

## A new species of theraphosid spider from Southern Africa (Araneae, Theraphosidae, Harpactirinae) with distributional notes on other harpactirines

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### Summary

A new species of theraphosid spider is described from the Kruger National Park, South Africa. The species, *Ceratogyrus paulseni* sp. n., is non-protuberate and possesses a transverse fovea. Its generic placement is discussed with specific reference to *Augacephalus* and *Pterinochilus*. Some basic information is provided on its ecology. New distribution records are also presented for *Augacephalus breyeri* (Hewitt, 1919), *A. junodi* (Simon, 1904), *Ceratogyrus bechuanicus* Purcell, 1902, *C. brachycephalus* Hewitt, 1919, *C. meridionalis* (Hirst, 1907), *Eucratoscelus constrictus* (Gerstäcker, 1873), *Idiothele nigrofulva* (Pocock, 1898), *Pterinochilus murinus* Pocock, 1897 and *Trichognathella schoenlandi* (Pocock, 1900). *Eucratoscelus constrictus* is recorded from Tanzania and *P. murinus* from Malawi for the first time.

### Introduction

An arachnological field-trip undertaken by Martin Paulsen and Ian Engelbrecht to the Kruger National Park in summer 2003, yielded specimens of a new species of *Ceratogyrus* Pocock, 1897. This new species is described here, bringing the total number of *Ceratogyrus* species to 11.

The genus *Ceratogyrus* was originally defined on the autapomorphies of a strongly procurved fovea and the presence of a foveal protuberance (Pocock, 1897). A few years later, Purcell proposed the genus *Coelogenium* Purcell, 1902 based on the possession of a strongly procurved fovea, without a foveal protuberance. Gallon (2001) synonymised *Coelogenium* with *Ceratogyrus* on the basis that the procurved fovea is autapomorphic for *Ceratogyrus* and that immature *Ceratogyrus* initially lack a protuberance. He also highlighted the fact that in *Ceratogyrus dolichocephalus* Hewitt, 1919 the female possesses a foveal protuberance, which is lacking in the male. Gallon (2001) redefined the genus *Ceratogyrus* and proposed the presence of a pale yellow sub-abdominal band and ventral darkening on the palps and legs I–II as synapomorphies of the genus.

The genus *Augacephalus* Gallon, 2002 was established on the following autapomorphies: reduced or absent tibial spur in adult males, robust anterior appendages in adult females, absence of numerous long emergent setae on female chelicerae giving a velvety appearance. Ventral darkening on the palps and legs I–II, and the presence of a pale sub-abdominal band, were also mentioned in the species redescrptions. It was noted that *A. breyeri* has a transverse fovea, whilst *A. junodi* has a slightly procurved fovea. In the same paper Gallon revised the genera *Pterinochilus* Pocock, 1897 and *Eucratoscelus* Pocock, 1898, showing that all other *Pterinochilus sensu lato* (i.e. *Pterinochilus*, *Trichognath-*

*ella* Gallon, 2004, *Idiothele* Hewitt, 1919) species have uniformly coloured legs and palps, without ventral darkening on the palps and legs I–II, and lack a distinct pale yellow sub-abdominal band.

The new *Ceratogyrus* species described here possesses a transverse fovea and lacks an obvious sub-abdominal band, and would thus key out as a *Pterinochilus* species using Gallon (2002). Hence the generic placement of this new species must be discussed with particular reference to *Pterinochilus* and *Augacephalus*.

### Methods

Methods follow Gallon (2002), except ocular measurements were obtained microscopically using an eyepiece graticule  $\pm 0.01$  mm. Exuviae used for the discussion were obtained from captive specimens and relaxed in a high-humidity atmosphere to permit setting. The dried exuviae were subsequently photographed on black velvet to maximise contrast. All measurements are in mm. *Abbreviations*: Eyes: AME=anterior median, ALE=anterior lateral, PME=posterior median, PLE=posterior lateral. Leg spines: DPV=distal proventral, DRV=distal retroventral, MPV=medial proventral, MRV=medial retroventral, MPL=medial prolateral, DMV=distal midventral, DPD=distal prodorsal, DRD=distal retrodorsal, MRD=medial retrodorsal. R=right, L=left. Spinnerets: DS=distal segment. Collections: BMNH=Natural History Museum, London, UK; PPRI=Plant Protection Research Institute (National Collection of Arachnids), Pretoria, South Africa; RSPC=Tony Russell-Smith's private collection, UK; ZMB=Museum für Naturkunde der Humboldt-Universität, Berlin, Germany.

### *Ceratogyrus paulseni* sp. n. (Figs. 1–7)

*Type material*: Holotype ♀ (PPRI AcAt 2004/81), from Republic of South Africa, Letaba, Kruger National Park, 23°50'S, 31°35'E, 1 December 2003 (Martin Paulsen and Ian Engelbrecht). Paratype 1♀ (PPRI AcAt 2004/79), same data.

*Etymology*: The specific epithet is a patronym in honour of Mr Martin Paulsen who co-discovered this species and who has been of help in my studies of South African theraphosids.

*Diagnosis*: As a result of its transverse fovea, *Ceratogyrus paulseni* sp. n. keys out as a *Pterinochilus* species in Gallon (2002). However, ventral darkening on the palps and legs I–II (Fig. 5) distinguish it from all *Pterinochilus* species. Amongst the harpactirines, only *Augacephalus* and *Ceratogyrus* exhibit ventral darkening on the palps and legs I–II (reduced in *C. meridionalis* (Hirst, 1907) and *C. hillyardi* (Smith, 1990)). *Ceratogyrus paulseni* sp. n. lacks the robust anterior appendages and velvety chelicerae found in *Augacephalus*. The absence of a foveal protuberance readily separates *C. paulseni* sp. n. from the protuberate *Ceratogyrus* species: *C. bechuanicus* Purcell, 1902, *C. brachycephalus* Hewitt, 1919, *C. darlingi* Pocock, 1897, *C. dolichocephalus* Hewitt, 1919, *C. marshalli* Pocock, 1897 and *C. sanderi* Strand, 1906.

It is distinguished from *C. meridionalis* and *C. hillyardi* by its transverse fovea and ventral darkening on the palps and legs I–II. The uniformly pale ventral abdominal coloration of *C. paulseni* sp. n. readily separates it from all other *Ceratogyrus* species and from *Augacephalus junodi* (Simon, 1904), where the coloration is dark and displays a distinct pale sub-abdominal band. Robust setae on the posterior margin of the epigastric scutum (Figs. 6–7) provide further distinction from all other harpactirines, which possess fine setae in this position. The plump triangular form of the spermathecae is also characteristic of the species.

**Description:** *Female holotype* (PPRI AcAt 2004/81) (Fig. 2): Total length, including chelicerae, but excluding spinnerets 32.2. Carapace profile low, length 13.9, width 10.8 (Fig. 3). Abdomen length 13.8, width 7.9. Fovea transverse and deep. Ocular tubercle length 1.39, width 1.78. Clypeus width 0.26. Eye sizes: AME 0.41, ALE 0.35, PME 0.32, PLE 0.41. Sternum with three pairs of oval sigilla; anterior two pairs submarginal, posterior pair more remote from sternal margin. Labium with 85 cuspules in tight oval grouping. Maxilla with *c.* 285 cuspules. Paired glabrous labiosternal areas present on labiosternal suture (Fig. 4). DS of posterior spinneret digitiform. Chelicerae with 12 teeth on promargin (left and right). Long emergent setae present on chelicerae (Fig. 2). Stridulatory scopula of well-developed plumose setae on retrolateral cheliceral face, corresponding with scopula of similar plumose setae on prolateral trochanteral face of palp. Leg and palp segment lengths in Table 1. Right leg I missing. Tarsal scopulae: integral. Metatarsal scopulae: legs I–II 80% (integral); leg III 66% (integral); leg IV 60% (bisected longitudinally by band of stiff setae). Clavate trichobothria: restricted to V-shaped region on apical half of all tarsi (tarsus I, 27L). Spination: palp tibia 2DRV, 2DPV; leg I tibia 1DRV, 1DPV; leg II tibia 1DRV, 1DPV; leg III tibia 1DRV, 1DPV, metatarsus 1MPV, 1DRV (0R), 1DMV, 1DPV, 1MPL, 1DPD, 1DRD; leg IV tibia 2DRV, 1DPV, metatarsus 1MPV (0L), 1DRV, 1DMV, 1DPV, 1MRD (0R), 1MPL, 1DPD, 1DRD. Remaining leg segments aspinose. Coloration (Figs. 2, 5): Carapace dark brown (black in life) with prominent beige radial striae and margin. Dorsum of chelicerae ash grey. Dorsum of abdomen beige with dark pattern of bars, spots and reticulations; anterior pair of spots prominent. Venter of abdomen mottled beige with two small dark spots either side of epigastric furrow. Booklung covers and epigastric scutum slightly paler, more so in alcohol. Sternum, coxae and trochanters dark brown (grey-black in life), but trochanters III–IV lighter than I–II. Ventral



Fig. 1: *Ceratogyrus paulseni* sp. n., adult female. Body length *c.* 40 mm.

and prolateral surfaces of palp and legs I–II dark brown (grey-black in life). Retrolateral surfaces of palp and legs I–II grey-brown except for retroventral part of patella which is dark brown. Ventral and lateral surfaces of legs III–IV grey-brown. Dorsum of all femora dark brown with pair of pale longitudinal lines. Dorsum of palp and legs (excluding femora) ash grey, contrasting with darker lateral coloration, particularly on palp and legs I–II. Spermathecae (Fig. 6): Paired, unlobed, with plump triangular form and inwardly curving termini. Setal fringe on posterior margin of epigastric scutum composed of robust curved setae.

**Female paratype** (PPRI AcAt 2004/79): As holotype except: Total length 28.1. Carapace length 11.7, width 9.3. Abdomen length 12.2, width 7.0. Ocular tubercle length 1.28, width 1.65. Clypeus width 0.17. Eye sizes: AME 0.44, ALE 0.44, PME 0.31, PLE 0.41. Labium with *c.* 95 cuspules. Maxilla with *c.* 250 cuspules. Chelicerae with 10 teeth on promargin (left and right). Leg and palp segment lengths in Table 2. Left leg IV missing. Clavate trichobothria: arrangement as in holotype (tarsus I, 15R, 28L). Spination: palp tibia 2DRV (1R), 2DPV; leg II tibia 1DRV (0L); leg II aspinose; leg III tibia 1DRV, 1DPV, metatarsus 1MPV, 1DRV, 1DMV, 1DPV, 1MPL, 1DPD, 1DRD; leg IV tibia 2DRV, 1DPV, metatarsus 1MPV, 1DRV, 1DMV, 1DPV, 1MRD, 1MPL, 1DPD, 1DRD. Spermathecae (Fig. 7): as holotype.

**Male:** Unknown.

**Material examined:** Only the types.

	Fe	Pa	Ti	Mt	Ta
<b>I</b>	10.0	6.5	7.0	6.2	4.6
<b>II</b>	8.8	6.0	5.9	6.2	4.6
<b>III</b>	7.9	5.0	5.2	7.6	4.8
<b>IV</b>	9.8	5.7	7.6	9.8	5.6
<b>Palp</b>	7.1	5.2	4.2	—	5.3

Table 1: *Ceratogyrus paulseni* sp. n. Lengths of leg and palp segments of female holotype (PPRI AcAt 2004/81).

	Fe	Pa	Ti	Mt	Ta
<b>I</b>	7.9	5.2	5.9	5.6	4.1
<b>II</b>	7.6	5.0	5.2	5.1	4.2
<b>III</b>	6.5	4.3	4.4	5.7	4.8
<b>IV</b>	8.4	4.7	6.5	8.3	4.9
<b>Palp</b>	5.8	3.9	3.8	—	4.8

Table 2: *Ceratogyrus paulseni* sp. n. Lengths of leg and palp segments of female paratype (PPRI AcAt 2004/79).

**Distribution:** Known only from Letaba, Kruger National Park, Republic of South Africa.

**Ecology:** Approximately 20 burrows of *C. paulseni* sp. n. were located in a clay substrate clearing within Mopane–Acacia woodland. Burrows were sub-vertical with a depth of *c.* 60 cm and their circular entrances lacked silk/vegetal-debris collars. A single female was observed with young within her burrow. Specimens of *Ceratogyrus bechuanicus* (*c.* 10) and *Augacephalus jumodi* (*c.* 20) occurred sympatrically within the clearing.

## Discussion

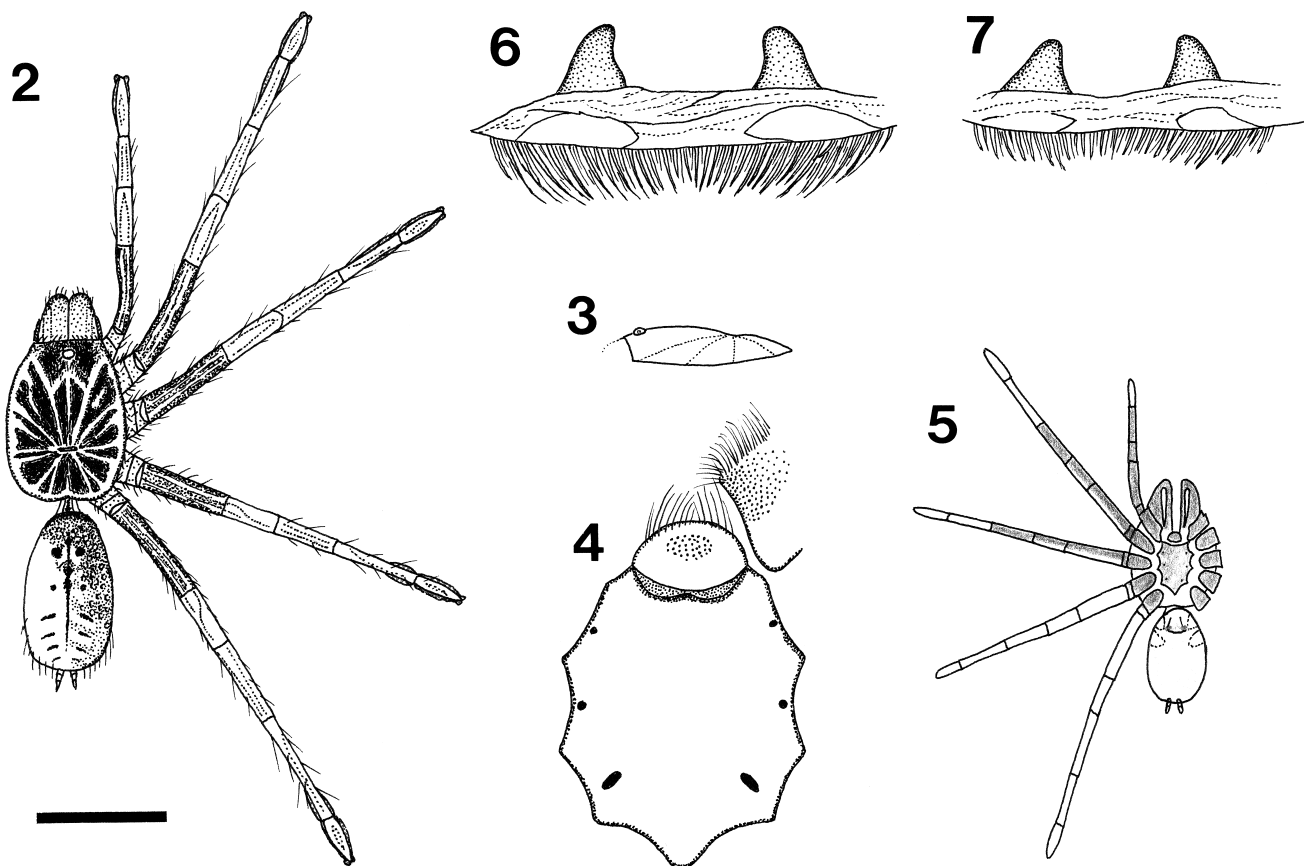
The generic placement of *Ceratogyrus paulseni* sp. n. initially proved difficult. Its transverse fovea and apparent absence of a pale sub-abdominal band meant the species keyed out to the genus *Pterinochilus*. However, *C. paulseni* sp. n. has ventral darkening on the palps and legs I–II (Fig. 5), which is synapomorphic for the *Augacephalus/Ceratogyrus* clade (Fig. 16, character A; see also Table 3), to the exclusion of other harpactirine genera.

The extent of ventral leg darkening is useful for identification at the species level. In *Ceratogyrus bechuanicus* the entire ventral and prolateral surfaces of the palps and legs I–II are darkened (Fig. 8). In *C. brachycephalus* (Fig. 10) this darkening is restricted to the femora and patellae of the palps and legs I–II. *Ceratogyrus marshalli* (Fig. 11) is similarly marked,

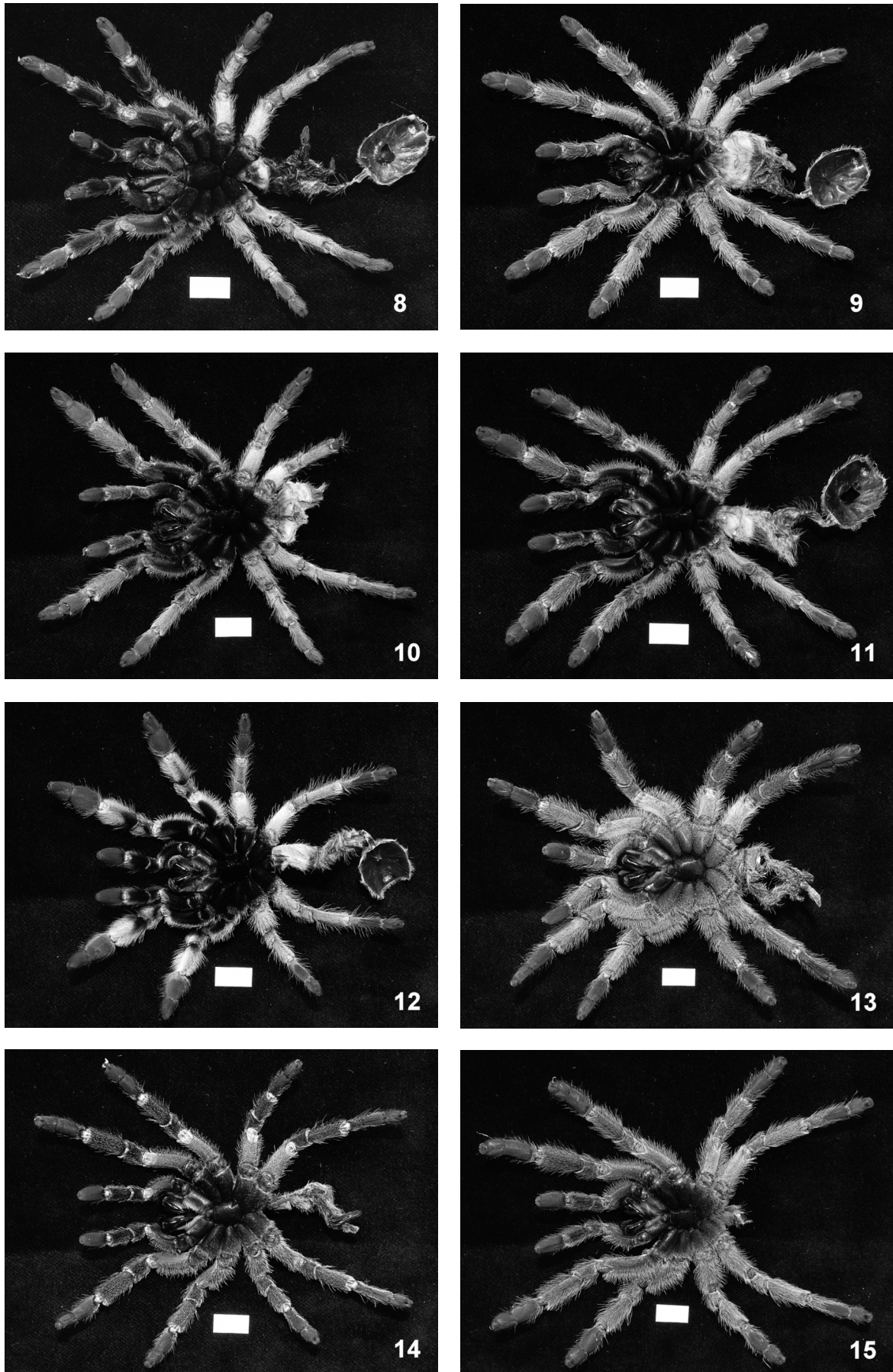
although darkening also extends onto the palpal tibiae. In *C. meridionalis* there is no obvious ventral leg darkening (Fig. 9). Other *Ceratogyrus* ventral markings are illustrated in Gallon (2001). In *Augacephalus* the ventral leg darkening is well defined (Fig. 12). The ventral and prolateral palpal surfaces are black. Ventral and prolateral surfaces of legs I–II are also black, except for the distal sections of the tibiae (and prolateral regions of the patellae in *A. jumodi*). The ventral leg coloration of other harpactirine genera is uniform (Gallon, 2002), with no marked difference in colour between the front and rear appendages (Figs. 13–15).

The presence of a pale sub-abdominal band is another synapomorphy for the *Augacephalus/Ceratogyrus* clade (Fig. 16, character B). In all other *Ceratogyrus* species (except *C. paulseni*) and *A. jumodi*, the postero-ventral region of the abdomen is dark brown, creating a strong contrast with the pale sub-abdominal band. However, *C. paulseni* sp. n., like *A. breyeri*, has a pale postero-ventral abdominal surface which obscures this character (although immersion in alcohol reveals it to some extent in both species).

Robust anterior appendages (character F) and few long emergent setae on the chelicerae (character D) are both autapomorphies of the genus *Augacephalus* (females only). *Ceratogyrus paulseni* sp. n. exhibits the plesiomorphic states (anterior appendages not robust, numerous long emergent setae on chelicerae), as found in other *Ceratogyrus* species. An important



Figs. 2–7: *Ceratogyrus paulseni* sp. n. 2–6 Holotype female (AcAt 2004/81). 2 Dorsal view; 3 Carapace profile; 4 Sternum, labium and proximal region of maxilla, ventral view; 5 Ventral coloration (dark tarsal and metatarsal scopulae omitted); 6 Spermathecae, dorsal view. 7 Paratype female (AcAt 2004/79, spermathecae, dorsal view. Scale line=11.5 mm (2–3), 2.8 mm (4), 1 mm (6–7).



Figs. 8–15: Female exuviae, ventral views, showing extent of ventral leg darkening (note tarsal and metatarsal surfaces are scopulated, therefore similarly coloured in all species). **8** *Ceratogyrus bechuanicus*; **9** *C. meridionalis*; **10** *C. brachycephalus*; **11** *C. marshalli*; **12** *Augacephalus jumodi*; **13** *Harpactira gigas* Pocock, 1898; **14** *Pterinochilus chordatus* (Gerstäcker, 1873); **15** *P. murinus*. Scale lines=10 mm.

- A — Ventral darkening on palp and legs I–II [not darkened].  
 B — Pale sub-abdominal band between booklungs [no band].  
 C — Fovea procurved [transverse].  
 D — Few long emergent setae on chelicerae giving velvety appearance [numerous emergent setae present].  
 E — Tibial spur megaspine reduced [not reduced].  
 F — Palp and legs I–II robust [not robust].  
 G — Tibial spur apophysis absent [present].  
 H — Retrolateral cheliceral scopula present [absent].  
 I — Tibial spur is a megaspine on an apophysis [not like this].

Table 3: Synapomorphies shown in Fig. 16. Plesiomorphic character states in square brackets.

autapomorphy of *Augacephalus* is the reduction of the male tibial spur megaspine on leg I (character E). However, the male of *C. paulseni* sp. n. is unknown, so this character cannot be discussed for this new species at present.

Previously, the presence of a strongly procurved fovea was considered autapomorphic for the genus *Ceratogyrus* (Pocock, 1897; De Wet & Dippenaar-Schoeman, 1991; Gallon, 2001). However, *Augacephalus junodi* exhibits a slightly procurved fovea, and the degree of foveal curvature varies amongst *Ceratogyrus* species; in *C. dolichocephalus* it is extremely procurved, but in *C. meridionalis* much less so (Gallon, 2001). This suggests that a “procurved fovea” is synapomorphic for the *Augacephalus/Ceratogyrus* clade (character C) with a reversal to the plesiomorphic transverse fovea in *A. breyeri*. The transverse fovea of *C. paulseni* sp. n. is here considered a reversal within the *Ceratogyrus* clade. Examination of the tibial spur and palpal bulb of the *C. paulseni* sp. n. male (currently unknown) should eventually help confirm its placement within the *Augacephalus/Ceratogyrus* clade.

### New distributional data on Harpactirinae

Examination of new material since the publication of Gallon (2001, 2002) has produced additional distributional data:

*Augacephalus breyeri* (Hewitt, 1919): SOUTH AFRICA: 1 imm. ♀ (PPRI AcAt 83/222), Farm Althorpe, 10 km E. of Kaapmuiden, 25°33'S, 31°26'E, in burrow in soil, 14 April 1979 (M. Stiller).

*Augacephalus junodi* (Simon, 1904): SOUTH AFRICA: 1♀ (PPRI AcAt 81/666), Roodeplaatdam Nature Reserve, 28°22'S, 25°38'E, January 1980 (A. Leroy); 1♂ (PPRI AcAt 91/242), Mooketsi, N. Transvaal, 23°36'S, 30°06'E (E. T. Rossouw); 1 imm. ♀ (PPRI AcAt 2004/1170), Terra Nostia Game Farm, near Marble Hall, 25°00'S, 29°25'E, burrow in soft soil, 22 March 2003 (J. Leroy); 1♀ (PPRI AcAt 2004/1179), Letaba airstrip, Kruger National Park, 23°50'S, 31°35'E, burrow in clay substrate in Mopane–Acacia woodland, 1 December 2003 (Martin Paulsen); 1♀ (PPRI AcAt 2004/1171), Vienna Game Farm, Hoedspruit, 24°18'S, 30°55'E, deep burrow in open grassveld, 20 March 1999 (A. Leroy); 1♀ (Hope Museum Oxford 105), Pretoria, 25°44'S, 28°12'E, December 1906 (Ernest Lane).

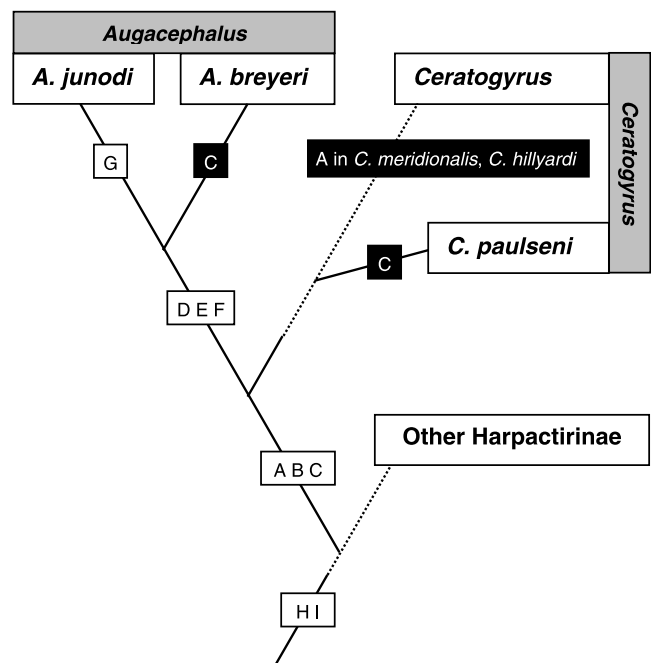


Fig. 16: *Augacephalus/Ceratogyrus* clade. Other harpactirine genera and all *Ceratogyrus* species are left unresolved. Synapomorphies listed in Table 3. Black boxes=reversals.

*Ceratogyrus bechuanicus* Purcell, 1902: SOUTH AFRICA: 1♀ (PPRI AcAt 2004/1180), Rochdale Farm, Soutpansberg, 22°53'S, 29°42'E, 4 April 1993 (A. Leroy); 1♀? (PPRI AcAt 2004/1162), Nylsvlei Nature Reserve, 24°39'S, 28°42'E, 28 June 2003 (A. Leroy); 1♀ (PPRI AcAt 2004/1172), Lapalala Wilderness, Waterberg, 23°50'S, 28°15'E, under big log, 1 November 1997 (J. Leroy).

*Ceratogyrus brachycephalus* Hewitt, 1919: SOUTH AFRICA: 1♀ (PPRI AcAt 2004/1159), Alldays, 22°40'S, 29°06'E, August 2003 (F. van der Westhuizen). ZIMBABWE: 1 imm. ♂ (PPRI AcAt 2004/1163), Farm Shonalanga, Kurekwe, December 1999 (K. Wilkens).

*Ceratogyrus meridionalis* (Hirst, 1907): Gallon (2001) listed captive-bred specimens of this species without locality data. The original wild stock, from which these specimens were derived, was imported from Malawi (Guy Tansley pers. comm. with Michael Mann).

*Euratoscelus constrictus* (Gerstäcker, 1873): TANZANIA: 1♀ (RSPC 016), Mkomazi Game Reserve, c. 3 km from Njiro gate, 04°08'S, 38°01'E, from hole beside track in grass, 17 August 1993 (M. Ritchie *et al.*). This is the first substantiated record for the species from Tanzania.

*Idiothele nigrofulva* (Pocock, 1898): SOUTH AFRICA: 1 imm. (PPRI AcAt 91/95), Kransberg, Thabazimbi, 24°22'S, 27°36'E, 1 May 1990 (M. Stiller); 1♂ (PPRI AcAt 2004/78), Letaba rest camp, Kruger National Park, 23°50'S, 31°35'E, mixed acacia woodland, free roaming, 21:00h, 1 December 2003 (M. Paulsen & I. Engelbrecht); 1 imm. ♂ (PPRI AcAt 91/1401), Skukuza, 25°01'S, 31°35'E, September 1973 (F. Scholtz); 1 imm. (PPRI AcAt 84/783) (with five other theraphosids), Farm Amsterdam, Dendron, 23°23'S, 29°19'E, May 1970 (J. Viljoen).

*Pterinochilus murinus* Pocock, 1897: MALAWI: 1♀ exuvia (Hope Museum Oxford), Monkey Bay, 14°05'S, 34°55'E, 10 February 1963 (J. A. L. Cooke); 2 exuviae, moulted 28 March 1963 (Hope Museum Oxford); 1♀ (Hope Museum Oxford), Nkata Bay, 11°37'S, 34°20'E, January 1963 (D. H. Eccles). These are the first records for this species from Malawi. TANZANIA: 1♂ (RSPC 014), Iyaya camp, Mkomazi Game Reserve, 03°58'S, 37°48'E, on wall of hut at night, 26 November 1994 (A. Russell-Smith); 1♀ (RSPC), Mkomazi Game Reserve, 03°53'S, 37°52'E, Acacia Senegal Woodland, in hollow tree, 20 November 1994 (A. Russell-Smith); 1 imm. (RSPC), same data.

*Trichognathella schoenlandi* (Pocock, 1900): SOUTH AFRICA: 2♂ (PPRI AcAt 96/131), Farm Ulster, near Fort Brown, 33°08'S, 26°38'E, on soil—pit trap, 2 November 1993 (M. Burger).

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