

A new genus of the pseudoscorpion family Chernetidae (Pseudoscorpiones) from southern Australia with Gondwanan affinities

Mark S. Harvey: Collections & Research, Western Australian Museum, 49 Kew Street, Welshpool, Western Australia, 6106, Australia; Adjunct, School of Biological Sciences, University of Western Australia, Crawley, Western Australia 6009, Australia. E-mail: mark.harvey@museum.wa.gov.au.

Abstract. A new genus of pseudoscorpions of the family Chernetidae, *Austinochernes*, is described for two new Australian species, *A. andrewaustini* (type species) from South Australia and Victoria, and *A. zigzag* from Tasmania. They are most similar to species of the Neotropical genus *Pseudopilanus* Beier, 1957 in the possession of a spine-like seta on the prolateral face of the chelal hand at the base of the fingers, but differ by the presence of acuminate setae on the male pedipalpal trochanter. The suspected relationship between *Austinochernes* and *Pseudopilanus* suggests that their distribution is the result of Gondwanan vicariance.

Keywords: Taxonomy, morphology, new species, *Pseudopilanus*

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The Chernetidae is one of the most diverse pseudoscorpion families with 117 genera and 664 species currently recognized as valid. They are found all over the world and in virtually all terrestrial environments, and some species are regularly found in phoretic or commensal associations with other animals such as flying insects and mammals (Beier 1948; Muchmore 1971; Harvey et al. 2012). Chernetids comprise approximately a quarter of the world's generic diversity of pseudoscorpions, which currently includes 467 genera. Nevertheless, the Australian fauna is imperfectly known with only 37 indigenous species in 17 genera currently described (Harvey 2013, 2018), with a single introduced species, *Lamprochernes savignyi* (Simon, 1881) recorded from urban regions (Harvey 1987). However, the Australian fauna is actually quite diverse, with several genera that appear to represent new genera, and numerous new species (Harvey, unpublished data).

The two species described below could not be assigned to any existing genus and are quite unlike any other described Australian chernetids. They resemble, however, the temperate members of the Neotropical genus *Pseudopilanus* Beier, 1957, most notably in the possession of a spine-like seta on the prolateral face of the chelal hand at the base of the fingers (Figs. 9, 28) and the broad, foliate vestitural setae (Figs. 8, 27). They also share other features such as the number of blades in the cheliceral rallum (Figs. 17–19, 34), the positions of the trichobothria (Figs. 11, 13, 29) and the lack of tactile setae on the tarsi of legs III and IV (Figs. 20, 31). Despite these similarities, there were several notable differences that warrant the inclusion of both species in a new genus, which is described in this contribution.

METHODS

The specimens used in this study are lodged in the following institutions: Museum Victoria, Melbourne (NMV), South Australian Museum, Adelaide (SAM), Tasmanian Museum and Art Gallery, Hobart (TMAG) and the Western Australian Museum, Perth (WAM). The specimens were studied using

temporary slide mounts prepared by immersion of the specimen in lactic acid at room temperature for several days, while mounted on microscope slides with 10 or 12 mm coverslips supported by small sections of 0.25, 0.35 or 0.5 mm diameter nylon fishing line. After study, the specimens were rinsed in water and returned to 75% ethanol with the dissected portions placed in 12 × 3 mm glass genitalia microvials (BioQuip Products, Inc.). Specimens were examined with an Olympus BH–2 compound microscope, and illustrated with the aid of a drawing tube attached to the latter. The digital images were generated with a Leica MZ16A dissecting microscope using Leica Application Suite Version 3.7.0 software. Measurements were taken at the highest possible magnification using an ocular graticule.

Terminology and mensuration mostly follow Chamberlin (1931), with the exception of the nomenclature of the pedipalps, legs and with some minor modifications to the terminology of the trichobothria (Harvey 1992), chelicerae (Judson 2007) and faces of the appendages (Harvey et al. 2012). Measurements are given as length/width in each Dimensions section. There seems little point in providing measurements of the chelicera and leg I for most chernetid pseudoscorpions, as they are usually not diagnostic. Such measurements are therefore not included in the descriptions.

SYSTEMATICS

Family Chernetidae Menge, 1855

Subfamily Chernetinae Menge, 1855

Genus *Austinochernes* gen. nov.

ZooBank Registration: <http://zoobank.org/NomenclaturalActs/57B9471B-0F59-414D-9FF2-A26430310028>

Type species.—*Austinochernes andrewaustini* sp. nov.

Diagnosis.—Species of *Austinochernes* most closely resemble those of the Neotropical genus *Pseudopilanus*, as they share the following features: spine-like seta present on prolateral face of chelal hand at base of fingers (Figs. 9, 28); and



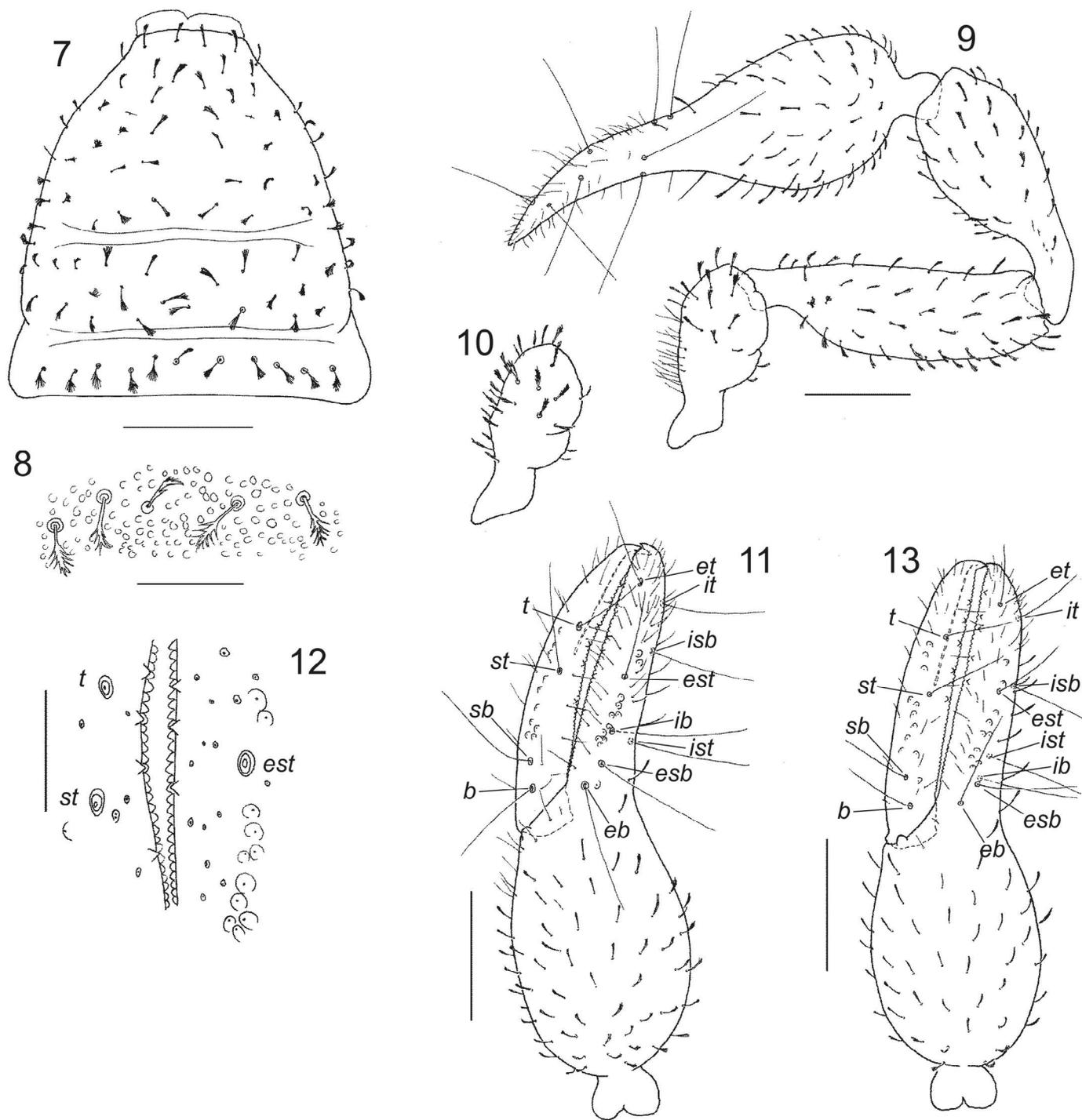
Figures 1–6.—*Austinochernes andrewaustini* sp. nov.: 1–3, holotype male, habitus (SAM PS2430): 1. Dorsal; 2. Ventral; 3. Cephalothorax, dorsal; 4–6, paratype female, habitus (SAM PS2431): 4. Dorsal; 5. Ventral; 6. Cephalothorax, dorsal. Scale lines = 1 mm (Figs. 1, 2, 4, 5), 0.5 mm (Figs. 3, 6).

vestitural setae of the carapace, tergites and pedipalps strongly foliate (Figs. 8, 27). They differ as follows: prolateral surface of the male pedipalpal trochanter with several acuminate setae (Figs. 9, 28) (absent in *Pseudopilanus*); setae of carapace, abdomen and pedipalps strongly foliate, but with long stalk prior to branching (Figs. 8, 27) (short stalk in *Pseudopilanus*); chelal fingers with several accessory teeth on margins of both fingers (Figs. 12, 30) (absent in most *Pseudopilanus*); trichobothrium *isb* situated substantially closer to *it* than *ist* (Figs. 11, 13, 29) (*isb* situated midway between *it* and *ist* in most *Pseudopilanus*); and cheliceral hand with 6, 7 or 8 setae (Figs. 14, 32) (5 setae in most *Pseudopilanus*).

Description (adults).—*Setae*: most vesitural setae large, curved and strongly clavate (Figs. 8, 27); setae on chelal fingers and prolateral face of trochanter (male only) acuminate.

Chelicera: hand with 6, 7 or 8 setae (Figs. 14, 32); movable finger with 1 long subdistal seta; with 2 dorsal lyrifissures and 1 ventral lyrifissure; rallum of 2 (rarely) or 3 blades, distal blade serrate, others smooth (Figs. 17–19, 34); galea of ♂ without rami (Figs. 15, 33), ♀ with 3 terminal rami and 3 rami medially (Fig. 16); lamina exterior present.

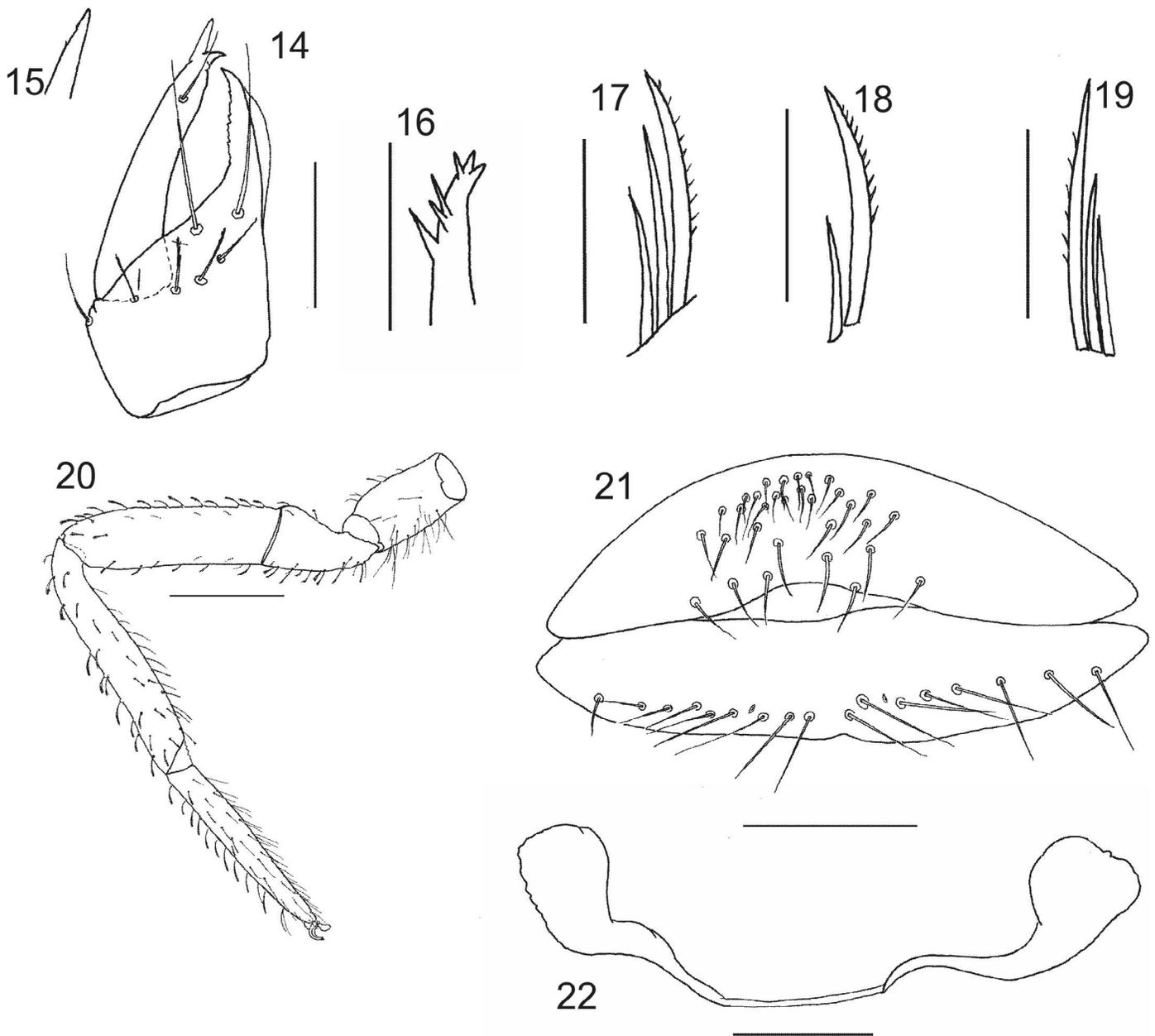
Pedipalp: male trochanter with several acuminate setae on prolateral face (Figs. 9, 28). Fixed chelal finger with 8



Figures 7–13.—*Austinochernes andrewaustini* sp. nov., holotype male (SAM PS2430), unless stated otherwise: 7. Carapace, dorsal; 8. Carapace, detail of section of metazone, dorsal; 9. Right pedipalp, dorsal; 10. Right trochanter, dorsal, paratype female (SAM PS2431); 11. Left chela, retrolateral; 12. Left chelal fingers, retrolateral, detail; 13. Left chela, retrolateral, paratype female (SAM PS2431). Scale lines = 0.25 mm (Figs. 7, 9–11, 13), 0.1 mm (Figs. 8, 12).

trichobothria, movable chelal finger with 4 trichobothria (Figs. 11, 13, 29): trichobothria *eb* and *esb* sub-basal; *est* situated between *esb* and *et*, either midway or slightly closer to *et* than to *esb*; *et* sub-distal; *ib* and *ist* sub-basal; *isb* situated subdistally, closer to *it* than to *ist*; *it* situated distally, slightly basal to *et*; *b* and *sb* sub-basal; *st* midway between *sb* and *t*.

Venom apparatus only present in movable chelal finger, venom duct long terminating in slightly inflated nodus ramosus; marginal chelal teeth juxtadentate, with accessory chelal teeth on retrolateral and prolateral margins (Figs. 12, 30). Chelal fingers of male slightly gaping (Figs. 11, 12, 29, 30), of female not gaping (Fig. 13). Chelal hand with prominent



Figures 14–22.—*Austinochernes andrewaustini* sp. nov., holotype male (SAM PS2430), unless stated otherwise: 14. Left chelicera, dorsal; 15. Left galea, dorsal; 16. Left galea, dorsal, paratype female (SAM PS2431); 17. Left rallum, lateral; 18. Left rallum, lateral, paratype female (SAM); 19. Left rallum, lateral, female from Victoria (NMV K13972); 20. Left leg IV, retrolateral, holotype male (SAM PS2430); 21. Genital opercula (sternites II and III), paratype female (SAM PS2431); 22. Spermathecae, paratype female (SAM PS2431). Scale lines = 0.25 mm (Fig. 20), 0.1 mm (Figs. 14, 21), 0.05 mm (Figs. 16–19, 22).

anteriorly-directed spine-like seta on prolateral face at base of fingers (Figs. 9, 28).

Carapace: rugose (Figs. 3, 6, 8, 25, 27); eyes and eye-spot absent (Figs. 3, 6, 25); with 2 transverse furrows, posterior furrow closer to posterior margin than anterior furrow; posterior margin of carapace straight; without pale patches (Figs. 3, 6, 25).

Coxal region: manducatory process with small sub-oral seta on medial edge; median maxillary lyrifissure rounded and situated submedially; posterior maxillary lyrifissure rounded.

Legs: junction between femora and patellae I and II strongly oblique; suture line between femora and patellae III and IV strongly oblique (Figs. 20, 31); femora III and IV much smaller than patellae (Figs. 20, 31); tarsi III and IV without tactile setae (Figs. 20, 31); all tarsi with slit sensillum on raised mound; legs with subterminal tarsal setae arcuate and acute; arolium undivided, slightly shorter than claws; claws slender and simple, without ventral process.

Abdomen: most tergites and sternites with medial suture line (Figs. 1, 2, 4, 5, 23, 24). Tergites unicolorous, without pale patches (Figs. 1, 2, 23). Sternite II of female with widely



Figures 23–25.—*Austinochernes zigzag* sp. nov., holotype male, habitus (TMAG J6274): 23. Dorsal; 24. Ventral; 25. Cephalothorax, dorsal. Scale lines = 1 mm (Figs. 23, 24), 0.5 mm (Figs. 25).

spaced setae (Fig. 21). Spiracles simple, with spiracular helix. Pleural membrane hispido-granulate, without setae.

Genitalia: male with typical chernetid morphology; female with 1 pair of laterally directed spermathecae, each with a broad terminal receptaculum (Fig. 22).

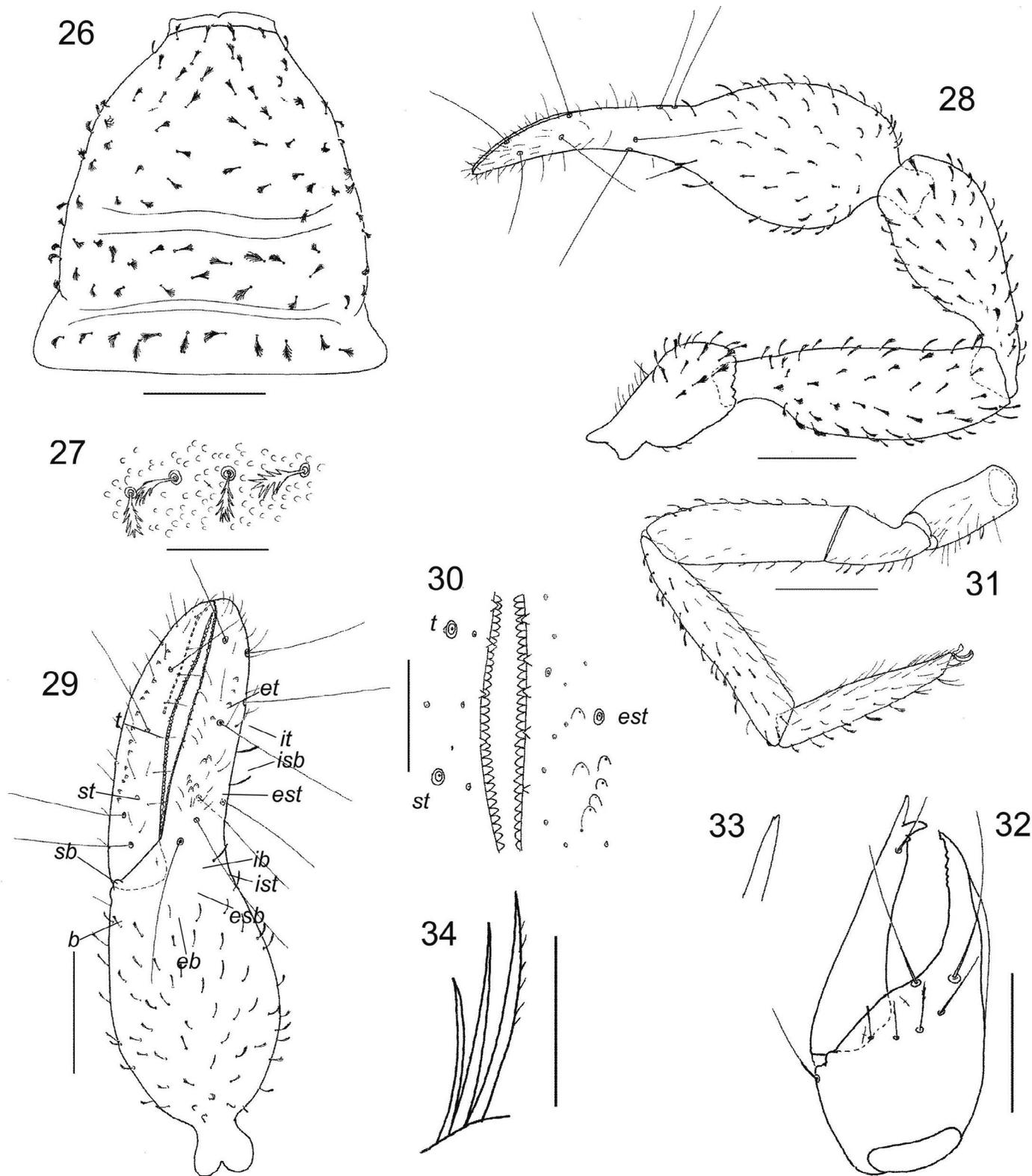
Remarks.—Species of *Austinochernes* appear to most closely resemble many species of the South American genus *Pseudopilanus* Beier, 1957, especially in the presence of large, conspicuous, foliate vestitural setae that adorn the majority of the sclerites and the presence of a spine-like seta on the prolateral face of the chelal hand at the base of the fingers (Beier 1957, 1964a, b, 1977; Mahnert 1985). Most species of *Pseudopilanus* have a prominent spine-like seta on the prolateral surface of the chelal hand at the base of the fingers, including *P. chilensis*, *P. echinatus*, *P. fernandezianus*, *P. kuscheli* and *P. topali* (Beier 1957, 1959, 1964a, b). However, it is absent in *P. crassifemoratus* and *P. inermis* (Beier 1977; Mahnert 1985) and has not been described or illustrated in *P. foliosus* (Balzan 1890; Mahnert 2016).

As noted in the diagnosis, *Austinochernes* differs from *Pseudopilanus* in the presence of several acuminate setae on the prolateral surface of the male pedipalpal trochanter (Figs. 9, 28), and the long stalk on the foliate vestitural seta (Figs. 8, 27). There are several other features that only partially serve to differentiate the two genera. In the original description of *Pseudopilanus*, Beier (1957) noted that the type species, *P. fernandezianus* Beier, 1957 (Juan Fernandez Islands), lacked accessory teeth on the chelal fingers. Other *Pseudopilanus* species have also been found to lack accessory teeth, including *P. chilensis* Beier, 1964 (Chile), *P. crassifemoratus* Mahnert, 1985 (Brazil) (Beier 1964a; Mahnert 1985). However, the presence or absence of accessory teeth was not mentioned in the description of *P. echinatus* (Argentina, Brazil and Chile), *P. kuscheli* Beier, 1964 (Chile) and *P. topali* Beier, 1964 (Argentina) (Beier 1959, 1964a, b), and they were reported to

be present in *P. foliosus* (Balzan, 1887) (Argentina) and *P. inermis* Beier, 1977 (Ecuador) (Beier 1977; Mahnert 2011), thus negating its usefulness as a genus-level diagnostic feature of *Pseudopilanus* species. Most *Pseudopilanus* species have only five setae on the cheliceral hand, although *P. inermis* has seven setae (Beier 1977), a similar morphology to *Austinochernes* which has six, seven or eight setae (Figs. 14, 32), and *P. foliosus* has six setae (Mahnert 2016). Finally, trichobothrium *isb* is situated substantially closer to *it* than *ist* in *Austinochernes* (Figs. 11, 13, 29), but it is situated midway between *it* and *ist* in most *Pseudopilanus* species, including *P. chilensis*, *P. crassifemoratus*, *P. foliosus* and *P. topali* (Beier 1964a, b; Mahnert 1985). Trichobothrium *isb* is situated closer to *ist* than to *it* in *P. echinatus* and *P. kuscheli* (Beier 1959, 1964a), and is closer to *it* than to *ist* in *P. inermis* and both species of *Austinochernes* (Beier 1977; Figs. 11, 13, 29). The position of *isb* is unknown in *P. fernandezianus*, as the only known specimens are tritonymphs (Beier 1957; Mahnert 2011) which typically lack *isb* in cheliferoid pseudoscorpions (e.g., Harvey 1992).

It is possible that the current composition of *Pseudopilanus* is artificial and that the two northern species, *P. crassifemoratus* from Amazonian Brazil and *P. inermis* from Ecuador (Beier 1977; Mahnert 1985) are misplaced in the genus. Most notably, both species lack the spine-like seta found in other *Pseudopilanus*. The systematic placement of these species must rely on a more detailed analysis of the Neotropical chernetid fauna.

When establishing the genus *Pseudopilanus*, Beier (1957) suggested it was most similar to *Pilanus* Beier, 1930, which is endemic to Africa [Eritrea, Kenya and Senegal; see Beier (1930, 1955)] but differed by the presence of three blades in the rallum (two in *Pilanus*). The Sri Lankan genus *Parapilanus* Beier, 1973, which is known only from *P. ceylonicus* Beier, 1973, was also compared with *Pilanus* based on the presence of



Figures 26–34.—*Austinochernes zigzag* sp. nov., holotype male (TMAG J6274): 26. Carapace, dorsal; 27. Carapace, detail of section of metazone, dorsal; 28. Right pedipalp, dorsal; 29. Left chela, retrolateral; 30. Left chelal fingers, retrolateral, detail; 31. Left leg IV, retrolateral; 32. Left chelicera, dorsal; 33. Left galea, dorsal; 34. Left rallum, lateral. Scale lines = 0.25 mm (Figs. 26, 28, 29, 31), 0.1 mm (Figs. 27, 28, 32, 34).

two blades in the rallum (Beier 1973). The pedipalps of the three species of *Pilanus* and *Parapilanus ceylonicus* lack a spine-like seta on the prolateral face of the chela. Whether these genera are indeed closely related to *Austinochernes* is beyond the scope of the present study, other than noting that *Austinochernes* differs by the presence of acuminate setae on the male pedipalpal trochanter (Figs. 9, 28).

Austinochernes also resembles several other Australasian chernetine genera in the combined possession of three (usually) blades in the rallum (Figs. 17, 19, 34) and the lack of a tactile seta on tarsi III and IV (Figs. 20, 31): *Apatochernes* Beier, 1948 (18 species, New Zealand), *Hebridochernes* Beier, 1940 (9 species, Australasia), *Maorichernes* Beier, 1932 (1 species, New Zealand), *Meiochernes* Beier, 1957 (1 species, Micronesia), *Nesidiochernes* Beier, 1957 (14 species, Australasia, Micronesia), *Nesiochernes* Beier, 1976 (1 species, New Zealand), *Nesochernes* Beier, 1932 (3 or 4 blades) (1 species, New Zealand, Norfolk Island), *Opsochernes* Beier, 1966 (1 species, New Zealand), *Phaulochernes* Beier, 1976 (5 species, New Zealand), *Reischekia* Beier, 1948 (3 species, New Zealand, Papua New Guinea), *Smeringochernes* Beier, 1957 (11 species, Australasia, Micronesia), *Systellochernes* Beier, 1964 (2 species, New Zealand) and *Thapsinochernes* Beier, 1957 (1 species, Micronesia). Likewise, the following Neotropical genera have the same pair of features: *Ceratochernes* Mahnert, 1994 (2 species, Venezuela), *Chelodamus* R.V. Chamberlin, 1925 (4 species, central America), *Corosoma* Karsch, 1879 (1 species, Brazil), *Dasychernes* Chamberlin, 1929 (4 species, central America), *Neoallochernes* Hoff, 1947 (6 species, central and North America), *Petterchernes* Heurtault, 1986 (2 species, Brazil) and *Zaona* Chamberlin (2 species, North and South America). However, none of these taxa have a spine-like seta on the chelal hand and are therefore unlikely to be closely related to *Austinochernes*.

Somewhat curiously, the cheliceral rallum of species of *Austinochernes* is variable, with three blades found in the majority of specimens (Figs. 17, 19, 34), but only two blades in the female of *A. andrewaustini* from Scott Creek Conservation Park (Fig. 18). Variation in the number of rallar blades appears to be rarely reported in chernetids, but is of significance considering it is a primary character used to distinguish between groups of genera in identification keys. Indeed, the tribes Chernetini and Hesperochernetini were originally differentiated primarily on the basis of the number of rallar blades (at that time referred to as the flagellum), with tribes Chernetini supposedly having two or three blades and Hesperochernetini having four blades (Beier 1932, 1933). However, Muchmore (1972, 1974) showed that species of *Chernes* Menge, 1855, including the type species *C. cimicoides* (Fabricius, 1793), typically possess four blades, thus diminishing the major feature by which the tribes could be separated. The presence of four rallar blades has since been confirmed in other species of *Chernes* (see Mahnert 1978; Krumpál & Kiefer 1982). However, Smith (1967) reported only three rallar blades in most specimens of all post-embryonic life stages of *C. cimicoides* collected from Britain. She also found that some specimens had four blades, with the smallest blade duplicated. The presence of three or four blades in the British samples and four in the specimens examined by Muchmore (1972, 1974), presumably from Germany, suggests

the presence of considerable intraspecific variation. Other cases of intraspecific variation in Chernetidae include *Dendrochernes instabilis* (Chamberlin, 1934) which has three or four blades (Chamberlin 1934), and Vachon (1938) noted three, four or even five rallar blades in some European chernetids. Both Chamberlin (1934) and Vachon (1938, 1957) also recorded variation within the same individual, with one chelicera bearing three blades and the other bearing four. Consequently, Beier (1963) characterized the European species of *Chernes* as usually having three blades, but occasionally (“teratologisch”) with four blades.

The assignment of *Austinochernes* to the subfamily Chernetinae is based on the criteria employed by Harvey (1995) whereby Goniochernetinae are defined by the presence of an angulate posterior margin of the carapace, Lamprochernetinae are defined by the presence of T-shaped spermathecae and Chernetinae are characterized by lacking either of these features. As species of *Austinochernes* have straight posterior carapaceal margins (Figs. 7, 26) and paired spermathecae (Fig. 22), they are regarded as chernetines.

The morphology of spermathecae is often extremely informative and sufficient to differentiate chernetid taxa at the generic level (e.g., Muchmore 1975; Mahnert 1978; Gao et al. 2017). However, the only illustrations depicting the female genitalia of a species of *Pilanus*, *Parapilanus* or *Pseudopilanus* are those of *P. crassifemoratus* Mahnert, 1985 which has a pair of globular receptula connected to the bursa by short ducts (Mahnert 1985, fig. 46) and *P. kuscheli* Beier, 1964 which also has globular receptacula but with longer ducts (Mahnert 2011, fig. 22). The spermathecae of *A. andrewaustini* are also paired, but the ducts are broader than in *Pseudopilanus* (Fig. 22).

Biology.—The specimens of *Austinochernes* were taken from a variety of habitats including under stones, in litter or soil samples, or in a malaise trap. The label accompanying the holotype of *A. andrewaustini* stated that it was collected with ants, but the identity of the ant is not mentioned. The four specimens of *A. zigzag* were collected from under a single rock, but with no obvious association with an ant colony. The female of *A. andrewaustini* was collected from a malaise trap, which it had presumably entered while attached to a flying insect. This suggests that members of this genus undertake phoresy, like many other chernetids (e.g., Vachon 1940; Beier 1948; Muchmore 1971; Zeh & Zeh 1992; Gärdenfors & Wilander 1995; Aguiar & Bührnheim 1998).

The habitat data associated with collections of *Pilanus*, *Parapilanus* and *Pseudopilanus* species typically record that specimens were collected from forest litter or humus samples (Beier 1957, 1964a, b, 1973, 1977; Mahnert 1985; Mahnert & Adis 1986; Adis & Mahnert 1990, 1993; Aguiar & Bührnheim 2003; Aguiar et al. 2006), apart from *Pilanus proximus* Beier, 1955 which was collected from the nest of the ant *Messor cephalotes* (Emery, 1895) (Beier 1955).

Biogeography.—The suspected relationship between *Austinochernes* and *Pseudopilanus*, if proven, would suggest that they are remnants of a Gondwanan fauna (Sanmartín & Ronquist 2004). Such relationships are not uncommon among pseudoscorpions, with numerous taxa showing vicariant distribution patterns between the southern continents (Harvey 1996). The presence of *Austinochernes* species in temperate mesic habitats in south-eastern Australia, mimics that of many

Pseudopilanus species in South America, which inhabit similar biotopes in Chile, Argentina, the Juan Fernandez Islands and southern Brazil (Beier 1957, 1959, 1964a, b; Sanmartín & Ronquist 2004). The removal of those species of *Pseudopilanus* that lack the chelal spine-like seta, namely *P. crassifemoratus* from Amazonian Brazil and *P. inermis* from Ecuador (Beier 1977; Mahnert 1985), would further enhance the southern temperate affinities of both *Pseudopilanus* and *Austinochernes*.

Etymology.—This genus is named in honor of Professor Andy Austin, in recognition of his contributions to systematics, which is combined with the genus name *Chernes* (laborer, Greek) (Brown 1956). It is masculine in gender.

Austinochernes andrewaustini sp. nov.

ZooBank Registration: <http://zoobank.org/NomenclaturalActs/9F32F725-7CC5-4F44-9D08-DD647522A3AD>
(Figs. 1–22)

Type material.—*Holotype male*. AUSTRALIA: *South Australia*: Mt Barker summit [35°04'S, 138°55'E], 17 March 2007, under rock, caught with ants, L.N. Chapman (SAM).

Paratype. AUSTRALIA: *South Australia*: 1 ♀, Scott Creek Conservation Park [35°05'S, 138°41'E], 6–13 March 1990, malaise trap, R. Wharton (SAM).

Other material examined.—AUSTRALIA: *Victoria*: 1 ♀, Jack the Miners, Nation Road, Selby, Sherbrooke Forest [37°54'S, 145°22'E], 16 June 1980, ex soil cores and humus layer, P. Fell (NMV K 13972).

Diagnosis.—*Austinochernes andrewaustini* differs from *A. zigzag* by the less attenuated leg segments (Fig. 20) [e.g., femur + patella IV 4.22 (♂) and tibia IV 5.61 (♂) × longer than deep in *A. zigzag* versus femur + patella IV 5.06 (♂), 4.94–4.97 (♀) and tibia IV 6.08 (♂), 5.96–6.18 (♀) × longer than deep in *A. andrewaustini*], the position of trichobothrium *est* which is situated midway between *esb* and *et* (Figs. 11, 13) (slightly closer to *et* in *A. zigzag*), the position of trichobothrium *st* which is situated closer to *t* than *sb* (Figs. 11, 13) (midway between *sb* and *t* in *A. zigzag*), and the slightly smaller teeth of the chelal fingers (Fig. 12).

Description (adults).—*Color* (Figs. 1–6): pedipalps, carapace and coxae deep red-brown; tergites and sternites, red-brown; carapace and tergites unicolorous, without pale patches; legs yellow-brown.

Chelicera (Fig. 14): with 7 (♂), 6–7 (♀) setae on hand and 1 subdistal seta (*gs*) on movable finger; setae *bs*, *sbs*¹ and *sbs*² strongly dentate, *es* and *sbs*³ short and acuminate, and *ls* and *is* long and acuminate; galea without rami in ♂ (Fig. 15), with 3 distal and 3 medial rami in ♀ (Fig. 16); rallum composed of 3 (♂) (Fig. 17), 2 or 3 (♀) blades (Figs. 18, 19), distal blade dentate on anterior face, others smooth; serrula exterior with 19 (♂), 18 (♀) blades.

Pedipalp (Fig. 9): most setae large, curved and strongly clavate; setae on chelal fingers and prolateral face of trochanter acuminate; prolateral face of chelal hand with long acuminate seta at base of fingers. Chelal fingers smooth; all other surfaces finely shagreened; patella pedicellate, with several sub-basal lyrifissures; trochanter 2.13 (♂), 2.22–2.38 (♀), femur 3.58 (♂), 3.31–3.39 (♀), patella 2.45 (♂), 2.59–2.63 (♀), chela (with pedicel) 3.24 (♂), 3.17–3.34 (♀), chela (without pedicel) 2.96 (♂), 2.94–3.12 (♀), hand (without

pedicel) 1.45 (♂), 1.35–1.46 (♀) × longer than broad, movable finger 1.07 (♂), 1.22–1.26 (♀) × longer than hand (without pedicel). Fixed chelal finger with 8 trichobothria, movable chelal finger with 4 trichobothria (Figs. 11, 13): *eb* and *esb* situated basally; *est* situated midway between *esb* and *et*; *et* situated distally; *ib* and *ist* situated subbasally, noticeably distal to *eb* and *esb*; *isb* situated subdistally, closer to *it* than to *ist*; *it* situated distally, slightly basal to *et*; *b* and *sb* situated basally, *sb* closer to *b* than to *st*; *st* situated closer to *t* than to *sb*; *t* situated closer to *st* than to tip of finger. Venom apparatus only present in movable chelal finger, venom duct long, terminating in nodus ramosus between *st* and *t*. Chelal fingers of male slightly gaping (Figs. 11, 12), of female not gaping (Fig. 13); teeth slightly retrorse and pointed, basal teeth more rounded (Figs. 11–13); fixed finger with 60 (♂), 55 (♀) teeth, plus 7 (♂), 6 (♀) retrolateral accessory teeth and 3 (♂, ♀) prolateral accessory teeth; movable finger with 62 (♂), 60 (♀) teeth, plus 7 (♂), 5 (♀) retrolateral accessory teeth and 4 (♂), 2 (♀) prolateral accessory teeth; sense-spots arranged: fixed chelal finger with 11 (♂), 10 (♀) retrolateral and 12 (♂), 14 (♀) prolateral, and movable chelal finger with 11 (♂, ♀) retrolateral and 2 (♂), 3 (♀) prolateral.

Carapace (Figs. 3, 6, 7): lightly rugose; 1.12 (♂), 0.94–1.06 (♀) × longer than broad; eyes and eye-spot absent; with 94 setae arranged with 4 (♂, ♀) near anterior margin, 50 (♂), 42 (♀) other setae in prozone, 29 (♂), 28 (♀) setae in mesozone and 11 (♂), 12 (♀) setae in metazone; all setae large, curved and strongly clavate; with 2 transverse furrows, posterior furrow closer to posterior margin than to anterior furrow.

Coxal region: maxillae rugose; manducatory process pointed, with 6 (♂), 4 (♀) apical acuminate setae, with 1 small suboral seta, and 35 (♂), 30 (♀) additional setae. Chaetotaxy of coxae I–IV: ♂, 18: 18: 34: 58; ♀, 12: 20: 33: 52.

Legs: femur + patella of leg IV 5.06 (♂), 4.94–4.97 (♀), tibia 6.08 (♂), 5.96–6.18 (♀) and tarsus 6.64 (♂), 6.06–6.11 (♀) × longer than deep; tarsi III and IV without tactile setae (Fig. 20).

Abdomen: tergites I–X with medial suture line (Figs. 1, 3); sternites IV–X with medial suture line (Fig. 2, 4). Tergites I–XI and sternites IV–XI rugose. Tergal chaetotaxy: ♂, 10: 12: 12: 14: 15: 14: 14: 14: 14: 13: 10: 2; ♀, 11: 12: 15: 16: 14: 16: 17: 14: 13: 12: 10: 2; all setae large, curved and strongly clavate. Sternal chaetotaxy: ♂, 51: (3) 27 [2 + 4] (3): (4) 12 (4): 17: 21: 20: 17: 16: 11: 8: 2; ♀, 31: (4) 16 (4): (3) 8 (3): 15: 17: 18: 18: 15: 11: 6: 2; without tactile setae. Sternite II of ♀ with setae broadly spaced (Fig. 21). Pleural membrane hispido-granulate; without setae.

Genitalia: male with typical chernetid morphology; female with 1 pair of laterally directed spermathecae, each with a broad terminal receptaculum (Fig. 22).

Dimensions (mm): holotype male: Body length 2.87. Pedipalps: trochanter 0.645/0.260, femur 0.930/0.260, patella 0.785/0.320, chela (with pedicel) 1.375/0.425, chela (without pedicel) 1.260, hand (without pedicel) length 0.615, movable finger length 0.655. Carapace 0.895/0.800. Leg IV: femur + patella 0.885/0.175, tibia 0.730/0.120, tarsus 0.565/0.085.

Dimensions (mm): paratype female, with other female in parentheses: Body length 2.66 (2.82). Pedipalps: trochanter 0.560/0.235 (0.565/0.255), femur 0.865/0.255 (0.895/0.270), patella 0.750/0.285 (0.790/0.305), chela (with pedicel) 1.330/

0.420 (1.405/0.42), chela (without pedicel) 1.235 (1.310), hand (without pedicel) length 0.565 (0.590), movable finger length 0.690 (0.745). Carapace 0.850/0.800 (0.895/0.950). Leg IV: femur + patella 0.845/0.170 (0.815/0.165), tibia 0.685/0.115 (0.680/0.110), tarsus 0.550/0.090 (0.545/0.090).

Remarks.—*Austinochernes andrewaustini* has been recorded from two locations in the Mount Lofty Ranges, to the east of Adelaide, South Australia, and a single location in the Dandenong Ranges, east of Melbourne, Victoria. The male specimen from the summit of Mt Barker was collected under a rock with ants. The identity of the ants is unknown. The female from Scott Creek Conservation Park was collected from a malaise trap, and the female from Selby was collected from soil and litter samples.

Etymology.—Like the genus name, this species is named in honor of Professor Andy Austin.

Austinochernes zigzag sp. nov.

ZooBank Registration: <http://zoobank.org/>

NomenclaturalActs/9BF439F8-5F50-4FCF-8585-

B4E6ECEFFBA

(Figs. 23–34)

Type material.—*Holotype male.* AUSTRALIA: *Tasmania:* Zigzag Track, Cataract Gorge, Launceston, 41°26'43"S, 147°07'18"E, 5 September 2005, under rocks, M.S. Harvey (TMAG J6274).

Paratypes. AUSTRALIA: *Tasmania:* 1 ♂, collected with holotype (TMAG J6275); 2 ♂, collected with holotype (WAM T47598, T47599).

Diagnosis.—*Austinochernes zigzag* differs from *A. andrewaustini* by the more attenuated leg segments (Fig. 31) [e.g., femur + patella IV 5.06 (♂), 4.94–4.97 (♀) and tibia IV 6.08 (♂), 5.96–6.18 (♀) × longer than deep in *A. andrewaustini* versus femur + patella IV 4.22 and tibia IV 5.61 × longer than deep in *A. zigzag*], the position of trichobothrium *est* which is situated slightly closer to *et* than to *esb* (Fig. 29) (midway between *esb* and *et* in *A. andrewaustini*), the position of trichobothrium *st* which is situated midway between *sb* and *t* (Fig. 29) (closer to *t* than *sb* in *A. andrewaustini*), and the slightly larger teeth of the chelal fingers (Figs. 29, 30).

Description (adult male).—*Color* (Figs. 23–25): pedipalps, carapace and coxae deep red-brown; tergites and sternites, red-brown; carapace and tergites unicolorous, without pale patches; legs yellow-brown.

Chelicera (Fig. 32): with 7 or 8 setae on hand and 1 subdistal seta (*gs*) on movable finger; setae *bs*, *sbs*¹, *sbs*² and strongly dentate, *es* and *sbs*³ short and acuminate, and *ls* and *is* long and acuminate; galea simple, without rami (Fig. 33); rallum of 3 blades, distal blade dentate on anterior face, medial blade with 2 spinules on anterior face, basal blade smooth (Fig. 34); serrula exterior with 19 blades.

Pedipalp (Fig. 28): most setae large, curved and strongly clavate; setae on chelal fingers and prolateral face of trochanter acuminate; prolateral face of chelal hand with long acuminate seta at base of fingers. Chelal fingers smooth; all other surfaces finely shagreened; patella pedicellate, with several sub-basal lyrifissures; trochanter 1.86–2.27, femur 3.45–3.67, patella 2.51–2.56, chela (with pedicel) 3.13–3.31, chela (without pedicel) 2.89–3.06, hand (without pedicel) 1.27–1.39 × longer than broad, movable finger 1.13–1.30 × longer

than hand (without pedicel). Fixed chelal finger with 8 trichobothria, movable chelal finger with 4 trichobothria (Fig. 29): *eb* and *esb* situated basally; *est* situated slightly closer to *et* than to *esb*; *et* situated distally; *ib* and *ist* situated subbasally, noticeably distal to *eb* and *esb*; *isb* situated subdistally, closer to *it* than to *ist*; *it* situated distally, slightly basal to *et*; *b* and *sb* situated basally, *sb* closer to *b* than to *st*; *st* situated slightly closer to *t* than to *sb*; *t* situated slightly closer to *st* than to tip of finger. Venom apparatus only present in movable chelal finger, venom duct long, terminating in nodus ramosus between *st* and *t*. Chelal fingers slightly gaping (Figs. 29, 30); teeth pointed, basal teeth more rounded (Figs. 29, 30); fixed finger with 60 teeth, plus 8 retrolateral accessory teeth and 2 prolateral accessory teeth; movable finger with 67 teeth, plus 4 retrolateral accessory teeth and 2 prolateral accessory teeth; sense-spots arranged: fixed chelal finger with 15 retrolateral and 24 prolateral, and movable chelal finger with 15 retrolateral and 3 prolateral.

Carapace (Figs. 25, 26): lightly rugose; 1.14–1.17 × longer than broad; eyes and eye-spot absent; with 92 setae arranged with 4 near anterior margin, 50 other setae in prozone, 27 setae in mesozone and 11 setae in metazone; all setae large, curved and strongly clavate; with 2 2 transverse furrows, posterior furrow closer to posterior margin than to anterior furrow.

Coxal region: maxillae rugose; manducatory process pointed, with 5 apical acuminate setae, with 1 small sub-oral seta, and 44 additional setae. Chaetotaxy of coxae I–IV: 20: 22: 35: 60.

Legs: femur + patella of leg IV 4.22, tibia 5.61 and tarsus 5.55 × longer than deep; tarsi III and IV without tactile setae (Fig. 31).

Abdomen: tergites I–X with medial suture line (Fig. 23); sternites IV–X with medial suture line (Fig. 24). Tergites I–XI and sternites IV–XI rugose. Tergal chaetotaxy: 11: 14: 14: 16: 17: 15: 17: 15: 16: 16: 10: 2; all setae large, curved and strongly clavate. Sternal chaetotaxy: 59: (3) 33 [4 + 4] (3): (2) 16 (2): 21: 22: 23: 22: 18: 15: 8: 2; without tactile setae. Pleural membrane hispido-granulate; without setae.

Genitalia: male with typical chernetid morphology.

Dimensions (mm): holotype male, with 3 paratypes in parentheses: Body length 2.80 (2.40–2.71). Pedipalps: trochanter 0.590/0.265 (0.465–0.525/0.250–0.270), femur 0.945/0.270 (0.915–0.935/0.255–0.265), patella 0.820/0.320 (0.770–0.815/0.305–0.325), chela (with pedicel) 1.490/0.465 (1.360–1.420/0.420–0.445), chela (without pedicel) 1.370 (1.285–1.305), hand (without pedicel) length 0.635 (0.565–0.600), movable finger length 0.745 (0.675–0.735). Carapace 0.910/0.795 (0.860–0.895/0.740–0.78). Leg IV: femur + patella 0.865/0.205, tibia 0.785/0.140, tarsus 0.610/0.110.

Remarks.—*Austinochernes zigzag* has been recorded from Cataract Gorge, Launceston, where the four specimens were collected from the underside of the same rock embedded in soil. The gorge has numerous exposed rocks, and no further specimens were detected on that day. Cataract Gorge has a variety of saxicolous pseudoscorpions including *Synsphyronus hansenii* (With, 1908) (Garypidae), *Neopseudogarypus scutellatus* Morris, 1948 (Pseudogarypidae), and unidentified species of *Austrochthonius* Chamberlin, 1929, *Tyrannochthonius* Chamberlin, 1929 (Chthoniidae) and *Protogarypinus* Beier,

1954 (Garypinidae) (M. Harvey, unpublished data). *Neopseudogarypus scutellatus* is a highly significant biogeographic relic that belongs to a family – the Pseudogarypidae – that is otherwise only known from North America and some Cretaceous–Eocene fossils from Europe (Morris 1948; Harvey 1998; Harms & Dunlop 2017; Judson 2017).

Etymology.—The species epithet is a noun in apposition taken from the type locality, Zigzag Track.

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