troch.	Fem.	Pat.	Tib.	Met.	Tar.	Total
Leg 1	0.55	2.67	0.66	2.09	2.56	1.44	9.97
Leg 2	0.65	3.85	0.98	3.37	4.10	3.55	16.50
Leg 3	0.55	3.00	0.70	2.31	3.04	1.76	11.36
Leg 4	0.55	3.70	0.75	3.00	4.38	2.38	14.76
Pedipalp	0.59	2.82	1.68	1.63	-	1.68	8.37

Ranges (mm): length scute 3.60-4.53; length leg 4 femur 3.19-4.10, length pedipalp femur 2.16-2.89.

Colour: scute orange-brown with areas of dark-brown to black pigmentation. Chelicerae and pedipalps yellow-brown with dark-brown reticulations. Legs yellowish with dark-brown markings.

Body (Fig. 9A-C): eyemound spine long and slender, eye-level c. 0.3 total eyemound height. Lateral margin with prominent laterally directed spine above coxa 3. Spine on TA3 relatively long; spines on TA5 and free tergites strong.

Pedipalps (Fig. 9A, D, F, H, I): proportion femur to scute length 0.58-0.68; proportion femur dorsoventral

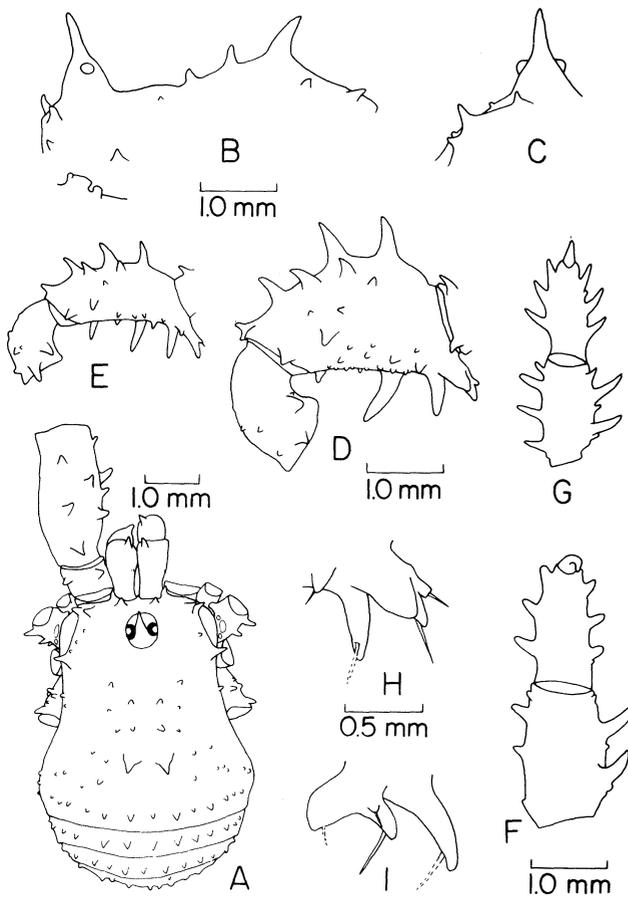


Fig. 9. *Equitius richardsae* n.sp.; male: A-D,F,H-I; female: E,G. A, dorsum; B, lateral profile of scute; C, anterior profile of eyemound; D - E, prolateral view of pedipalp femur and patella; F - G, ventral view of pedipalp tibia and tarsus; H - I, proximoventral trifold spine on pedipalp femur: H, prolateral; I, posterior.

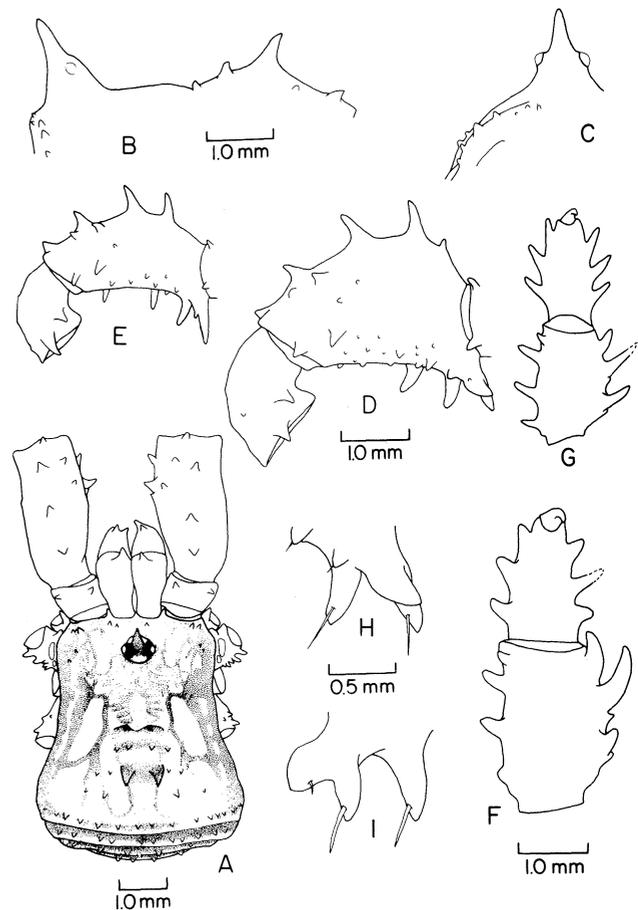


Fig. 10. *Equitius montanus* n.sp.; male: A-D,F,H-I; female: E,G. A, dorsum showing body colour pattern; B, lateral profile of scute; C, anterior profile of eyemound; D - E, prolateral view of pedipalp tibia and tarsus; F - G, ventral view of pedipalp tibia and tarsus; H - I, proximoventral trifold spine on pedipalp femur: H, prolateral; I, posterior.

thickness to length 0.51–0.56. Femur with 4 mediadorsal spines and 2–3 spines placed more prolaterally (Fig. 9A,D). Shape of proximoventral trifold spine as in Fig. 9D,H,I: proximal process strongly developed, more or less parallel to main axis when viewed laterally, reaching beyond base of relatively strong distal process. On prolateral surface, tips of 2 distal spines not reaching level of ventral surface when viewed laterally (Fig. 9D).

Legs (Fig. 13F): proportion leg 4 femur to scute length 0.76–0.93. Tarsal formula: 4–5, 11–15, 4, 4. Form of metatarsal notch as in Fig. 13F.

Penis (Fig. 4D–F): shape of fused ventral plates and arrangement of setae as in Fig. 4D,E; both subject to minor variation. Dorsal plate (Fig. 4F) apically bifid, very short (not reaching level of superior setae) and much narrower than base of glans. Lateral plates long, reaching level of superior setae (Fig. 4E).

FEMALE. Measurements (mm) paratype KS 6485: scute length 3.70, width 3.42; carapace length 1.61, width 2.42; genital operculum length 0.53, width 0.60; chelicera length, first segment 1.19, second 1.65, total 2.84.

	Troch.	Fem.	Pat.	Tib.	Met.	Tar.	Total
Leg 1	0.44	2.05	0.59	1.70	2.07	1.17	8.02
Leg 2	0.59	3.11	0.87	2.86	3.48	3.04	13.95
Leg 3	0.44	2.45	0.59	2.01	2.67	1.65	9.81
Leg 4	0.44	3.20	0.70	2.56	4.00	2.09	12.99
Pedipalp	0.37	1.90	1.20	1.20	–	1.25	5.92

Differs from male as does that of *E. doriae*. Tarsal formula: 3, 10–12, 4, 4.

Variations. Scute length ranges from 3.60–4.53 mm. The lateral spine on the scute above coxa 3 is small in populations in the Jeogla area at the south-western extent of the known range of *E. richardsae*.

Distribution. Along the coastal strip of N.S.W. from north side of Hastings River Valley to south side of Clarence River Valley. Along the ranges, its approximate western limits extend from the Jeogla area in the south (but not Point Lookout area), to Dorrigo Plateau, Gibraltar Range National Park, and northward to Bald Mountain on the Great Dividing Range in the extreme south of Queensland. The eastern-most record at this latitude is Mt Lindesay via Woodenbong.

Comments. Both *E. richardsae* and *E. tambourineus* show unusual development of spines along the lateral margin of the carapace above coxae 2 and 3 respectively. The structure of the pedipalp in *E. richardsae* is remarkably similar to that of *E. doriae*, but the femur of the latter tends to have 5 mediadorsal spines rather than 4. Apart from these possibly independently evolved similarities, *E. richardsae* has a highly distinctive penis possessing a short and apically bifid dorsal plate and relatively long lateral plates which distinguish it from other species.

***Equitius montanus* n.sp.**

Figs 4G-I;10;11;13G-H;14D

Type material. HOLOTYPE ♂ Point Lookout, New England National Park, N.S.W., temperate rainforest, 28 August 69, G.S. Hunt, AM KS6495.

PARATYPES: New South Wales: Point Lookout, temperate rainforest, 28 August 69, G.S. Hunt, ♀, AM KS6496; Round Mountain, New England National Park, wet sclerophyll forest, 28 August 69, G.S. Hunt, 3 ♂, 2 ♀, AM KS6498; same data, 1 ♂, 1 ♀, ANIC; Point Lookout, snow-gum woodland, 28 August 69, G.S. Hunt, 1 ♂, 1 ♀, AM KS6497; Point Lookout, 17 July 65, B. Cantrell, 1 ♂, 1 ♀, UQ; 26 km W. of Dorriggo on Ebor Rd, subtropical rainforest, 30 August 69, G.S. Hunt, ♂, 2 ♀, AM KS6499.

Description. The following description is based on the '4-spine' form, with differences exhibited by the '5-spine' form discussed under 'Variations'.

MALE. As in *E. doriae* except as set out below.

Measurements (mm) holotype: scute length 4.72, width 4.40; carapace length 2.45, width 3.39; genital operculum length 0.81, width 0.73; chelicera length, first segment 1.52, second 2.50, total 4.02.

	Troch.	Fem.	Pat.	Tib.	Met.	Tar.	Total
Leg 1	0.59	2.93	0.76	2.34	2.75	1.72	11.09
Leg 2	0.74	4.15	1.21	3.59	4.38	3.70	17.77
Leg 3	0.63	3.30	0.66	2.64	3.20	2.12	12.55
Leg 4	0.70	4.00	1.05	3.39	4.78	2.71	16.63
Pedipalp	0.52	3.20	2.02	1.95	-	1.94	9.63

Ranges (mm): length scute 4.05–5.13, length leg 4 femur 3.94–4.34, length pedipalp femur 2.71–3.66.

Colour: pattern as in Fig. 10A. Scute orange-brown with dark-brown to black pigmented areas. Chelicerae and pedipalps orange with dark-brown reticulations. Legs yellowish-brown with darker brown markings.

Body (Fig. 10A–C): large; eyemound spine long and relatively stout, eye-level c. 0.38 total eyemound height. Tubercles along anterior margin of carapace small (Fig. 10B,C).

Chelicerae: very long; proportion second segment to scute length c. 0.53.

Pedipalps (Fig. 10A,D,F,H,I): very long and robust; proportion femur to scute length 0.67–0.72; proportion femur dorsoventral thickness to length 0.55–0.64. Dorsal surface of femur rising steeply from articulation with trochanter and with only 1–2 spines placed more prolaterally to 4 mediadorsal spines (Fig. 10A,D). Shape

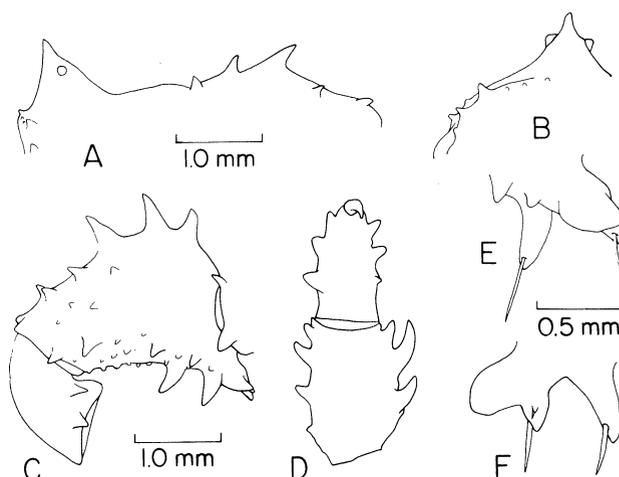


Fig. 11. *Equitius montanus* n.sp.; '5-spine form', male. A, lateral profile of scute; B, anterior profile of eyemound; C, prolateral view of pedipalp femur; D, ventral view of pedipalp tibia and tarsus; E–F, proximoventral trifid spine on pedipalp femur: E, prolateral; F, posterior.

of proximoventral trifid spine as in Fig. 10D,H,I; proximal process directed backwards and curved across main axis when viewed laterally (Fig. 10H), distal process small or absent. Midventral spine slightly smaller than more proximal retroventral spine. Tips of 2 distal spines on prolateral surface not reaching level of ventral surface when viewed laterally. The equivalent of the most distal medioventral spine in *E. doriae* reduced to small tubercle. Distal prolateral spine on tibia, and spine proximal to it, both extremely strong and strongly curved towards tarsus (Fig. 10F). Smaller proximal prolateral spine also curves towards tarsus.

Legs: proportion leg 4 femur length to scute length 0.84–0.97. Tubercles on retrolateral surface of coxa 2 and prolateral surface of coxa 4 as in Fig. 10A. Ventral notch on metatarsus very deep, proximal slope steep, prominent mound on proximal edge (Fig. 13G; 14D). Tarsal formula: 5-6, 11-15, 4, 4.

Penis (Fig. 4G–I): shape of fused ventral plates and arrangement of setae as in Fig. 4G,H, but subject to variation. Dorsal plate long, narrower than base of glans, reaching beyond level of base of superior setae. Lateral plates short. Glans wide basally, but narrow subapically; apex markedly spatulate.

FEMALE. **Measurements** (mm) paratype KS6496: scute length 4.36, width 4.70; carapace length 2.11, width 3.00; genital operculum length 0.70, width 0.79; chelicera length, first segment 1.30, second 2.12, total 3.42.

	Troch.	Fem.	Pat.	Tib.	Met.	Tar.	Total
Leg 1	0.52	2.45	0.70	2.10	2.42	1.43	9.62
Leg 2	0.63	3.63	1.00	3.22	3.85	2.93	15.26
Leg 3	0.57	2.89	0.66	2.42	3.00	1.50	11.04
Leg 4	0.66	3.55	0.87	3.11	4.38	2.34	14.91
Pedipalp	0.48	2.52	1.53	1.58	-	1.57	7.68

Differs from male in: trifid spine on femur with proximal process not directed backwards across main

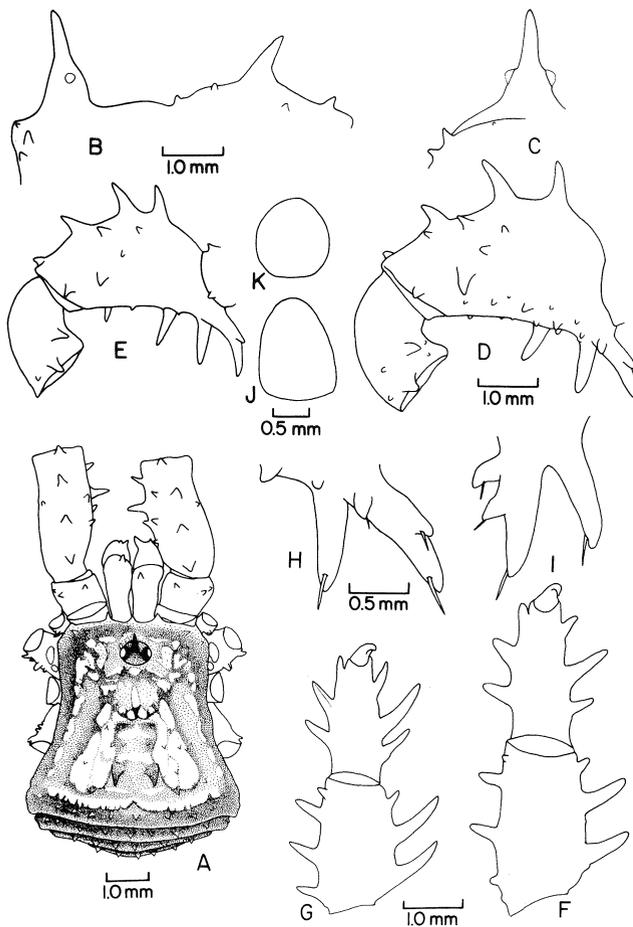


Fig. 12. *Equitius formidabilis* n.sp.; male: A-D,F,H-J; female: E,G,K. A, dorsum showing body colour pattern; B, lateral profile of scute; C, anterior profile of eyemound; D - E, prolateral view of pedipalp tibia and tarsus; F - G, ventral view of pedipalp tibia and tarsus; H - I, proximoventral trifid spine on pedipalp femur: H, prolateral; I, posterior; J - K, genital operculum, male and female.

axis of spine; prolateral spines on tibia not as strong and strongly curved (Fig. 10G); tarsal formula 3, 7-13, 4, 4.

Distribution. High country in the Point Lookout - Ebor area, N.S.W.

Variations. Several Form A specimens lack a distal process on the trifid spine of the pedipalp femur and, if present, it is small.

A possible case of ecophenotypic variation occurs in this species. Specimens collected in the temperate rainforest at Point Lookout, and the eucalypt forest on Round Mountain, have the same general form as that described above. Specimens from the small area of snow-gum woodland at the summit of Point Lookout (altitude 1,600 m) resemble the rainforest specimens in: penis structure; the presence of a strong, backwardly directed proximal process on the trifid spine of the pedipalp femur (Fig. 11E); the presence on the prolateral surface of the pedipalp tibia of strong spines which curve markedly towards the tarsus (Fig. 11D); the structure of the metatarsal notch (c.f. Fig. 13G,H).

However, these 'snow-gum' specimens differ in that they are smaller in size (scute length 3.70-4.22 mm); have shorter pedipalps and legs relative to scute length (proportions 0.58-0.64 and 0.74-0.80 respectively); have a less steeply sloping eyemound with a shorter spine (Fig. 11A,B); have shorter spines on TA3 (Fig. 11A) and 5 instead of 4 spines along the dorsal surface of the pedipalp femur (Fig. 11C). Tarsal formula: 5, 9-13, 4, 4.

For convenience they are referred to as '5-spine' (snow-gum woodland) and '4-spine' forms; both have Form A and Form B males. A possible explanation is that less equable conditions of the woodland result in the general stunting of the '5-spine' form, due perhaps to nutrition or to an effect of temperature on development. However, the presence of 5 spines instead of 4 is difficult to explain in these terms.

Another possibility is that they are different species. Although the rainforest gives way abruptly to the woodland with virtually no ecotone, there appears to be little mixing between the two populations. From a large series, only one specimen of the '4-spine' form (a female) was taken in the woodland, and no individuals of the '5-spine' form were taken in the rainforest. If the study of vagility in *E. doriae* is a guide (Hunt, 1979), more mixing of these two populations might have been expected. It is therefore possible the two forms are different, but closely related species, with distinct habitat preferences. In the absence of further data the ecophenotypic explanation is tentatively accepted.

Comments. This species most closely resembles *E. spinatus* from which it has probably evolved. It differs from it in the presence in the penis of a relatively attenuated dorsal plate lacking a narrow apical process, and in specialised modifications of the trifid spine on the pedipalp femur and the prolateral spines on the pedipalp tibia. The morphology of these last two characters also distinguishes *E. montanus* from all other species.

E. montanus has been recorded at altitudes above 1,100 m from rainforest, eucalypt forest and woodland in the New England National Park area, but may have a wider distribution especially to the north. It is sympatric with *E. richardsae*, which generally occurs at lower altitudes, in a small patch of rainforest between Dorrigo and Ebor.

Equitius formidabilis, n.sp.

Figs 4J-L;12;13I;14E

Type material. HOLOTYPE ♂: Bryants Creek, Royal National Park, 9 July 70, M.R. Gray, AM KS6491.

PARATYPES: New South Wales: Bryants Creek, Royal National Park, 9 July 70, M.R. Gray, 2 ♂, AM KS6492; Jamberoo Mtn, via Kiama, 5 April 70, G.S. Hunt, 1 ♂, 2 ♀, AM KS6491, KS6493; Mt Kiera Faunal Reserve, 25 January 78, M.R. Gray & C. Horseman, AM KS1500; Cambawarra Mtn, via Bomaderry, 19 December 80, G.S. Hunt, 1 ♂, 1 ♀, ANIC.

Description. MALE. As in *E. doriae* except as set out below.

Measurements (mm) holotype: scute length 5.36, width 5.30; carapace length 2.53, width 3.85; genital operculum length 1.24, width 0.96; chelicera length, first segment 1.98, second 2.75, total 4.73.

	Troch.	Fem.	Pat.	Tib.	Met.	Tar.	Total
Leg 1	0.61	3.85	0.91	3.11	3.74	1.87	14.09
Leg 2	0.95	5.88	1.36	5.21	6.64	4.26	24.30
Leg 3	0.87	4.64	0.98	3.40	4.90	2.38	17.14
Leg 4	0.91	5.94	1.46	4.45	7.44	2.93	23.13
Pedipalp	0.70	3.74	2.36	2.38	-	2.38	11.56

Ranges (mm): length scute 4.64–5.36, length leg 4 femur 5.32–5.94, length pedipalp femur 3.08–3.74.

Colour: pattern of dorsum as in Fig. 12A. Overall colour of scute orange-brown with lighter patches of yellowish-brown but heavily pigmented areas are dark-brown to black. Chelicerae and pedipalps orange-brown with dark-brown reticulations. Background colour of legs yellowish, but mainly obscured by dark-brown to black pigmentation.

Body (Fig. 12A–C): very large; eyemound rising slightly further behind anterior margin than in other species of *Equitius* and with very long, suberect spine (Fig. 12B). Viewed laterally, eyemound narrow with posterior edge sloping steeply, eye-level *c.* 0.3 total eyemound height. Viewed anteriorly, lateral edge of eyemound slopes steeply immediately below eyes (Fig. 12C). Anterior margin with 1–2 small spines above each pedipalp coxa (Fig. 12A–C). Mesial pair of spines on TA3 very large, pairs on TA1 and TA2 very small and of equal size. Spines forming rows on TA5 and free tergites relatively large. Genital operculum very large and relatively long (Fig. 12J).

Chelicerae: long; proportion second segment length to scute length 0.51.

Pedipalps (Fig. 12A,D,F,H,I): very long; proportion femur to scute length 0.62–0.70. Proportion femur dorsoventral thickness to length 0.50–0.56. Femur with 4 mediodorsal spines with 2–3 much smaller spines placed more prolaterally (Fig. 12A,D). Shape of proximoventral trifold spine as in Fig. 12D,H,I; proximal process very weak, little stronger than distal process. Viewed posteriorly (Fig. 12I) proximal process and main axis not V-shaped or arcuate. Midventral spine smaller than more proximal retroventral spine; spines on proventral margin immediately distal to trifold spine small (Fig. 12D). Tips of 2 distal spines on prolateral surface failing to reach level of ventral surface when viewed laterally (Fig. 12D). Long spines on lateral margins, especially prolateral margin of tibia and tarsus. Spine on retrodistal corner of tibia longer than that on prodistal corner. Second spine on prolateral margin of tarsus much longer than other spines. Tarsus relatively slender, longer than broad in ratio 1.2:1.

Legs: extremely long; proportion leg 4 femur to scute length *c.* 1.11. Ventral notch on calcaneus of leg 1 very shallow, lacking prominent mound on proximal edge (Fig. 13I); distal part of nodule field interrupted by

transverse grooves (Fig. 14E). Tarsal formula: 4–5, 12–15, 4, 4.

Penis (Fig. 4J–L): ventral plates extremely long, twice as long as wide. Dorsal plate long but not reaching level of superior setae on ventral plate, narrower than base of glans and tapering to a blunt point. Lateral plate long, slender, tongue-like. Glans very broad basally, lateral margins following margins of ventral plates; viewed laterally glans markedly curved.

FEMALE. Measurements(mm) paratype KS6493: scute length 4.98, width 5.55; carapace length 2.20, width 3.46; genital operculum length 0.95, width 0.98; chelicera length, first segment 1.72, second 2.25, total 3.97.

	Troch.	Fem.	Pat.	Tib.	Met.	Tar.	Total
Leg 1	0.63	3.19	0.86	2.71	3.15	1.50	12.04
Leg 2	0.76	4.90	1.21	4.53	5.51	3.68	20.59
Leg 3	0.62	3.85	0.76	3.11	4.15	2.12	14.61
Leg 4	0.86	5.02	0.98	4.00	6.30	2.71	19.87
Pedipalp	0.59	3.08	1.91	1.96	-	1.96	9.50

Very similar to male, but differs in having an approximately circular genital operculum (Fig. 12K); having a weaker trifold spine including proximal process on the pedipalp femur (Fig. 12D); having relatively longer retroproximal and pro- and retrodistal spines on the pedipalp tibia (Fig. 12G). Tarsal formula: 3, 12–13, 4, 4.

Variations. Only 8 specimens were available for study and no important infraspecific variations were noted except that the shape of the genital operculum may vary slightly in the male, being more elongate in some individuals than in others. It is not known if male dimorphism occurs as no bimodality was detected in the small samples.

Distribution. N.S.W., in patches of subtropical rainforest in coastal areas south of Port Hacking and north of Shoalhaven River.

Comments. This species has no close affinity with any other species of *Equitius*. Its highly distinctive characters include the structure of the penis, the lack of development of the trifold spine on the pedipalp femur and the form of the notch on metatarsus 1.

Discussion

While the genus is an arbitrary category, there is little doubt that the seven species currently placed in *Equitius* constitute a phylogenetic unit. All possess a penis and male metatarsal notch with the same basic structure, and have fundamentally the same morphology in other respects, including spination of the eyemound, scute and pedipalp. This cannot be said for certain other Australian harvestmen genera, such as *Nunciella* Roewer (Hunt, 1971), which contain a miscellany of species of doubtful affinity. Thus the previous confusion regarding the taxonomy of species of *Equitius* is a little surprising. It is attributable to two main causes: failure to recognise the nature of sexual dimorphism and undue

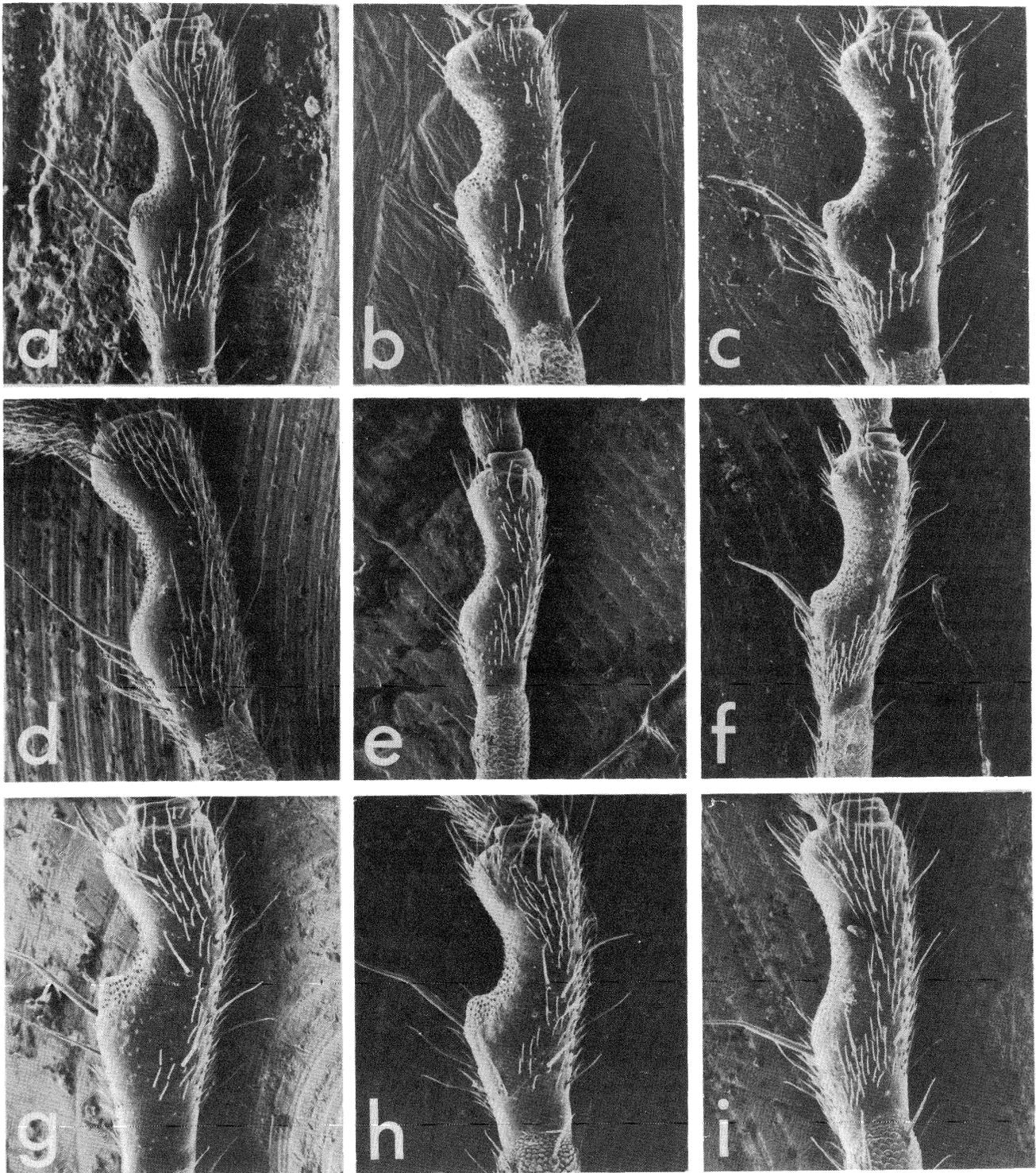


Fig. 13. Leg 1 metatarsal notch in male *Equitius* spp., prolateral. **a**, *E. doriae* Simon; **b**, *E. spinatus* (Pocock) ex Hillgrove; **c**, ex Barrington Tops population; **d**, *E. altus* (Forster); **e**, *E. tambourineus* (Roewer); **f**, *E. richardsae* n.sp.; **g**, *E. montanus* n.sp. '4-spine' form; **h**, '5-spine' form; **i**, *E. formidabilis* n.sp. Magnification: X 70.

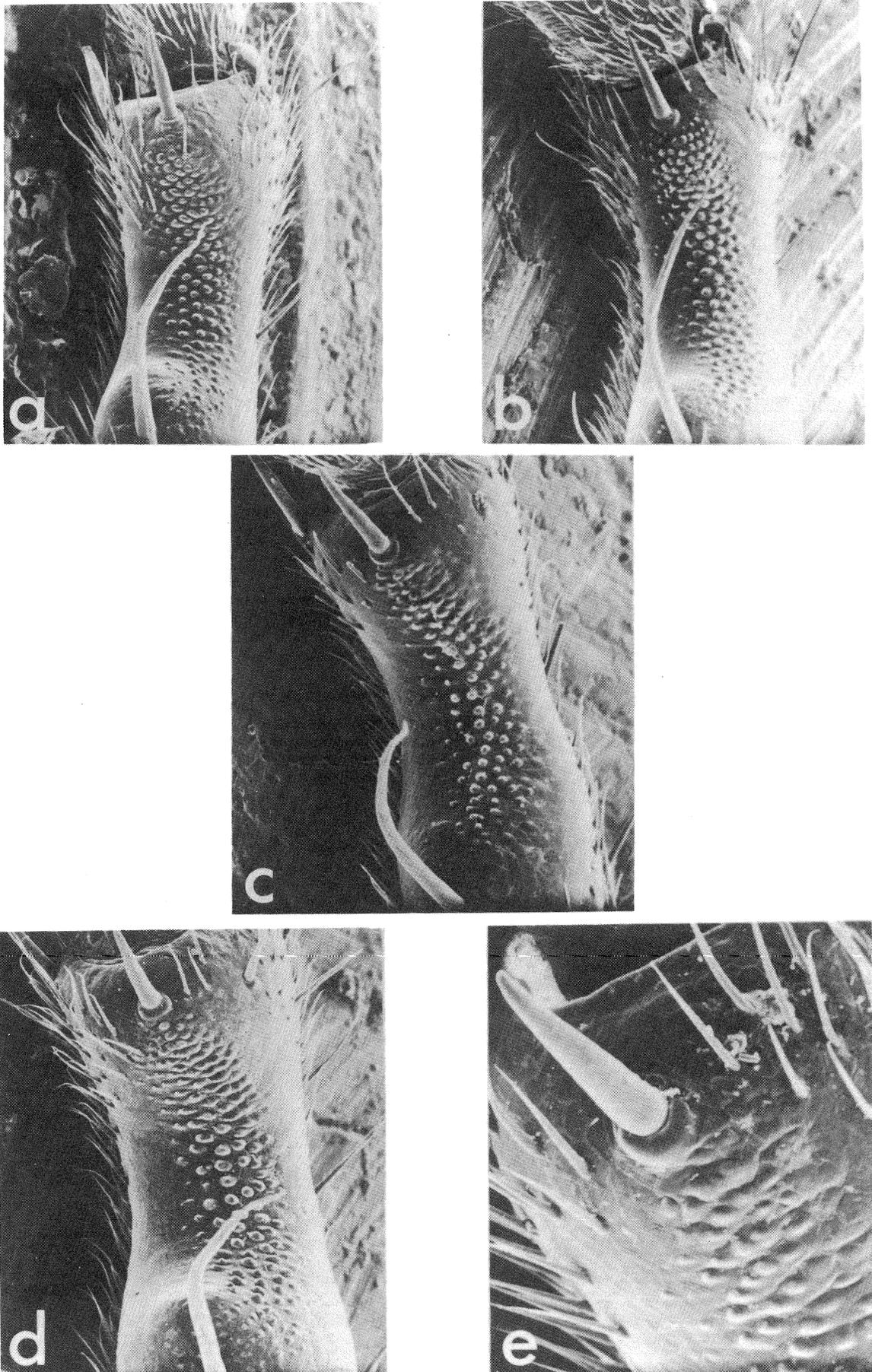


Fig. 14. Leg 1 metatarsal notch in male *Equitius* spp. ventral. **a**, *E. doriae* Simon; **b**, *E. altus* (Forster); **c**, *E. tambourinei* (Roewer); **d**, *E. montanus* n.sp.; **e**, *E. formidabilis* n.sp. distal region. Magnifications: a and b, X 160; c, X 240; d, X 180; e, X 310.

emphasis on the value of tarsal segmentation as a generic character.

Probably because of the relatively low frequency of Form B to Form A males, male dimorphism has not caused authors as much difficulty. However, Forster (1955), from his experience of male dimorphism in New Zealand harvestmen (Forster, 1954), believed he had identified this phenomenon in *E. altus* from Barrington Tops, N.S.W. As noted above, Forster's paratype 'Form B' male is, in fact, a Form A male of a separate species, *E. spinatus*, which is sympatric with *E. altus* at this locality. Also, Roewer (1931) misidentified a Form B male of *E. tambourineus* as a male of *E. doriae* while two Form A males were identified as females.

The seven species of *Equitius* are recognised on morphological grounds, and constitute morphospecies in the terminology of Mayr (1963; 1969). However, certain situations concerning *Equitius* permit direct evaluation of populations in terms of the biological species concept. At Barrington Tops, *E. altus* is sympatric with a population of *E. spinatus* while in the Carrai Bat Cave area, west of Kempsey, a cavernicolous population of *E. altus* occurs beneath a surface population of *E. spinatus*, ecological isolation being virtually complete. *Equitius richardsae* is sympatric with *E. montanus* in a small patch of rainforest between Ebor and Dorrigo. Further north, at Bald Mountain via Emu Vale in S.E. Queensland, *E. richardsae* is sympatric with *E. tambourineus*. Hybrids are not known in any of these examples of sympatry, although more sampling is required to determine the presence or absence of hybrid zones and the extent of range overlap.

In two of these examples the species involved show altitude preferences: at Barrington Tops and Point Lookout (near Ebor) which, interestingly, represent the areas of greatest topographic relief in N.S.W. outside the Snowy Mountains region. *Equitius altus* and *E. richardsae* are more common at low altitudes, whereas *E. spinatus* and *E. montanus* occur mainly at higher altitudes. *Equitius altus* and *E. spinatus* may also show habitat preferences, apart from the cave-surface example noted above. The former species occurs in both subtropical and temperate rainforest almost to the exclusion of the latter which, at Barrington Tops, is more common in *Eucalyptus* forest. Apart from having largely separate ranges, *E. richardsae* and *E. tambourineus* do not appear to have different altitude or habitat preferences.

The most closely related species in the genus appear to be *E. spinatus*, *E. montanus* and *E. doriae*. The affinities of the other four species are more obscure. The first two occur in adjacent parts of the New England Plateau but it is not known whether they are allopatric or partly sympatric.

Equitius spinatus and *E. doriae* seem to be geographically isolated, occurring respectively north and south of the Hunter River. Apart from the waterway itself, the main isolating barrier appears to be the topographic gap known as the Cassilis Gate (Taylor, 1919) which runs east-west through the Great Dividing

Range. Being inland and low-lying, it has a lower rainfall than the mountain areas to the north and south, resulting in a zone of dry country unsuitable for *Equitius*. It is not known how long this has acted as a barrier to dispersal, but the morphological differences between the two species are not very marked. The discontinuous nature of moist montane areas has also been used to explain the distribution of flies in the genus *Pelecorrhynchus* (Mackerras, 1942) and the geographical races of the phasmid *Didymuria violescens* (Leach) (Craddock, 1970). Lawrence (1953) believes discontinuous areas of moist habitat have promoted speciation in South African Triaenonychidae.

Both rivers and dry sclerophyll country appear to isolate *E. doriae* from *E. formidabilis*, though in this case the species are not closely related. The latter species occurs in patches of coastal rainforest from Royal National Park just south of Sydney to Cambawarra Mountain just north of the Shoalhaven River. Westwards, it appears to be isolated from populations of *E. doriae* by an inland tract of mostly dry sclerophyll country. Moister areas in this drier region are occupied by *Holonuncia* spp. *Equitius formidabilis* is the most distinctive species of the genus in both genital and external morphology, and has probably been isolated in rainforest areas south of Sydney for a considerable period. It may once have had a wider distribution when the rainforest belt was more continuous but, like *E. altus*, now appears to be restricted to isolated 'relict' populations.

The Hastings River Valley forms a barrier between populations of *E. spinatus* and *E. richardsae* occurring respectively to the south and north. Similarly, further north the Clarence River Valley separates populations of *E. richardsae* and *E. tambourineus*. While the Clarence River was once considered a major zoogeographical boundary between the southern, temperate Bassian fauna and the tropical Torresian fauna (Spencer, 1896; Littlejohn, 1967), it is not generally so recognised now (Horton, 1973) and is certainly not respected by *Equitius*.

The northern limits of *Equitius* appear to be in the vicinity of Brisbane and approximate the northern boundary of the modified Bassian distribution of Mackerras (1970). Northwards, *Equitius* is replaced mainly by tropical assamiids and phalangodids and also by species in the undescribed genus of triaenonychids (noted above), including the nominal species *Monoxyomma manicatum* and *M. rotundum*.

The low-lying area of drier country south of Goulburn known as the Lake George Gate (Taylor, 1919), and the Shoalhaven River in the moister coastal strip, appear to act as barriers to the southward dispersal of *Equitius*. To the south, *Equitius* is replaced principally by the related genus *Holonuncia*, and by *Nunciella* and the undescribed genus noted above.

ACKNOWLEDGEMENTS. I wish to thank Dr Aola M. Richards, School of Zoology, University of N.S.W., for her help and encouragement in the preparation of both my doctoral thesis and this paper which is derived from it. I also thank the staff of the Australian Museum, Sydney, particularly Dr D.K. McAlpine for his criticisms of the manuscript, Mr John Fields for photographic work and Mrs Karen McRae and Mrs June Adams for typing. Mrs Phlyp Greer redrafted the illustrations. The co-operation of the many institutions which provided material for study is gratefully acknowledged.

rendu des Séances de Société entomologique de Belgique (1880): 100–103.

Spencer, W.B., 1896. Summary of the zoological, botanical, and geological results of the Expedition. In 'Report on the Work of the Horn Scientific Expedition to Central Australia' (ed. W.B. Spencer), Part 1: 139–199. Dulau, London.

Taylor, T.G., 1919. Climatic cycles and evolution. *Geographical Review* 8: 289–328.

References

- Craddock, E., 1970. Chromosome number variation in a stick insect *Didymuria violescens* (Leach). *Science* 167: 1380–1382.
- Forster, R.R., 1954. The New Zealand harvestmen (sub-order Laniatores). *Canterbury Museum Bulletin* 2: 4–329.
- 1955. Further Australian Opiliones. *Australian Journal of Zoology* 3(3): 354–411.
- Hickman, V.V., 1958. Some Tasmanian harvestmen of the family Triaenonychidae (sub-order Laniatores). *Papers and Proceedings of the Royal Society of Tasmania* 92: 1–116.
- Horton, D., 1973. The concept of zoogeographic sub-regions. *Systematic Zoology* 22: 191–195.
- Hunt, G.S., 1971. The genus *Nunciella* Roewer (Opiliones, Laniatores) with description of a new species from Kangaroo Island, South Australia. *Journal of the Linnean Society of New South Wales* 96(1): 53–65.
- 1979. Male Dimorphism and Geographic Variation in the Genus *Equitius* Simon (Arachnida, Opiliones). PhD Thesis, University of N.S.W., Sydney (copies in University of N.S.W. and Australian Museum Libraries).
- Lawrence, R.F., 1953. The Biology of the Cryptic Fauna of the Forests. With special reference to the indigenous forests of South Africa. A.A. Balkema, Cape-Town, pp. 408.
- Littlejohn, M.J., 1967. Patterns of zoogeography and speciation in south-eastern Australian Amphibia. In 'Australian Inland Waters and Their Fauna' (ed. A.H. Weatherley): 150–174, Australian National University Press, Canberra.
- Mackerras, I.M., 1942. The genus *Pelecorhynchus* (Diptera, Tabanoidea). *Proceedings of the Linnean Society of New South Wales* 67: 9–76.
- 1970. Composition and distribution of the fauna. In 'The Insects of Australia' (ed. D.F. Waterhouse): 187–203. Melbourne University Press, Melbourne.
- Mayr, E., 1963. *Animal Species and Evolution*. Belknap Press, Cambridge, Mass., pp. 796.
- 1969. *Principles of Systematic Zoology*. McGraw-Hill, New York, pp. 428.
- Pocock, R.I., 1903. On some new harvest-spiders of the order Opiliones from southern continents. *Proceedings of the Zoological Society of London* (1902) Part 2: 392–413.
- Roewer, C. Fr., 1915. Die Familie der Triaenonychidae der Opiliones Laniatores. *Archiv fuer Naturgeschichte* (1914) 80A(12): 61–168.
- 1921. Australische Opiliones. *Arkiv Zoologi* 13(18): 1–10.
- 1923. Die Weberknechte der Erde. Fischer, Jena, pp. 1116.
- 1931. Über Triaenonychiden (VI. Ergänzung der 'Weberknechte der Erde', 1923). *Zeitschrift fuer Wissenschaftliche Zoologie* 138(1): 137–185.
- Simon, E., 1880. Premier supplément au travail intitulé essai d'une classification des Opiliones Mecostethi, remarques synonymiques et descriptions d'espèces nouvelle. *Compte*