A new species of *Epichernes* from Costa Rica (Pseudoscorpionida, Chernetidae)

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Abstract

Epichernes guanacastensis, a new pseudoscorpion phoretic on the spiny pocket mouse, *Liomys salvini* (Heteromyidae), in Costa Rica, is described and compared with the other two species in the genus. A key is provided to separate the three.

Introduction

The genus *Epichernes* Muchmore was established with the type species *E. aztecus* Hentschel from the Distrito Federal, Mexico (Muchmore and Hentschel, 1982). One other species has been described, *E. navarroi* Muchmore (1990), from Quintana Roo, Mexico. Both of these pseudoscorpions are phoretic on rodents, the former on the volcano mouse, *Neotomodon alstoni* Merriam (Muridae), and the latter on the forest spiny pocket mouse, *Heteromys gaumeri* Allen and Chapman (Heteromyidae), and on the white-footed mouse, *Peromyscus yucatanicus* Allen and Chapman (Muridae). Recently, a third species of the genus has been discovered riding on the spiny pocket mouse, *Liomys salvini* (Thomas) (Heteromyidae), in Costa Rica; it is described below.

Methods

To allow for detailed study of the holotype, allotype, and selected paratypes, they have been dissected, cleared, and mounted on microscope slides, generally following the procedure outlined by Hoff (1959), with the substitution of clove oil for beechwood creosote.

Following the recommendations of Shultz (1989) and Snodgrass (1948) and in conformity with usual arachnid nomenclature, I have made some changes in the names applied to certain segments of pseudoscorpion appendages. The two parts of each leg distal to the coxa are herein and hereafter called "femur" and "patella", (rather than "basifemur" and "telofemur"). Similarly the segment of the palp distal to the femur is now called "patella" (rather than "tibia"). Where the femur and patella of a leg are immovably joined together, as in legs III and IV of most pseudoscorpions, the combined segment is now referred to as "femur+patella" (rather than "entire femur").

Genus *Epichernes* Muchmore

Epichernes Muchmore, Muchmore and Hentschel 1982:41.

Diagnosis, emended. The diagnosis given originally by Muchmore must be changed in several respects to accommodate the species *E. navarroi* and *E. guanacastensis*. There is more variation in some external features than was known at that time.

1) Setae on middle tergites may number as few as 16 in *E. guanacastensis* or as many as 30 in *E. aztecus*.

2) In the original description it is stated "11th tergite with 4 and 11th sternite with 2 long, tactile setae" (Muchmore and Hentschel 1982:42). This is erroneous, the numbers are reversed. The actual situation is stated on page 44, where the chaetotaxies of *E. aztecus* show that the 11th tergite bears 2 and the 11th sternite bears 4 tactile setae (T), which are long and acuminate. *E. navarroi* and *E. guanacastensis* do not have any acuminate tactile setae on the 11th tergite; and on the 11th sternite both of these species bear 4 long tactile setae, the median ones always acuminate, the lateral ones often finely denticulate.

Within the genus, therefore, there is some variability in the occurrence of typical long, acuminate tactile setae on the 11th tergites and sternites.

3) The hand of the chelicera in *E. aztecus* and *E. guanacastensis* bears 5 setae, as originally stated. However, in *E. navarroi* there are 6 or 7 setae on the cheliceral hand. For the genus as now known, the range is 5-7.

4) In *E. aztecus* and *E. navarroi* seta *es* on the cheliceral hand is distinctly denticulate. However, in *E. guanacastensis* this seta usually is finely denticulate, often only at the tip, and sometimes is acuminate.

5) The dorsomedial swelling of the patella (previously called "tibia"), which is very pronounced in *E. aztecus* is less obvious in *E. guanacastensis* and *E. navarroi*.

6) In *E. aztecus* and *E. navarroi* the tactile seta on tarsus IV is long and acuminate. However, in *E. guanacastensis* this seta is much shorter and sometimes finely denticulate.

7) While all 3 species of *Epichernes* are found phoretic (?) on small mammals, each species seems to be rather specific in its selection of host.

Key to species of *Epichernes*

1. Palpal femur 2.35-2.75 times as long as broad ... 2
1'. Palpal femur less than 2.3 times as long as broad ..... *aztecus* Hentschel

2. Cheliceral hand with 6 or 7 setae; central tergites with 20-25 setae ..... *navarroi* Muchmore
2'. Cheliceral hand with 5 setae, central tergites with 16-19 setae ..... *guanacastensis*, new species

Epichernes guanacastensis, new species (Figures 1-4)

Type data. Holotype male (WM7740.01002), allotype female (WM7740.01003), and 34 paratypes (6 male, 26 female, 2 tritonymph), COSTA RICA, Guanacaste Province, Guanacaste Conservation Area, Santa Rosa National Park, 1-3 km east of Administration Area, 7 June 1991, D. H. Janzen and W. Hallwachs, on fur of *Liomys salvini*; 11 paratypes (1 male, 10 female), same locality and collectors, 15 January 1991, on *Liomys salvini*; 3 paratypes (1 male, 2 female), same locality and collectors, January 1985, on *Liomys salvini* in forest at night. The 4 males, 11 of the females and the 2 tritonymphs have been mounted on microscope slides. The holotype, allotype and 13 paratypes (3 males, 10 females) are deposited in the Florida State Collection of Arthropods, Gainesville, Florida, U. S. A.; the other paratypes are in the collection of the Instituto Nacional de Biodiversidad de Costa Rica (INBio), Santo Domingo de Heredia, Heredia, Costa Rica.

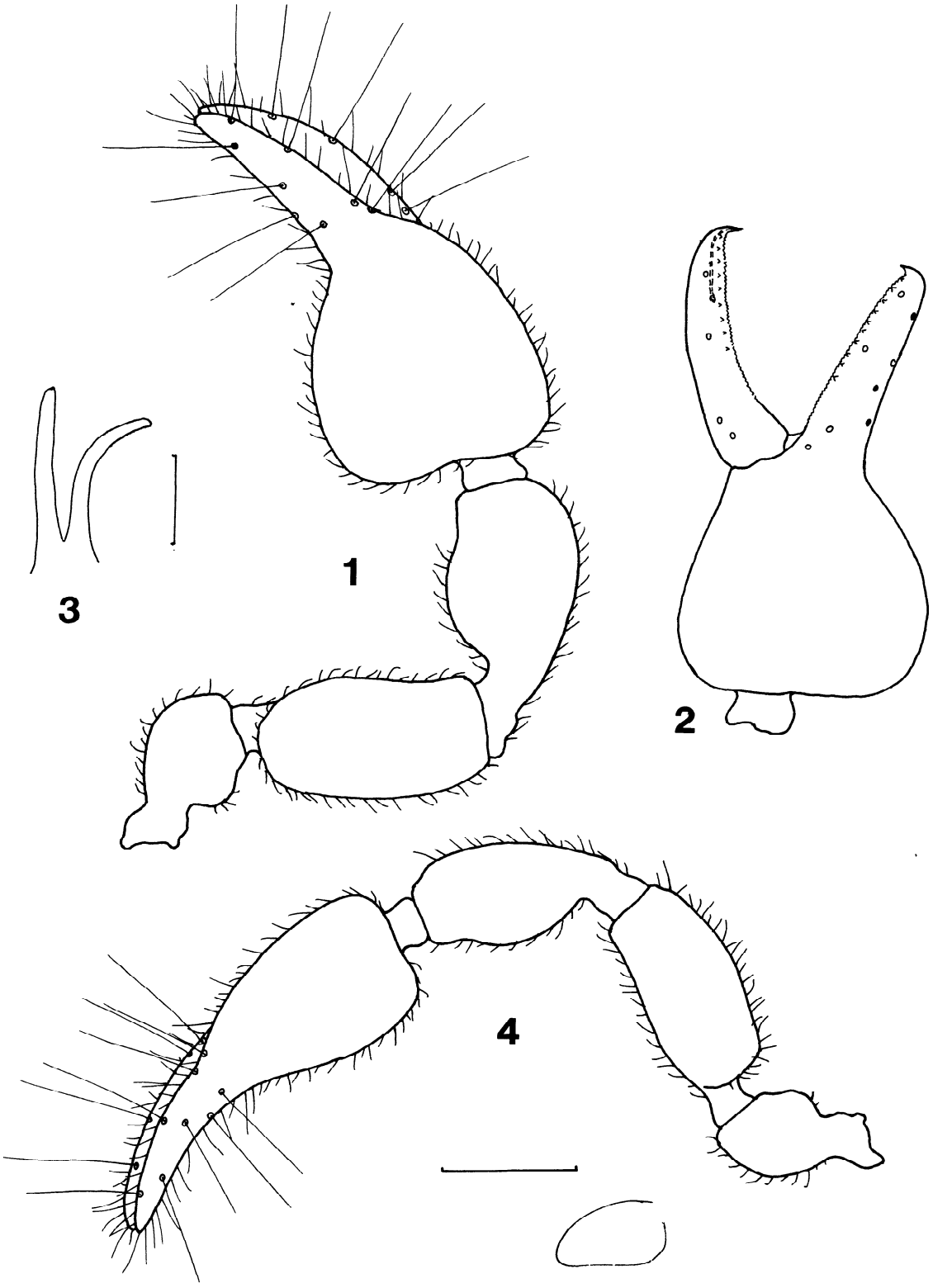
Etymology. The species is named for the area where it is found, in Guanacaste Province, Costa Rica.

Diagnosis. Variable in size, the carapace ranging 1.05-1.37 mm in length. Central tergites with 16-19 setae. Cheliceral hand with 5 setae. Palpal femur 2.35-2.75 times as long as broad.

Description of male (based on 4 mounted specimens). Male and female much alike, but male usually more robust. Entire animal well sclerotized and colored, reddish brown. Carapace a little longer than broad; surface covered with small, low granules, and with 2 distinct transverse furrows; no eyes; about 150 rather short, dentate setae, 4-6 at anterior and 12-16 at posterior margin. Coxal area generally typical of chernetids. Abdominal tergites 2-10 and sternites 4-10 divided; surfaces of tergites granulate, of sternites lightly granulate to scaly; pleural membranes longitudinally granulostriate; setae of tergites short, terminally denticulate, those of sternites acuminate to denticulate. Tergal chaetotaxy of holotype 14:17:17:18:18:17:17:16:17:13:10:2, others similar. Sternal chaetotaxy of holotype 31:[2-2]:(4)24(4):(1)16(1):23:23:22:20:18:15:T2T3T2T:2; spiracular setae may be 3 or 4. Internal genitalia generally typical of chernetids, similar to *E. aztecus* and *E. navarroi*.

Chelicera about 1/3 as long as carapace; hand with 5 setae, *bs* and *sbs* denticulate, *es* usually denticulate but sometimes acuminate; flagellum of 4 denticulate setae; serrula exterior of 18-20 blades; galea of male small and simple or with 1-2 tiny denticles.

Palp rather robust (Fig. 1): trochanter 1.65-1.8, femur 2.35-2.4, patella 2.05-2.15, and chela (without pedicel) 2.0-2.25 times as long as broad; hand (without pedicel) 0.93-1.09 times as long as deep; depth of hand usually greater than breadth (1.00-1.11); movable finger 1.01-1.13 times as long as hand. Surfaces generally granulate, especially of femur; most setae short, denticulate. Trichobothria as shown in Fig. 2. fixed finger with 46-48 and movable finger with 50-52 marginal teeth; each finger with 8-12 external and internal accessory teeth.



Figures 1-4. *Epichernes guanacastensis*, new species: 1, right palp of male, dorsal view; 2, left chela of male, lateral view, showing trichobothria (darkened areoles are underneath); 3, spermathecae of female; 4, right palp of female, dorsal view. Scale bar for Figs. 1, 2 and 4 = 0.5 mm; for Fig. 3 = 0.05 mm.

Legs rather slender; leg IV with femur+patella 3.8-4.2 and tibia 5.8-6.1 times as long as deep. Tactile seta on tarsus short (about 0.15 as long as segment), acuminate, about 3/4 length of segment from proximal end.

Description of female (based on 11 mounted specimens). Much like male but usually with more slender appendages and with several sex-specific characters. Coxal area generally typical, but each coxa IV with about 70 long, acuminate setae on posterodorsal aspect. Chaetotaxy of anterior sternites of allotype 26:(4)18(5):(1)19(1):--; spiracular setae of others vary 3-5. Spermathecae consist of 2 short tubes, as shown in Fig. 3.

Chelicera as in male but galea considerably larger and with 5-6 small rami on the distal half.

Palp (Fig. 4) usually more slender than that of male: trochanter 1.65-1.85, femur 2.4-2.75, patella 2.15-2.4, and chela (without pedicel) 2.4-2.85 times as long as broad; hand (without pedicel) 1.06-1.45 times as long as deep; depth of hand usually less than or equal to breadth (0.93-1.00), but occasionally greater (1.02-1.10); movable finger 1.06-1.15 times as long as hand.

Tactile seta on tarsus of leg IV short, usually acuminate but sometimes denticulate.

Description of tritonymph (based on 2 mounted specimens). Generally like adults but lighter in color, smaller, and with slightly different proportions. Central tergites with 14-18 setae; tergite 11 without tactile setae; sternite 2 with 6-8 setae; sternite 11 with 4 long, acuminate tactile setae.

Cheliceral hand with 5 setae, *bs* and *sbs* denticulate, *es* denticulate or acuminate; galea long, with 3-5 small rami.

Palpal trochanter 1.6-1.75, femur 2.15-2.25, patella 1.85-1.9, and chela (without pedicel) 2.5 times as long as broad; hand (without pedicel) 1.3 times as long as deep; movable finger 1.01-1.02 times as long as hand. Fixed finger of chela with 7 trichobothria and movable finger with 3.

Leg IV with femur+patella 3.3-3.4 times as long as deep; tarsus with short, acuminate tactile seta about 3/4 length from proximal end.

Measurements (mm). Male (figures given first for holotype, followed in parentheses by ranges for the 3 paratype males). Body length 3.22 (3.59-3.86). Carapace length 1.15 (1.30-1.36). Chelicera length 0.38 (0.38-0.43). Palpal trochanter 0.60 (0.67-0.71)/0.36 (0.40-0.43); femur 0.99 (1.09-1.20)/0.415 (0.465-0.50); patella 0.93 (1.04-1.11)/0.435 (0.50-0.54); chela (without pedicel) 1.59 (1.89-1.92)/0.70 (0.82-0.96); hand (without pedicel) 0.76 (0.89-1.00)/0.755 (0.82-1.07); pedicel length 0.13 (0.15-0.17); movable finger length 0.86 (0.96-1.07). Leg IV: femur+patella 0.93 (1.01-1.11)/0.245 (0.26-0.29); tibia 0.86 (0.93-1.07)/0.15 (0.17-0.175); tarsus 0.585 (0.63-0.65)/0.11 (0.12-0.125).

Female (figures given first for allotype, followed in parentheses by ranges for 10 paratype females). Body length 3.97 (2.95-4.11). Carapace length 1.23 (1.04-1.37). Chelicera length 0.385 (0.33-0.41). Palpal trochanter 0.63 (0.56-0.73)/0.37 (0.31-0.40); femur 1.05 (0.90-1.22)/0.42 (0.34-0.46); patella 0.925 (0.79-1.07)/0.41 (0.35-0.47); chela (without pedicel) 1.59 (1.33-1.85)/0.59 (0.47-0.72); hand (without pedicel) 0.805 (0.665-0.94)/0.60 (0.48-0.67); pedicel length 0.13 (0.11-0.15); movable finger length 0.865 (0.77-1.00). Leg IV: femur+patella 1.00 (0.87-1.13)/0.245 (0.22-0.26); tibia 0.91 (0.76-1.04)/0.16 (0.14-0.17); tarsus 0.555 (0.50-0.65)/0.12 (0.10-0.125).

Tritonymph. Body length 2.74-2.97. Carapace length 0.93-0.95. Chelicera length 0.295-0.30. Palpal trochanter 0.465-0.47/0.27-0.29; femur 0.725-0.73/0.325-0.34; patella 0.64-0.665/0.35; chela (without pedicel) 1.16-1.20/0.46-0.48; hand (without pedicel) 0.605-0.635/0.47-0.49; pedicel length 0.09; movable finger length 0.62-0.64. Leg IV: femur+patella 0.73-0.755/0.215-0.23; tibia 0.615-0.64/0.14-0.15; tarsus 0.43-0.435/0.105-0.11.

Remarks. The holotype is the smallest of the 4 available males. Normally, I would have selected as holotype a more average individual, but in this case 2 of the other 3 males are teratologic and the last is broken. The generally most representative specimen is, unfortunately, abnormal in having only 3 trichobothria on the movable finger of the left chela (*sb* is missing). The next best candidate has an abnormal number and distribution of setae on the 5th and 6th abdominal tergites and pleural membrane. The remaining specimen is the largest and most robust of the four, and the left chela is broken.

There is much variation in this species in size, in proportions, and in the nature of some of the setae. This is more evident in the females than in the males, perhaps because of the greater numbers of females available for study. The largest female is about 1/3 larger than the smallest; the largest male is about 1/5 larger than the smallest. As is the case in many chernetids, the hand of the palpal chela of the male is very heavy, and the depth is greater than the breadth; there is some variation in this feature, the larger

individuals usually having the more robust chelae. The chelal hand of the female is usually much more slender, but occasionally, as in one paratype here, the hand may be as robust as in most males.

Seta *es* on the hand of the chelicera is usually finely denticulate, often only at the tip, and sometimes may be acuminate. This differs from the situation in the other 2 species of *Epichernes*, where *es* is usually distinctly denticulate.

Similarly, the tactile seta on the tarsus of leg IV is somewhat different from that in the other species, where it is always long (length about 0.3 as long as tarsus) and acuminate. In *E. guanacastensis*, this tarsal seta is short (length only about 0.15 as long as tarsus) and sometimes denticulate.

The lateral tactile seta on sternite 11 is also variable, in that it is usually finely denticulate laterally and terminally but is sometimes simply acuminate.

There is in the collection a single female which is about 10% smaller in most measurements than the smallest paratype female and less than 10% larger than the larger of the 2 tritonymphs. Otherwise, this individual is similar to the other paratypes. It is likely just a very small individual of *E. guanacastensis*, but because of its extreme position it has not been included among the paratypes. There is the possibility that it represents yet another species of the genus.

The coxal area of the male does not differ significantly from the usual situation in Chernetidae. However, in the female there are very numerous (about 70), long setae on the posterodorsal aspect of coxa IV. Though not mentioned in the original descriptions, females of *E. aztecus* and *E. navarroi* have similar numbers and distribution of long setae on coxa IV. Similarly, numerous long setae are found on coxa IV of female *Megachernes* species, which are also phoretic on rodents, but the distribution of the setae is somewhat different in the 2 genera. In general, it appears that the setae on coxa IV of female chernetids have a role in securing the brood sac to the abdomen. In *Epichernes* and *Megachernes* species, these setae may be especially long and numerous to help withstand the added stresses caused by scratching or biting by the host rodent.

At present, *Epichernes guanacastensis* is known only from the dry forests of the eastern half of Santa Rosa National Park (300 m elevation), Guanacaste Conservation Area, Guanacaste Province, Costa Rica, where it is commonly found riding on the spiny pocket mouse, *Liomys salvini* (Heteromyidae). This contrasts with *E. aztecus*, known only from the Distrito Federal, Mexico, on the volcano mouse, *Neotomodon alstoni* (Muridae), and with *E. navarroi* from Quintana Roo, Mexico, mainly on the forest spiny pocket mouse, *Heteromys gaumeri* (Heteromyidae), with one individual on a white-footed mouse, *Peromyscus yucatanicus* (Muridae). According to D. H. Janzen and W. Hallwachs, who collected all of the specimens of *E. guanacastensis*, "these pseudoscorpions were clinging tightly to the hairs above and to the sides of the base of the tail of live-trapped *L. salvini* mice. They were found in both the wet and dry seasons, and on male and female, juvenile and adult mice. *L. salvini* leaves its tunnels at night to forage, carrying the pseudoscorpions; they do not leave the mouse in the daytime when in the trap. About 10% of the mice have them and they have been present in all years from 1983 to 1992. There are commonly 1-2 per infested mouse, but as many as 10 may be found on one mouse. Virtually all of them are adults, and greater than 90% are females. They do not flee from a restrained or struggling mouse, but do leave a freshly killed mouse as it cools. If the pseudoscorpions are grabbed with the fingers, they hold tightly to the hairs. If picked off and dropped on a table top, the pseudoscorpion remains motionless for 2-7 seconds and then runs quickly away in a relatively straight line." (in litt.)

Acknowledgments

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