

REDESCRIPTION AND THE SYSTEMATIC POSITION OF THE BRAZILIAN GENUS *XENOCHERNES* FEIO (PSEUDOSCORPIONIDA: CHERNETIDAE)

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ABSTRACT. The sole representative of *Xenochernes* Feio, *X. caxinguba* Feio from Minas Gerais, Brazil, is redescribed from a small portion of the type series, and compared with the myrmecophilous genera *Myrmochernes* Tullgren (South Africa) and *Marachernes* Harvey (southern Australia). A strong relationship based upon three synapomorphies was found to exist between *Myrmochernes* and *Xenochernes*, with an apparent weaker relationship with *Marachernes*. *Myrmochernes* and *Xenochernes* are placed in the Myrmochernetini, new status, within the Chernetinae.

The chernetid fauna of South America is diverse, with some 35 genera occurring south of the Panamanian isthmus (Harvey 1991). Of these genera, one of the most peculiar is *Xenochernes* Feio, known only from a single Brazilian species, *X. caxinguba* Feio. Indeed Feio (1945) considered it so unusual that he raised the monotypic chernetid subfamily Xenochernetinae for its inclusion. Feio (1945) also noted similarities with *Myrmochernes* Tullgren, then placed in the monotypic family Myrmochernetidae, and Sternophoridae. Given that *Myrmochernes* is now placed within the Chernetidae (Judson 1985), and the Sternophoridae are considered the sister-group of the Cheliferoidea (Harvey 1992b), the taxonomic position of *Xenochernes* deserves re-examination.

Through the courtesy of Dr. Norman Platnick, I have been able to examine four slides of type material of *X. caxinguba* lodged in Museu Nacional, Rio de Janeiro (MNR), and am now able to present a redescription, highlighting characters overlooked in the original description. In addition, the opportunity is taken to present illustrations of selected features of *M. africanus* Tullgren from a female in the American Museum of Natural History, New York (AMNH), also examined through the kindness of Dr. Platnick.

Terminology largely follows Chamberlin (1931) and Harvey (1992b). The number of carapacial setae follows Judson (1985): total setae (ocular: median: posterior).

Tribe Myrmochernetini Chamberlin, **new status**

Myrmochernetidae Chamberlin 1931: 240–241; see full synonymy under Chernetidae in Harvey 1991: 534. Synonymized with Chernetidae by Judson 1985: 321.

Xenochernetinae Feio 1945: 36–37, new synonymy.
Xenochernetini Feio: Beier 1970: 51.

Diagnosis.—Cheliceral setae *sbs* and *bs* strongly clavate; cheliceral setae *ls* and *is* nearly contiguous; three flagellar blades; chelal hand not much wider than pedicel.

Remarks.—The suprageneric relationships of chernetids has long proved taxing. Muchmore (1972, 1974) has shown that the limits of 'classic' family-group names such as Lamprochernetinae, Chernetinae, Chernetini and Hesperochernetini (Beier 1932) are in fact poorly defined entities. Legg (1987) and Legg & Jones (1988) have further compounded the problem by defining the Chernetinae and Lamprochernetinae solely based upon western European species, apparently without reference to the numerous genera which occur outside of the Palaearctic region, or with reference to two other available subfamily names, Goniochernetinae Beier 1932, and Xenochernetinae Feio 1945. Muchmore (1982) eloquently noted that "The arrangement of these genera into subfamilies and tribes is in a state of flux." Harvey (in press) discussed these problems in further detail and assigned seven genera to the Lamprochernetinae and three genera to the Goniochernetinae. The remaining 100 or so chernetid genera, including those discussed in this paper, were provisionally referred to the Chernetinae, even though this is clearly a group not based upon any apomorphic character states.

The two genera considered here are placed in the tribe Myrmochernetini, which is proposed as a monophyletic group supported by several synapomorphies (see the cladistic analysis presented below). Although the tribe is here regarded a

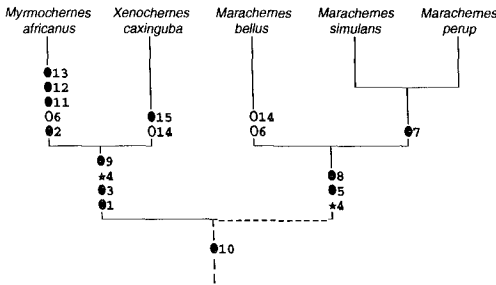


Figure 1.—Cladogram depicting suggested relationships between *Myrmochernes*, *Xenochernes* and *Marachernes*. Closed circle (●) = apomorphy; open circle (○) = homoplasy; star (*) = polarity uncertain.

member of the Chernetinae, further research on a wide series of chernetids (not simply those of a regional fauna) must be undertaken before a definitive taxonomic arrangement can be sustained.

Included species.—*Myrmochernes africanus* Tullgren 1907, *Xenochernes caxinguba* Feio 1945.

Cladistic analysis.—Several characters were scored to determine which could define a close relationship between *Myrmochernes* and *Xenochernes*, and which might be used to determine whether *Marachernes* (Harvey 1992a) is related to these genera (Table 1).

Chelicerae: As mentioned above, *My. africanus* and *X. caxinguba* possess strongly clavate cheliceral setae *sbs* and *bs*, which are only denticulate in *Marachernes* (Character 1). The almost contiguous position of *ls* and *is* in *My. africanus* and *X. caxinguba* is probably unique amongst chernetids (Character 3), while the lack of cheliceral seta *es* is found only in *My. africanus* (Character 2). The number of flagellar blades differs between *My. africanus* + *X. caxinguba* (three) and *Marachernes* spp. (four), with no way of determining the plesiomorphic state; Character 4 is thus left unpolarized.

Chelae: The presence of internobasal accessory teeth on a mound is unique to males of *Marachernes* spp. (Character 5), although it remains to be confirmed for *Ma. perup* Harvey, as males are not yet known. *Trichobothrium est* is much closer to *esb* than to *et* in *My. africanus* and *Ma. bellus* Harvey (Character 6), clearly the result of separate acquisitions. The dorsal setae of the pedipalpal patella are acuminate in *Marachernes simulans* Harvey and *Ma. perup*, whilst clavate in the remaining species (Character 7); the for-

mer is considered apomorphic as the pedipalpal setae of other chernetids are either uniformly clavate or uniformly acuminate (or nearly so). The dorsal chelal setae of all *Marachernes* spp. are acuminate, whilst they are clavate in *My. africanus* and *X. caxinguba*; the former character state is treated as apomorphic (Character 8). The chelal hand of *My. africanus* and *X. caxinguba* is barely wider than the pedicel, in contrast to the narrow pedicel of most other chernetids, including *Marachernes* (Character 9). The chelal hand of *My. africanus*, *X. caxinguba* and *Marachernes* spp. is barely wider than the base of the fingers, an unusual character state amongst chernetids (Character 10), although not entirely restricted to this group. The lack of both accessory teeth and a venom apparatus in *My. africanus* are very unusual within the family and considered apomorphic (Characters 11, 12).

Other characters: The single spermatheca found in *My. africanus* contrasts with the paired spermathecae found in *X. caxinguba*, *Marachernes* spp. and most other chernetids (Character 13). The smooth anteromedian area of the carapace found in *X. caxinguba* and *Ma. bellus* seems to have been independently derived from the fully granulate carapace found in *My. africanus* (Fig. 12) and the remaining *Marachernes* spp. (Character 14). The smooth median area of the carapace is unique to *X. caxinguba* (Character 15).

As the results of this analysis clearly indicate that *Myrmochernes* and *Xenochernes* are very closely related, they are here placed in their own tribe, Myrmochernetini, within the Chernetinae. Conversely, there is less evidence for the inclusion of *Marachernes* within the tribe. The only character state that is likely to support the monophyly of all three genera (Character 10) is also found in other chernetid genera and is, in fact, very difficult to quantify. Therefore, *Marachernes* is here excluded from the Myrmochernetini, and remains *incertae sedis* (along with numerous other genera) in the Chernetinae until further phylogenetic analyses are conducted on a much wider range of chernetids.

Genus *Xenochernes* Feio

Xenochernes Feio 1945: 37. Type species *Xenochernes caxinguba* Feio 1945, by original designation.

Diagnosis.—Differs from all other chernetid genera by the following combination of characters: cheliceral setae *bs* and *sbs* clavate, *ls* and *is* nearly contiguous; female with two spherical

Table 1.—Character matrix for *Myrmochernes*, *Xenochernes* and *Marachernes* (see text for explanation).

Character: plesiomorphy; apomorphy	<i>Myrmo- chernes africanus</i>	<i>Xeno- chernes caxinguba</i>	<i>Mara- chernes bellus</i>	<i>Mara- chernes simulans</i>	<i>Mara- chernes perup</i>
1. Cheliceral setae <i>sbs</i> and <i>bs</i> : denticulate; clavate	1	1	0	0	0
2. Cheliceral seta <i>es</i> : present; absent	1	0	0	0	0
3. Cheliceral setae <i>ls</i> and <i>is</i> : separated; nearly contiguous	1	1	0	0	0
4. Flagellum, number of blades:	3	3	4	4	4
5. Chelal hand of male, internobasal accessory teeth on mound: absent; present	0	0	1	1	?
6. Trichobothrium <i>est</i> much closer to <i>esb</i> than to <i>et</i> : no; yes	1	0	1	0	0
7. Pedipalpal patella, dorsal setae: clavate; acuminate	0	0	0	1	1
8. Pedipalpal chela, dorsal setae: clavate; acuminate	0	0	1	1	1
9. Chelal hand: much wider than pedicel; not much wider than pedicel	1	1	0	0	0
10. Chelal hand: much wider than base of fingers; not much wider than base of fingers	1	1	1	1	1
11. Chelal accessory teeth: present; absent	1	0	0	0	0
12. Venom apparatus: present; absent	1	0	0	0	0
13. Spermathecae: paired; single	1	0	0	0	0
14. Carapace, anteromedian area: granulate; smooth	0	1	1	0	0
15. Carapace, median area: granulate; smooth	0	1	0	0	0

spermathecae; chelal hand not much wider than pedicel.

Description.—Pleural membrane longitudinally striate. Most vestitural setae strongly clavate. Fixed chelal finger with eight trichobothria, movable chelal finger with four trichobothria, distributed as in Figs. 2, 3. Fixed finger with external and internal accessory teeth; movable finger without accessory teeth; movable chelal finger without internobasal accessory teeth or mound. Venom apparatus present in movable chelal finger. Chelicera with five setae on hand, *sbs* and *bs* clavate, *ls* and *is* nearly contiguous. Flagellum with three blades. Carapace with numerous setae (<170); with two distinct furrows; coarsely granulate, except for anteromedian and

median areas which are virtually smooth. Tergites biseriate. Female genitalia with two rounded spermathecae. Legs: all tarsi with subbasal slit sensillum; anterior legs with oblique junction between femur and patella; tarsus IV without tactile seta.

Remarks.—As stated above, Feio (1945) noted certain resemblances between *Xenochernes* and two other pseudoscorpion groups, *Myrmochernes* and the Sternophoridae. Although Feio (1945) dismissed such resemblances as unimportant, it is best to reanalyze the relationships of the genus in the light of recent changes in our understanding of the relationships and classification of pseudoscorpions (Judson 1985; Harvey 1992b).

The lack of a venom apparatus in the fixed chelal finger and the oblique junction of the anterior femora and patellae clearly place *X. caxinguba* in the Chernetidae (Harvey 1992b), where it shares several important character states with *My. africanus*, recently shown to be a chernetid (Judson 1985) (see above).

As attested by Feio (1945), a relationship with the Sternophoridae is not apparent, despite his assertion that a pseudosternum is present in *X. caxinguba*. Whilst a very small section of cuticular membrane is apparent between coxae III and IV, it is certainly not equivalent to the extensive pseudosternum found in sternophorids (Chamberlin 1931; Harvey 1985).

Beier (1970) compared *Xenochernes* and *Myrmochernes* with the South American myrmecophile *Syndeipnochernes* Beier, which is now considered a junior synonym of *Sphenochernes* Turk (Mahnert 1985). The three species currently attributed to this genus are known from the nests of the ants *Acromyrmex lundii* (Guerin) and *Camponotus rufipes* (Fabricius) (Mello-Leitão 1925; Turk 1953; Beier 1970). *Sphenochernes* spp. lack the two distinguishing features of *Myrmochernes* and *Xenochernes* (e.g., position of cheliceral setae *ls* and *is*, and the clavate cheliceral setae *esb* and *es*), and is clearly not closely related to either genus.

Xenochernes caxinguba Feio

Figs. 2–10

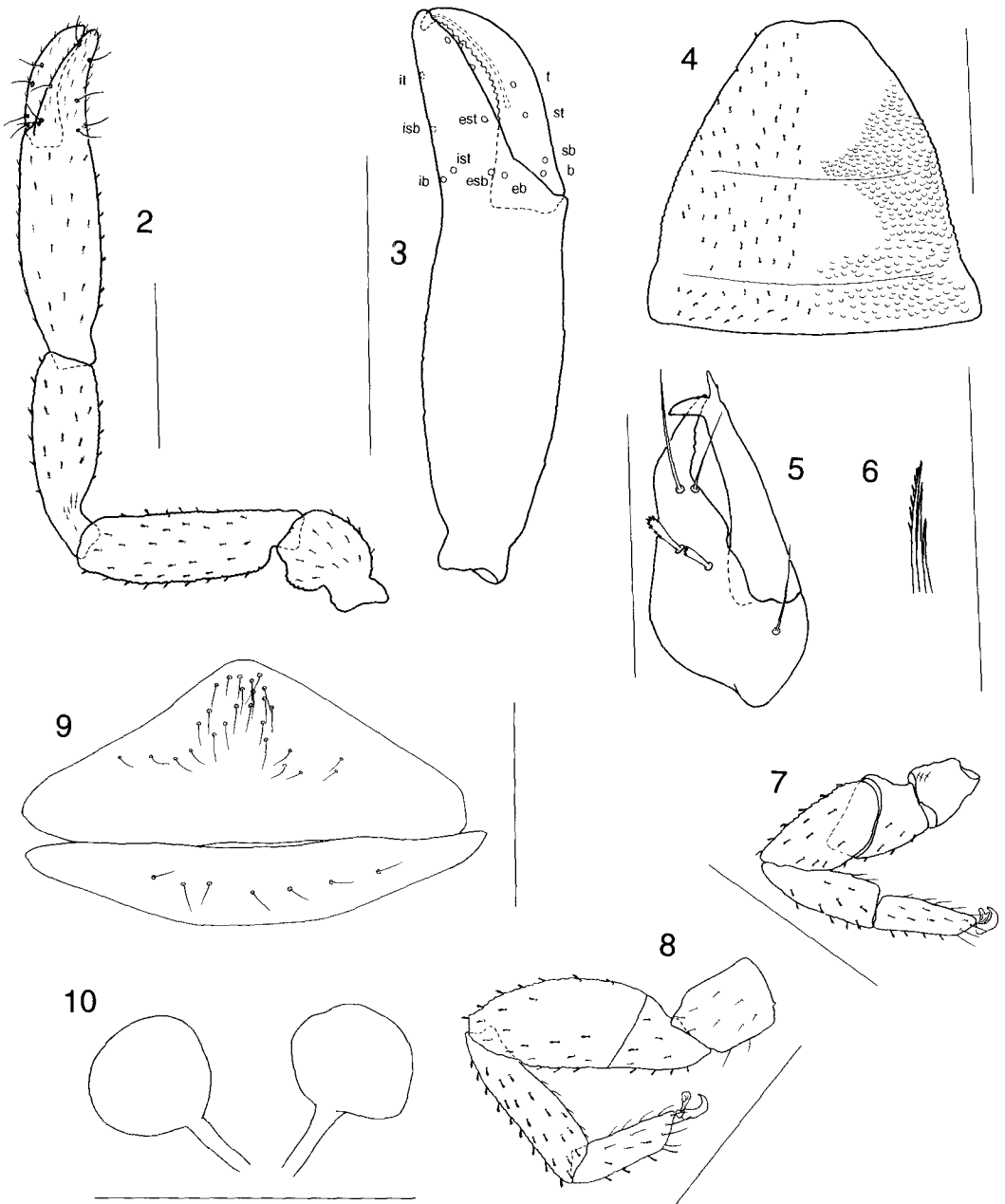
Xenochernes caxinguba Feio 1945: 37–40, figs. 28–32; Harvey, 1991: 639.

Types examined.—Holotype ♂, allotype ♀, Pirapora, Minas Gerais, Brazil (17°20'S; 44°54'W), 13 February 1942, J. Moojen and A. Passarelli (MNR; KOH treated and mounted on a single microscope slide). Three additional slides labelled "paratipo" containing the uncleaned appendages of adults: 1 leg I, 1 leg IV (slide 105b); right pedipalp, with chela separated from patella (slide 105d); right chelicera, 1 leg I, 1 leg IV (slide 105e).

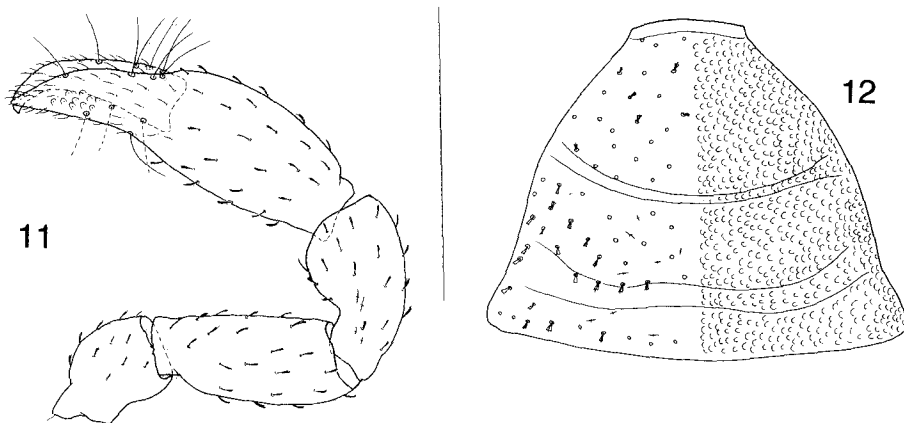
Diagnosis.—As for genus.

Description.—*Adult*: Color of KOH treated specimens pale yellow-brown; of uncleaned appendages, such as pedipalps and legs, red-brown. Pleural membrane longitudinally striate. Pedipalps: (Fig. 2) trochanter 1.49 (♂), 1.48 (♀), femur abruptly pedicellate, 3.33 (♂), 3.07 (♀), patella 2.77 (♂), 2.68 (♀), chela (with pedicel) 3.82 (♂), 3.52 (♀), chela (without pedicel) 3.61 (♂), 3.38 (♀),

hand (without pedicel) 2.27 (♂), 2.15 (♀) times longer than broad; movable finger 0.60 (♂), 0.59 (♀) times as long as hand. Pedipalps with coarse granulation on trochanter, femur, patella and most of chela, granulation less distinct on ventral surfaces, chelal fingers largely smooth; setae clavate. Chelal hand not much wider than pedicel. Fixed chelal finger with eight trichobothria, movable chelal finger with four trichobothria (Figs. 2, 3); *it* midway between *isb* and tip of finger; *est* slightly closer to *esb* than to *et*; *isb* on approximately same level as *est*; *st* slightly closer to *t* than to *sb*. Fixed finger with 19 (♂), 17 (♀) slightly spaced marginal teeth, plus three (♂), two (♀) external and one (♂,♀) internal accessory teeth; movable finger with 22 (♂), *ca.* 18 (♀) moderately spaced marginal teeth, with no accessory teeth; ♂ movable chelal finger without internobasal accessory teeth or mound. Venom apparatus present in movable chelal finger, terminating in nodus ramosus situated midway between *st* and *t*. Manducatory process smooth, with four acuminate setae, two situated distally, one medially and one basally. Chelicera (Fig. 5) with five setae on hand, *sbs* and *bs* clavate, *ls* and *is* nearly contiguous, separated by less than one areolar diameter; serrula exterior with *ca.* 18 (♂, ♀) lamellae; galea of unassociated chelicera (slide 105e) small, triangular with several small rami; flagellum (Fig. 6) composed of three blades, distal blade denticulate in distal half, others apparently smooth. Carapace (Fig. 4) with 210 [72: 98: 40] (♂), 176 [67: 68: 41] (♀) setae, including 15 (♂), 16 (♀) on posterior margin; 0.91 (♂), 0.89 (♀) times longer than broad; two distinct furrows, posterior furrow much closer to posterior margin of carapace than to anterior furrow; surface coarsely granulate, except for anteromedian and median areas which are virtually smooth. Tergites II–X and sternites IV–X divided. Tergal chaetotaxy (entire segments): ♂, 32: 35: 33: 39: 37: 40: 39: 39: 35: 36: 28: 2; ♀, 40: 40: 39: 40: 39: 41: 52: 51: 44: 36: 26: 2; setae arranged in two indistinct rows. Sternal chaetotaxy (entire segments): ♂, *ca.* 60: (3)7[4](3): (1)7(2): 12: 13: 15: 16: 15: 12: 8: 2; ♀, 30: (2)8(2): (2)4(1): 13: 17: 21: 19: 20: 13: 8: 2. Sternite XI without tactile setae. Genital opercula of male: with numerous large setae; several pairs of slit sensilla on anterior operculum, numerous smaller sensillae present on posterior operculum. Male genitalia normal for family. Genital opercula of female (Fig. 9): anterior operculum with small setae arranged in an inverted-U pattern. Female genitalia (Fig. 10) with two



Figures 2–10.—*Xenochernes caxinguba* Feio. 2, left pedipalp, dorsal, holotype ♂; 3, right chela, lateral, paratype adult, slide 105d; 4, carapace, depicting setae (left side) and granulations (right side), holotype ♂; 5, right chelicera, dorsal, paratype adult, slide 105b; 6, right flagellum, paratype adult, slide 105b; 7, leg I, paratype adult, slide 105e; 8, leg IV, paratype adult, slide 105e; 9, female genital opercula, allotype ♀; 10, spermathecae, allotype ♀. Scale lines: 0.5 mm (Figs. 2–4, 7, 8), 0.2mm (Figs. 5, 6, 9, 10).



Figures 11, 12.—*Myrmochernes africanus* Tullgren, ♀, Grahamstown, South Africa (AMNH). 11, right pedipalp, dorsal; 12, carapace, depicting setae (left side) and granulations (right side). Scale line: 0.5 mm.

spherical spermathecae; spermathecal ducts tubular, basal openings not visible. Legs: all tarsi with subbasal slit sensillum; legs I (Fig. 7) and II with oblique junction between femur and patella; leg IV (Fig. 8): femur + patella 2.39 (♂), 2.41 (♀) times longer than broad; tarsus without tactile seta.

Dimensions (mm), holotype ♂ (allotype ♀): body length 2.32 (2.28). Pedipalps: trochanter 0.35/0.235 (0.31/0.21), femur 0.70/0.21 (0.645/0.21), patella 0.595/0.215 (0.535/0.20), chela (with pedicel) 0.975/0.255 (0.915/0.26), chela (without pedicel) 0.92 (0.88), movable finger length 0.35 (0.33), hand length 0.58 (0.56). Chelicera 0.22/0.11 (0.215/0.12), movable finger length 0.155 (0.17). Carapace 0.91/1.00 (0.825/0.925). Leg I: femur + patella 0.41/0.19 (0.40/0.195), tibia 0.32/0.11 (0.29/0.12), tarsus 0.24/0.08 (0.31/0.09). Leg IV: femur + patella 0.55/0.23 (0.53/0.22), tibia 0.42/0.12 (0.38/0.125), tarsus 0.265/0.075 (0.28/0.095).

Remarks.—Of the 7 ♂, 7 ♀, and 8 juveniles mentioned by Feio, I have been able to examine only the holotype, allotype and miscellaneous appendages of an unspecified number of unsexed adults.

Genus *Myrmochernes* Tullgren

Myrmochernes Tullgren 1907: 59–60; Harvey 1991: 604 (full synonymy). Type species *Myrmochernes africanus* Tullgren 1907, by monotypy.

Diagnosis.—Differs from all other chernetid genera by the following combination of charac-

ters: cheliceral setae *bs* and *sbs* clavate, *ls* and *is* nearly contiguous; female with single spherical spermatheca with short duct; chelal hand not much wider than pedicel.

Description.—See Judson (1985).

Myrmochernes africanus Tullgren Figs. 11–12

Myrmochernes africanus Tullgren 1907: 60–61, figs. 18a–e; Harvey 1991: 639 (full synonymy).

Material examined.—1 ♀, Grahamstown, South Africa, Goodnight (AMNH), apparently slide-mounted by the late C. C. Hoff (S-366).

Diagnosis.—As for genus.

Description.—*Adult:* See Judson (1985).

Remarks.—This additional female differs very little from those specimens described by Judson (1985). The figures presented here provide further detail to the previous descriptions (Tullgren 1907; Beier 1932; Judson 1985).

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