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New and Little Known Ricinuleids of the Genus *Cryptocellus* (Arachnida, Ricinulei)

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ABSTRACT

Cryptocellus blesti Merrett is redescribed from adult females and the following six species are described for the first time: *C. dissimulans*, new species, female, El Salvador; *C. glenoides*, new species, both sexes, Panama and Colombia; *C. striatipes*, new species, male, Costa Rica; *C. isthmus*, new species, male, Panama; *C. fagei*, new species, both sexes, Costa Rica; *C. hanseni*, new species, both sexes, Nicaragua and Honduras. The characters used in ricinuleid systematics are discussed.

INTRODUCTION

The Ricinulei are a small and comparatively poorly known order of Arachnida that until recently have been regarded as extremely rare. The first ricinuleid specimen discovered (Buckland, 1836) was a fossil, but shortly afterward (Guérin-Méneville, 1838) the first living specimen was described. Today the living ricinuleids are placed in two genera. *Ricinoidea* Ewing from West Africa, with seven species, remains little studied, but the New World genus *Cryptocellus* Westwood has recently been receiving considerable attention. New species have been described (Coronado, 1970; Gertsch, 1971; Cooke, 1973) and studies made on their morphology (Pittard and Mitchell, 1972), ecology (Mitchell, 1970), and

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behavior (Cooke, 1971). The American Museum of Natural History has quite extensive ricinuleid collections, including representatives of 14 of the 21 previously known species of *Cryptocellus*. A careful examination of the American Museum material, together with specimens made available by other institutions has revealed the existence of six additional species described below. With the number of known species of *Cryptocellus* now standing at 27 and several more awaiting description, it is clear that there exists between the Rio Grande and the Amazon a ricinuleid fauna of hitherto unsuspected richness. The apparent scarcity of these animals until recently is undoubtedly a reflection of their cryptic habits and a dearth of skilled collectors.

ACKNOWLEDGMENTS

We are grateful to the following individuals and institutions for the loan of material: Prof. H. W. Levi, Museum of Comparative Zoology, Cambridge; Dr. P. H. Arnaud, Jr., California Academy of Sciences, San Francisco; Dr. M. Grasshoff, Senckenberg Museum und Forschungs Institut, Frankfurt am Main; Dr. W. J. Gertsch, Portal, Arizona, and Dr. R. W. Mitchell, Texas Tech University, Lubbock.

TAXONOMIC CHARACTERS IN THE RICINULEI

Published descriptions of ricinuleid species vary greatly both in their fullness of detail and in the features considered significant. Cooke (1967) drew attention to the difficulties attendant upon using characters whose biological significance and natural variation were unknown and he also emphasized that the groupings resulting from the use of such characters could have little or no phylogenetic value. The recent studies of Pittard and Mitchell (1972) on the detailed morphology of *Cryptocellus pelaezi* Coronado clarify the status of many characters, but further work is required. In particular a survey is needed of cuticular structures and the detailed morphology of the copulatory apparatus. The principle characters employed in the following descriptions are discussed below.

SIZE MEASUREMENTS

Cryptocellus species range in overall size from just under 3.0 to almost 8.0 mm., but such figures for total length are imprecise as they are markedly affected by the angle at which the cucullus is extended, by the degree of telescoping of the pygidial segments, and by the condition of the prosoma-opisthosoma hinge. More meaningful are measurements of carapace and abdominal proportions, but even for these there is room for idiosyncratic variation between authors, and the precise manner in which

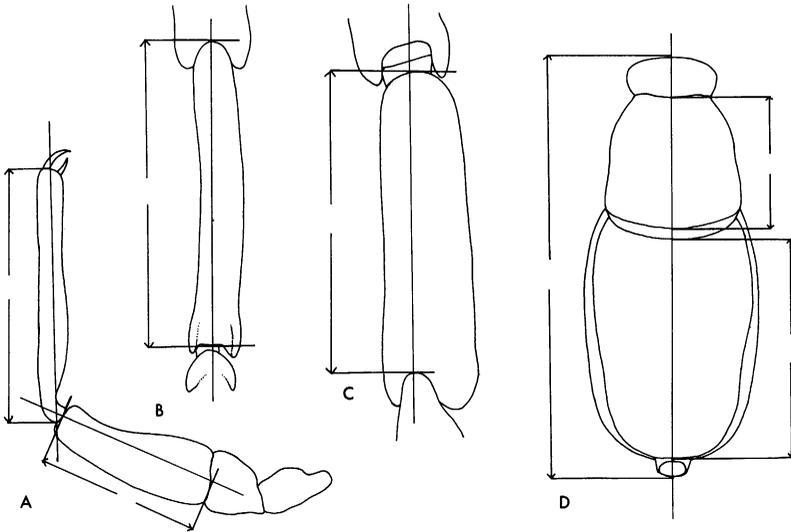


FIG. 1. Principal measurements employed in ricinuleid descriptions. A. Pedipalp tibia length. B. Pedipalp femur length. C. Metatarsus length. D. Femur length. E. Total body length. F. Carapace length. G. Abdomen length.

measurements are taken must be specified. In the descriptions below the measurements are as shown in figure 1. Carapace and abdominal lengths are measured along the midline and exclude both the hinge area and the pygidium. The width is taken as the maximum width. The length of the cucullus is measured along the midline and the width between the points of greatest lateral extension. The lengths of limb segments are measured along the middorsal line between articulations as shown in figure 1A-D, and the femoral diameter is measured from directly above at the midpoint. It seems superfluous to give measurements of each segment of each limb, particularly if a figure of the entire animal accompanies the description. However, measurements of the length and diameter of femora I and II (and to a lesser extent of metatarsi I and II) provide important information and should be included in any description.

COLOR

In general immature ricinuleids are pale yellow-brown in color, and become darker as adults. Adult ricinuleids can exhibit a range of hues from almost black to pale yellow that is generally characteristic for the species. The variation in adult color noted in some species probably results from individuals being killed soon after moulting. Color patterns

are not common in the Ricinulei, but some species exhibit a darkening of the margin of the carapace and abdomen that can be quite striking, and *C. striatipes*, new species, is remarkable for the pale longitudinal stripes running both dorsally and ventrally down each leg.

ABDOMINAL SCLERITES

The median tergites on somites 11–13 show considerable interspecific variation. Although apparent in whole animal illustrations, the systematic importance of this variation has not previously been commented upon. In juvenile instars the tergites are more widely separated than in the adults and appear somewhat more variable in their proportions. In the adults the proportions are fairly constant although some species exhibit a significant sexual dimorphism. The abdominal sternites do not appear to possess any systematic importance but the fact that they are fused in adults and separated in immatures provides a ready means of distinguishing females from third instar nymphs, which possess the full complement of tarsal segments.

PYGIDIUM

The pygidium, also referred to as the postabdomen or anal turret, consists of three segments. The two posterior segments are usually concealed by being telescoped within the basal segment, which is somite 14. Immatures bear four short, stout pre-anal teeth ventrally on somite 15, which disappear at maturity. The posterior dorsal margin of somite 14 may either be smooth or exhibit varying degrees of indentation. The significance of this indentation or notch is not known, but it seems to be constant within a species and certainly provides a useful diagnostic character. Because the pygidium is often tilted upward, care must be taken to view the posterior dorsal margin from directly above at right angles to the pygidial axis, as in some species the notch is not well developed and inconspicuous when viewed from slightly behind.

STERNAL REGION

Beck and Schubart (1968) drew attention to interspecific variation in the relationship between the tritosternum and coxae I. Three categories are recognized, depending on whether coxa I does or does not reach the tritosternum and whether, if it does, the area of contact is large or small. Although these relationships have been examined in comparatively few species, it appears that they provide characters of substantial value that could prove useful in grouping species. Beck and Schubart (1968) also commented upon the relative lengths of the median suture lines of coxae

II, III, and IV; although generally reflecting the relative size of femur II, this is not so in every case. *Cryptocellus blesti* Merrett, for example, has enlarged coxae II but normal femora. Thus this appears to be a character of some value.

CUCULLUS

The shape of the cucullus has generally been treated as an important character. However Pittard and Mitchell (1972) have shown that in addition to sexual dimorphism, which can be considerable, the cucullus is subject to individual variation from instar to instar. Thus differences in the shape of the cucullus should be used with prudence for distinguishing species. The interpretation of published figures also demands caution, as the form of the anterior margin and the appearance of the tubercles (see below) can be strongly affected by quite small differences in the angle of view.

BODY SURFACE

The surface of the ricinuleid integument bears a variety of structures such as pits, tubercles, and specialized hairs, which appear to possess considerable but largely untapped systematic potential. Perhaps the most striking structures of this kind are the scalelike hairs of *C. albosquamatus* Cooke, which cover the entire body at all instars. It should be noted here that Beck and Schubart (1968) are correct in questioning the presence of clavate hairs on *C. lampeli* Cooke. Re-examination has shown that the clavate appearance was due to accumulations of dirt that are easily removed by ultrasonic cleaning. The most important cuticular structures are the tubercles. Kennaugh (1968) and Pittard and Mitchell (1972) have pointed out that the tubercles assume a variety of forms. Some appear as small conical protuberances, whereas others are flattened button-like structures that may or may not be reflective. Hitherto there has been no attempt to utilize this diversity of tubercle structure as systematic characters, but it is hoped this deficiency will be rectified by a comparative survey with the Scanning Electron Microscope.

Although the form of the tubercles has hitherto escaped notice, their distribution on the body surface has not. Some species are virtually devoid of tubercles, whereas others are densely covered, even on the appendages. Cooke (1967) drew attention to the apparent reduction in the number of tubercles in successive instars, but Pittard and Mitchell (1972) demonstrated that this reduction is illusory and results from a migration of tubercles toward the periphery of the carapace, cucullus, and tergites at each moult. Despite sexual dimorphism and individual variation in the

actual number of tubercles, the overall pattern and relative density of the tubercles provide valuable characters.

CHELICERAE

Hitherto cheliceral dentition has been regarded as an important character in the description of ricinuleid species. Pittard and Mitchell (1972) demonstrated that enormous variation exists in all instars in the size and distribution of cheliceral teeth, even between the left and right chelicera of a single individual. The only characters of possible value appear to be the presence or absence of a large distal tooth on the fixed finger and perhaps the presence or absence of a large tooth on the movable finger. It is interesting to note that all species possessing a notched pygidium have the teeth on the movable finger of the chelicerae subequal in size.

PEDIPALPS

Although illustrations of the pedipalps accompany the descriptions of several *Cryptocellus* species, it does not appear that these appendages provide characters of much significance. Although the proportions of femur and tibia remain quite constant, there appear to be greater differences between the sexes than among many species. It is possible that the distribution of slit sensilla may provide characters of value but as yet we have too little information on their distribution and variation to be able to utilize them effectively.

OCELLI

It is generally stated (e.g., Pittard and Mitchell, 1972) that the Ricinulei are blind. However, many of the species we have examined possess structures on the carapace that are extremely eyelike in appearance. Beneath the smooth, transparent lens lies a patch of creamy colored tissue. Clearly, histological examination of the ocelli is needed before they can definitely be described as eyes, but it seems significant that ocelli are wholly absent in the known troglobitic Ricinulei but apparently widespread in epigeal species.

LEGS

Considerable differences exist among species in the lengths and proportions of the legs. In particular the legs of many troglobitic species such as *C. reddelli* Gertsch are extremely long and thin compared with those of epigeal species. In some species, most noticeably *C. mitchelli* Gertsch, the femora of the second pair of legs are markedly swollen, but unfortunately

it has been shown (Pittard and Mitchell, 1972) that this enlargement of the femora is subject to both sexual dimorphism and considerable individual variation. Some species possess a conspicuous spur ventrally on femur II, apparently less well developed in females, and this provides a valuable diagnostic character. Ewing (1929) drew attention to the unusual length of the last tarsomere of leg II in *C. manni* Ewing, but as this species is known from a single immature specimen it is not possible to tell whether this feature is a character of real value or simply a teratological deformity. The terminal tarsomere of leg III of *C. emarginatus* Ewing, which was previously held to be distinctive in shape, is dismissed by Pittard and Mitchell (1972) as being a typical characteristic of immature males.

COPULATORY APPARATUS

It has always been assumed, by analogy with other taxa, that the ultimate species characters will be found in the copulatory apparatus on the third leg of male ricinuleids. This assumption is probably correct, but until recently the morphology of the copulatory apparatus was too poorly understood to allow more than the grossest comparisons to be made. It is now clear that the form of the tarsal process and its accessory piece is highly significant and shows marked interspecific variation. The tarsal process has two main components, a squat basal portion and a larger, more elaborate canoe-shaped part distally. The accessory piece arises from the distal end of the basal portion and lies protected within the sweep of the distal part. The accessory piece is traversed by a duct that opens at the tip and runs back through the basal part of the tarsal process. The tip of the accessory piece, which appears to function as an embolus, lies when at rest in a characteristic fold at the distal end of the tarsal process that in some species appears as two small wings. The duct arises from a curious funnel-like structure lying on the anterior surface of the basal portion of the tarsal process, and in every species examined is associated with a characteristic tuft of short hairs. The role of this duct in sperm transfer is currently under investigation.

Cryptocellus blesti Merrett

Figures 2, 21

DIAGNOSIS: A small, pale tuberculate species resembling *C. emarginatus* Ewing and *C. foedus* Westwood in the possession of a notched pygidium. *Cryptocellus blesti* is distinguished by its small size and square cucullus.

DESCRIPTION OF ADULT FEMALE (IN MM.): Body length (total) 3.85; carapace length 1.17; carapace width 1.29; abdomen length 2.00; abdo-

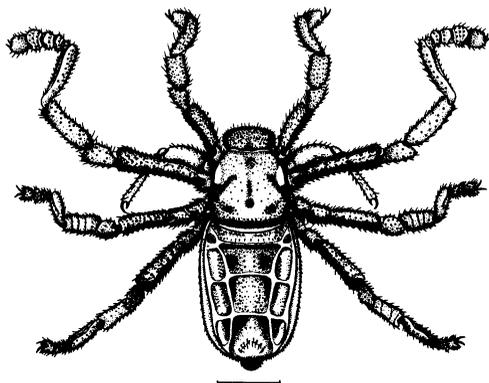


FIG. 2. *Cryptocellus blesti* Merrett, adult female. Scale line equals 1.0 mm.

men width 1.65; cucullus length 0.62; cucullus width 0.83; pedipalp femur length 0.71; pedipalp tibia length 1.10; femur I length 0.69; femur I diameter 0.24; metatarsus I length 0.41; femur II length 1.25; femur II diameter 0.26; metatarsus II length 0.96.

Carapace slightly wider than long; pale yellow-brown, lighter above ocular region; covered with conspicuous dark tubercles and with a few, fine short translucent hairs. Cucullus same color as carapace, slightly wider than long but without lateral lobes; uniformly covered in dark tubercles and with fine pale hairs, longer near margins. Chelicerae with fixed finger bearing four teeth, distal one much the largest; movable finger with 7 or 8 very small teeth only. Sternal region (fig. 21) with coxa I not reaching to tritosternum, median suture line of coxae II significantly longer than those of coxae III and IV. Abdomen same color as carapace; median tergites and median portions of lateral tergites well covered in dark tubercles; scattered fine hairs, most conspicuous on elevated portion of posterior median tergite. Pygidium with slight notch on posterior dorsal margin of basal segment. Pedipalps same color as body, devoid of tubercles on tibia and most of femur. Legs slightly darker than body and uniformly covered in scattered tubercles.

MATERIAL: *Panama:* Canal Zone, Barro Colorado Island: Jan. 26, 1972 (R. Mendez), one female in the American Museum of Natural History; Jan., 1960 (W. J. Brown), one female in the Museum of Comparative Zoology.

HABITATS: Under stone and in leaf litter at base of large tree, respectively.

DISCUSSION: The original description of this species was based entirely on immature specimens, and hence is of limited value. The two specimens

described here resemble each other closely in every respect and conform closely to the original description except for their larger size and such adult characteristics as the spacing of the abdominal tergites. It is clearly distinct from *C. relictus* Chamberlin and Ivie, the only other species reported from Barro Colorado Island, on the basis of size, tuberculations, cucullus shape, pygidial notch, and cheliceral teeth.

***Cryptocellus dissimulans*, NEW SPECIES**

Figures 3, 12, 16

Cryptocellus centralis: ROEWER, 1956, p. 425 (misidentification).

Cryptocellus boneti: BECK AND SCHUBART, 1968, p. 76 (misidentification).

DIAGNOSIS: A slender, long-legged species resembling *C. boneti* Bolivar in the possession of an unnotched pygidium and a large tooth on the movable finger of the chelicera. It differs, however, in the almost total absence of tubercles on the abdomen and in possessing shorter, stouter legs.

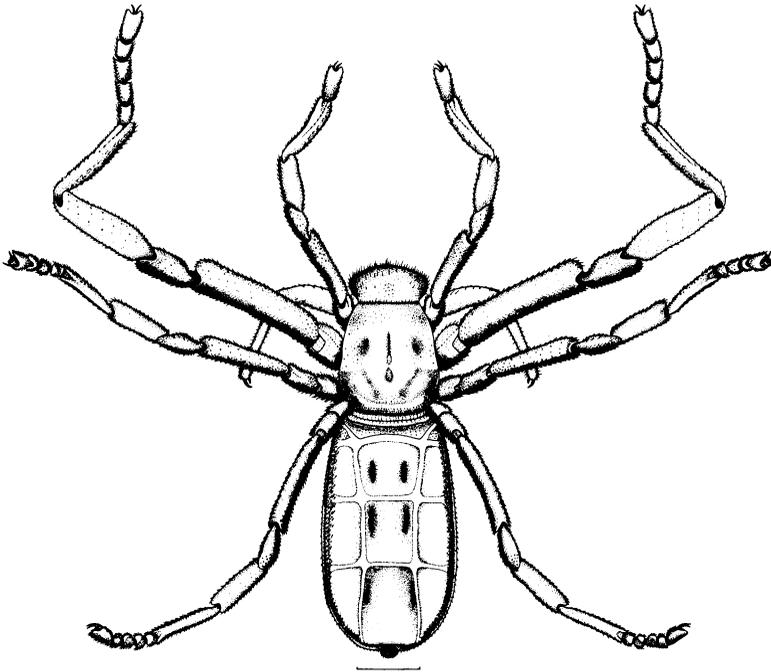


FIG. 3. *Cryptocellus dissimulans*, new species, adult female. Scale line equals 1.0 mm.

DESCRIPTION OF FEMALE HOLOTYPE (IN MM.): Body length (total) 6.30; carapace length 1.80; carapace width 1.70; abdomen length 3.50; abdomen width 2.20; cucullus length 0.86; cucullus width 1.30; pedipalp femur length 1.00; pedipalp tibia length 1.06; femur I length 1.17; femur I diameter 0.29; metatarsus I length 1.17; femur II length 2.00; femur II diameter 0.50; metatarsus II length 1.70.

Carapace slightly longer than broad; light orange-brown in color and covered in numerous small tubercles, particularly marginally; densely clothed in short, fine translucent hairs; irregular pale patches present above coxae II, but no smooth corneal lens. Cucullus (fig. 12) substantially wider than long, distinctly bilobed; same color as carapace and bearing numerous scattered tubercles. Chelicerae with fixed finger bearing five small teeth, movable finger with reduced dentition consisting of a single large tooth with other teeth represented by small granules. Sternal region (fig. 16) with coxa I just reaching tritosternum, suture line of coxae II significantly longer than suture lines of coxae III or IV. Abdomen

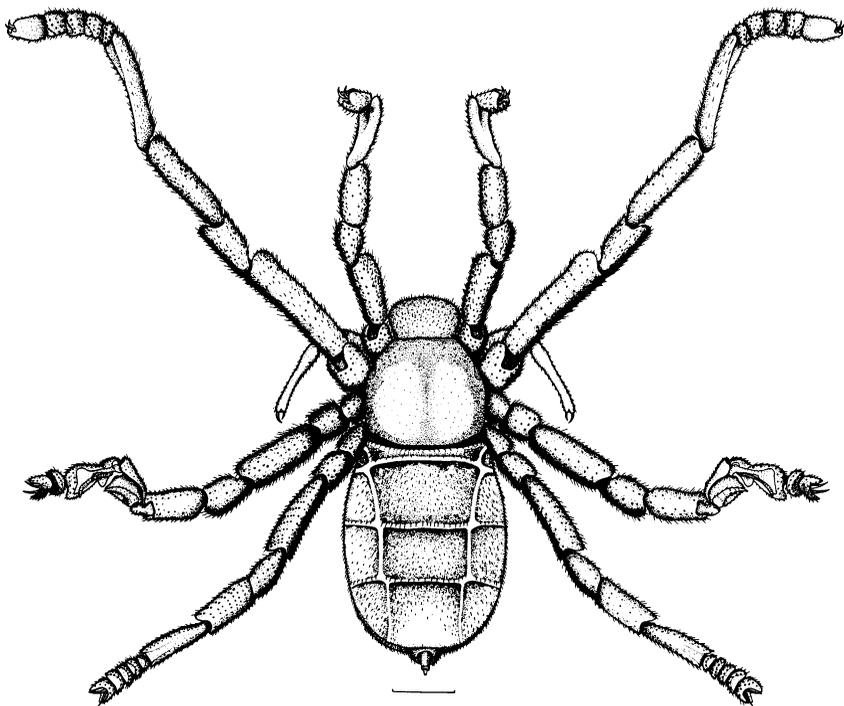


FIG. 4. *Cryptocellus glenoides*, new species, adult male. Scale line equals 1.0 mm.

same color as carapace, virtually devoid of tubercles except along anterior margin. Pygidium without notch in posterior dorsal margin of basal segment. Pedipalps paler in color than legs and with tubercles confined to basal segments. Legs same color as carapace except leg II is darker; all legs bearing scattered small tubercles.

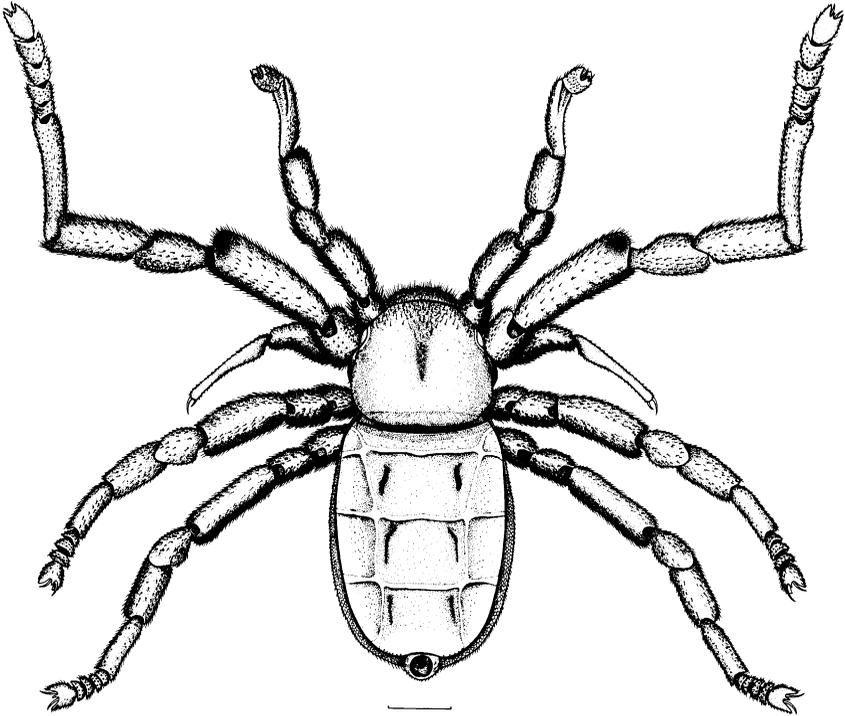


FIG. 5. *Cryptocellus glenoides*, new species, adult female. Scale line equals 1.0 mm.

MATERIAL: *El Salvador*: Dept. La Libertad; Santa Tecla, Finca Alicante, 1100 m., Feb. 2, 1951 (A. Zilch), holotype female, SMF 9733, in the Senckenberg Museum, Frankfurt.

ETYMOLOGY: From the Latin *dissimulo*, to hide or conceal, and referring to the incorrect placement of the holotype by previous authors.

Examination of several specimens including paratypes of *C. boneti* reveals that this species has the abdomen and legs densely covered in small reflective tubercles, which are absent in *C. dissimulans*. Moreover, *C. boneti* is a more slender species with longer, thinner legs. A female paratype had

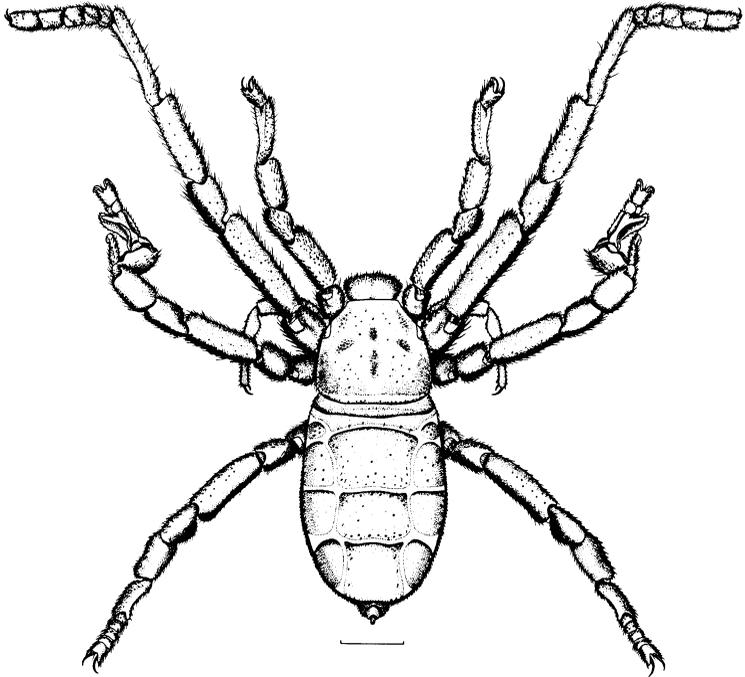


FIG. 6. *Cryptocellus striatipes*, new species, adult male. Scale line equals 1.0 mm.

the following measurements: carapace length 1.65 mm.; carapace width 1.61 mm.; femur II length 2.20 mm.; femur II diameter 0.33 mm.

***Cryptocellus glenoides*, NEW SPECIES**

Figures 4, 5, 15, 20, 27, 28, 31, 37

DIAGNOSIS: A large species with conspicuous ocelli, resembling *C. isthmius*, new species, and *C. striatipes*, new species, in having an unnotched pygidium and all teeth on the movable finger of the chelicerae subequal in size. It differs from them in size, degree of tuberculation on the body, and form of the male copulatory apparatus.

DESCRIPTION OF MALE HOLOTYPE (IN MM.): Body length (including cucullus in extended position and protruding postabdominal segments) 5.90; carapace length 1.75; carapace width 1.92; abdomen length 3.24; abdomen width 2.66; cucullus length 0.93; cucullus width 1.19; pedipalp femur length 0.93; pedipalp tibia length 1.43; femur I length 1.06; femur I diameter 0.42; metatarsus I length 1.11; femur II length 1.86; femur II diameter 0.44; metatarsus II length 1.89.

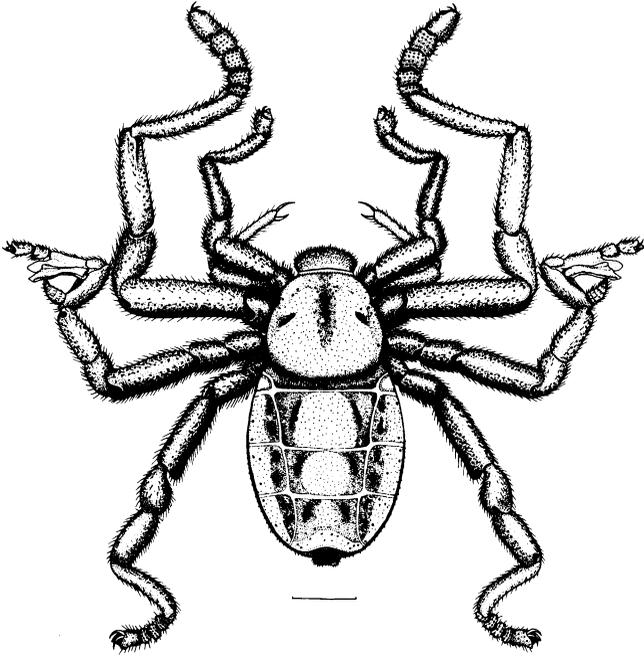


FIG. 7. *Cryptocellus isthmus*, new species, adult male. Scale line equals 1.0 mm.

Carapace slightly broader than long, with distinct median furrow; laterally between coxae I and II a clear lenslike area 0.30 mm. long giving the appearance of creamy-colored eyes; surface mat, rich reddish brown without tubercles or pits, clothed in scattered, fine translucent hairs. Cucullus wider than long, same color as carapace but with scattered tubercles along anterior and lateral margins; clothed in fine hairs up to 0.30 mm. in length along anterior margin. Chelicerae with movable finger bearing 10 teeth subequal in size; fixed finger with five teeth, distal one the largest. Sternal region (fig. 20): coxa I not reaching tritosternum, coxae II-IV equally contiguous along midline. Abdomen same color as carapace, slightly darker marginally; devoid of tubercles or pits but well clothed in fine translucent hairs. Pygidium with posterior dorsal margin of basal segment smooth and unnotched; posterior segments everted and bearing a few flattened scalelike tubercles laterally. Penis extruded, similar to that of *C. pelaezi* Coronado. Pedipalps yellow-brown with a few tubercles ventrally on femur and trochanter, claws well developed with minute teeth. Legs similar in color to carapace and abdomen but with scattered

tubercles on all segments except ventrally on metatarsi, clothed in fine translucent hairs similar to those on abdomen; leg II longest but not markedly more massive than others, without tibial spur or enlarged tubercles; tarsomeres II increasing in length distally, tarsomere 5 equal to combined lengths of tarsomeres 1 and 2. Copulatory apparatus (figs.

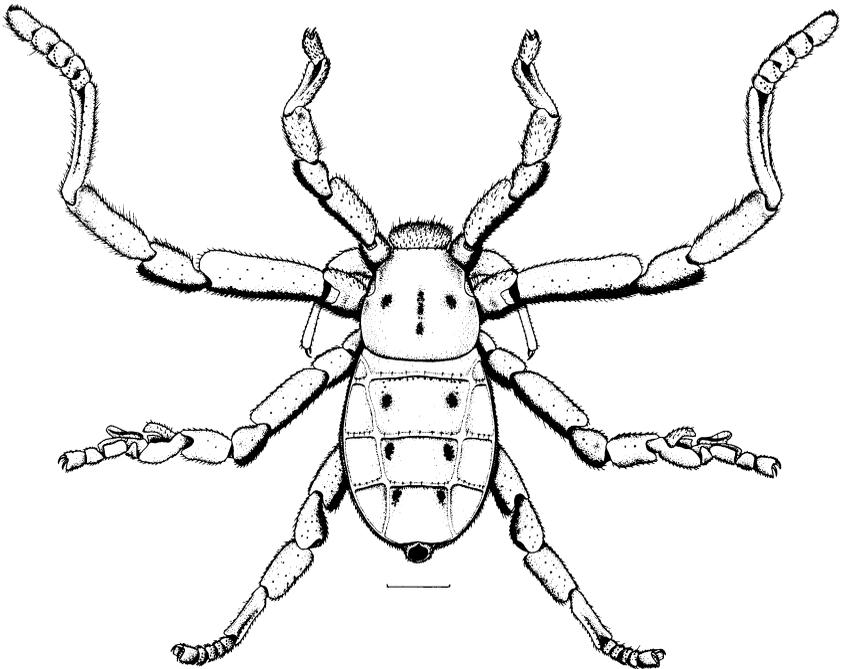


FIG. 8. *Cryptocellus fagei*, new species, adult male. Scale line equals 1.0 mm.

27, 28, 31, 37) with tarsal process and accessory piece highly distinctive in shape.

DESCRIPTION OF FEMALE ALLOTYPE (IN MM.): Body length 6.20; carapace length 2.00; carapace width 2.15; abdomen length 3.36; abdomen width 2.90; cucullus length 1.03; cucullus width 1.26; pedipalp femur length 1.07; pedipalp tibia length 1.64; femur I length 1.05; femur I diameter 0.50; metatarsus I length 1.10; femur II length 2.05; femur II diameter 0.63; metatarsus II length 1.90. Slightly larger than male but similar in general appearance. Differs from male in following features: median furrow of carapace with tubercles; abdomen much less hirsute, with only a few small scattered hairs; cucullus devoid of tubercles except in hinge

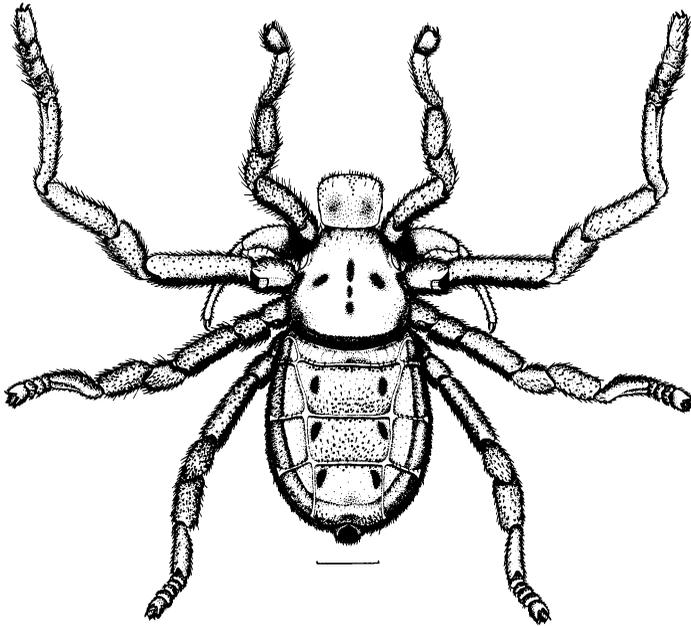


FIG. 9. *Cryptocellus hanseni*, new species, adult female. Scale line equals 1.0 mm.

area; pedipalps longer; legs devoid of tubercles except on metatarsi and tarsomeres and distally on femur I.

MATERIAL: *Colombia:* Valle, 5 km. west of Delfina, 400 m., Aug. 26, 1967 (P. and B. Wygodzinsky), holotype male in the American Museum of Natural History. *Panama:* Panama Province, Cerro Campana, Sept., 1962 (W. L. Brown), allotype female in the Museum of Comparative Zoology, Harvard.

ETYMOLOGY: From the Greek *glene*, an eyeball, referring to the conspicuous ocelli.

***Cryptocellus striatipes*, NEW SPECIES**

Figures 6, 13, 18, 23, 24, 34, 38

DIAGNOSIS: Resembling *C. isthmus*, new species, and *C. glenoides*, new species, in having all the teeth on the movable finger of the chelicerae subequal in size and in having the pygidium unnotched, but differing from these species in the form of the male copulatory apparatus and in the striking color pattern of the legs.

DESCRIPTION OF MALE HOLOTYPE (IN MM.): Body length (approximate,

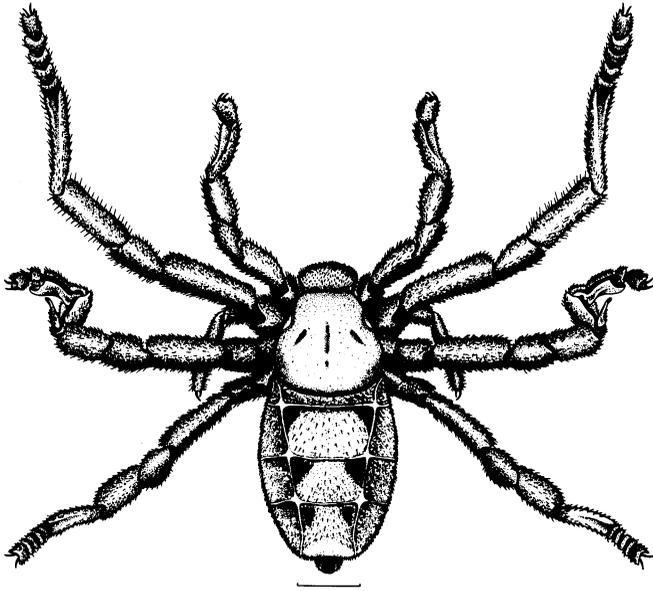
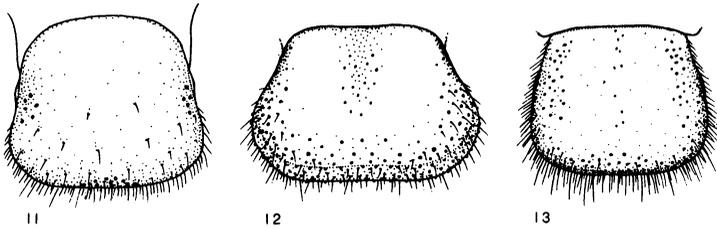


FIG. 10. *Cryptocellus hanseni*, new species, adult male. Scale line equals 1.0 mm.

body in two parts) 6.00; carapace length 1.67; carapace width 1.82; abdomen length 3.30; abdomen width 2.50; cucullus length 0.83; cucullus width 1.00; pedipalp femur length 0.86; pedipalp tibia length 1.28; femur I length 0.87; femur I diameter 0.43; metatarsus I length 0.89; femur II length 1.65; femur I diameter 0.47; metatarsus II length 1.55.

Carapace slightly broader than long; yellow-brown in color and covered in scattered tubercles; clothed in fine translucent hairs; ocelli inconspicuous. Cucullus (fig. 13) pale, lighter in color than carapace; clothed in fine, pale hairs, short except marginally; tubercles confined to margins, with narrow row down midline. Chelicerae with fixed finger bearing one big and two small teeth; movable finger with eight small teeth, subequal in size. Sternal region (fig. 18) with coxae I not reaching to tritosternum; median suture line of coxae II not significantly greater than those of coxae III or IV. Abdomen darker than carapace, rich reddish brown in color with darker border; clothed in fine hairs and with a few large scattered tubercles. Pygidium with anterior dorsal margin of basal segment smooth and unnotched. Pedipalps pale yellow-brown, tubercles confined to basal segments and basal portion of ventral surface of femur. Legs I and IV same color as cucullus, II and III darker as carapace; all legs with



FIGS. 11-13. Cucullus, from in front. 11. *Cryptocellus fagei*, new species, male. 12. *C. dissimulans*, new species, male. 13. *C. striatipes*, new species, male.

pale stripe running down midline dorsally and even more conspicuously down midline ventrally; few scattered tubercles on all legs. Copulatory apparatus (figs. 23, 24, 34, 38) with characteristically elongate tarsal process and correspondingly long, thin accessory piece.

MATERIAL: *Costa Rica*: "Colombiana," 1924 (W. M. Mann), male holotype in the American Museum of Natural History.

ETYMOLOGY: The name of this species refers to the color pattern on the legs.

It will be noted that the single specimen of *C. striatipes* was collected at the same time and place as the female allotype of *C. fagei*. Careful examination shows they are not conspecific, the absence of a pygidial notch in *C. striatipes* being considered particularly significant.

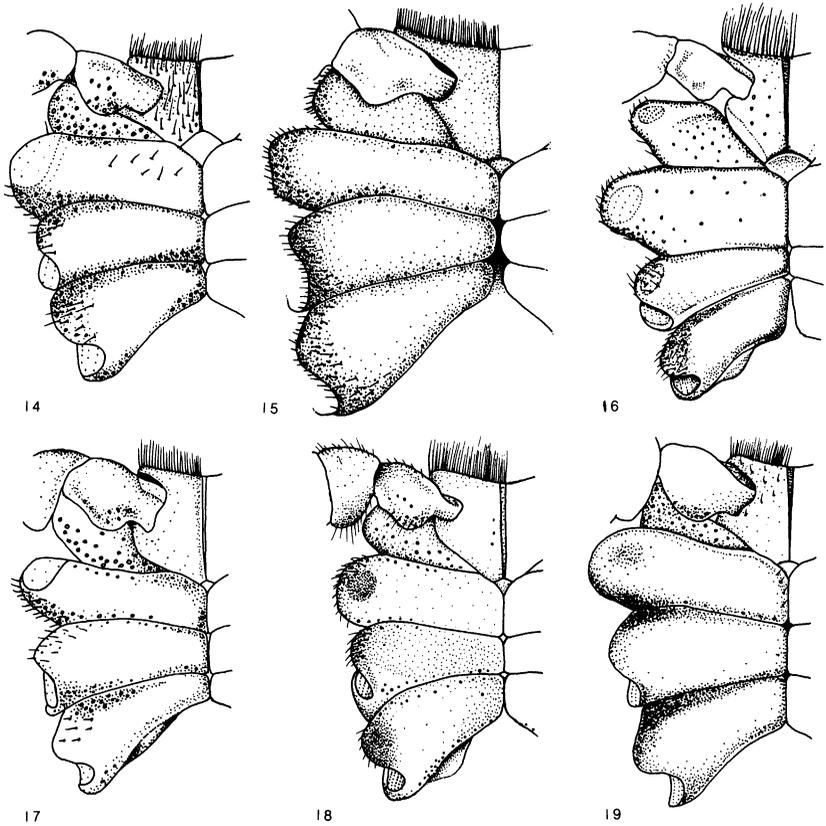
***Cryptocellus isthmius*, NEW SPECIES**

Figures 7, 22, 29, 30, 35, 39

DIAGNOSIS: Resembles *C. dorotheae* Gertsch and Mulaik, *C. paradoxus* Cooke, *C. striatipes*, new species, and *C. glenoides*, new species, in having an unnotched pygidium and all teeth on movable finger of chelicera subequal in size. Distinguished from *C. dorotheae* by size, from *C. paradoxus* by the absence of a tibial spur on leg II, and from *C. striatipes* and *C. glenoides* by the form of the copulatory apparatus.

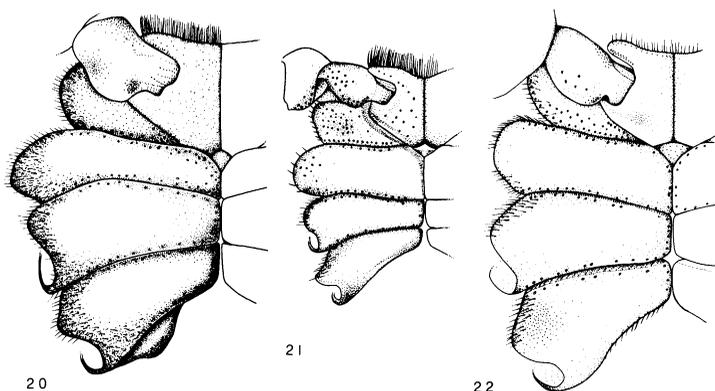
DESCRIPTION OF MALE HOLOTYPE (IN MM.): Body length (total) 5.10; carapace length 1.82; carapace width 1.95; abdomen length 2.74; abdomen width 2.44; cucullus length 0.89; cucullus width 1.07; pedipalp femur length 0.97; pedipalp tibia length 1.43; femur I length 1.00; femur I diameter 0.42; metatarsus I length 1.08; femur II length 1.85; femur II diameter 0.54; metatarsus II length 1.75.

Carapace slightly broader than long, and with median furrow containing a few dark tubercles; surface roughened but without tubercles generally; orange-brown in color with small refractile granules and with



FIGS. 14–19. Sternal region. 14. *Cryptocellus hanseni*, new species, male. 15. *C. glenoides*, new species, female. 16. *C. dissimulans*, new species, female. 17. *C. hanseni*, new species, female. 18. *C. striatipes*, new species, male. 19. *C. fagei*, new species, male.

few pale, fine hairs, mainly marginally; ocelli present. Cucullus wider than long, almost devoid of tubercles except laterally and along anterior margin; color and texture same as carapace; bearing fine translucent hairs, longer and more numerous marginally. Chelicerae with movable finger almost smooth, teeth reduced to little more than row of granules of indeterminate number; fixed finger with five teeth, distal one largest. Sternal region (fig. 22) with coxa I not reaching tritosternum; midline suture of coxae II slightly longer than that of coxae III and IV. Abdomen slightly darker than carapace but with similar texture and with numerous refractile granules, virtually devoid of hairs. Pygidium with posterior



FIGS. 20–22. Sternal region. 20. *Cryptocellus glenoides*, new species, male. 21. *C. blesti* Merrett, female. 22. *C. isthmius*, new species, male.

dorsal margin of basal segment smooth and unnotched. Pedipalps same color as body, smooth and almost devoid of tubercles; claws, lacking teeth. Legs same color as body, virtually devoid of tubercles except on anterior tarsomeres; tarsomere 5 of leg II equal in length to combined lengths of tarsomeres 1 and 2. Copulatory apparatus (figs. 29, 30, 35, 39) with characteristic tarsal process and long, thin accessory piece only gently curved.

MALE PARATYPE: Smaller than holotype with proportionally wider carapace but similar in most other features. The maxillae have a few tubercles near midline and there are more tubercles on the cucullus, but with the present state of our knowledge of the genus this does not seem sufficient to warrant the creation of a new taxon. Body length (cucullus extended) 5.7 mm.; carapace length 1.76 mm.; carapace width 2.06 mm.; abdomen length 2.56 mm.; abdomen width 2.50 mm.; cucullus length 0.83 mm.; cucullus width 1.07 mm.

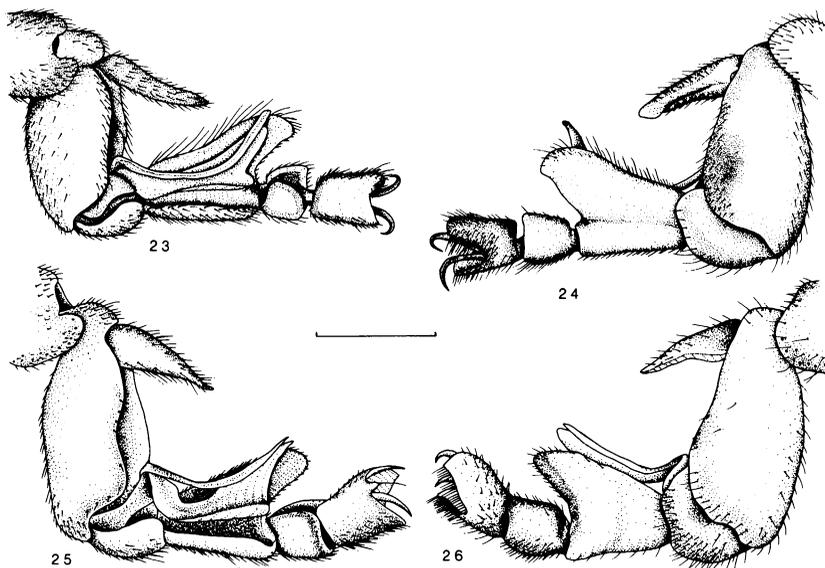
MATERIAL: *Panama:* Canal Zone, Gatun, Mar. 1930 (Zschokke), holotype male in the California Academy of Sciences; (no precise locality), Apr., 1924 (F. R. Swift), paratype male in the American Museum of Natural History.

ETYMOLOGY: The name is taken from the region where the species was collected, namely the isthmus of Panama.

***Cryptocellus fagei*, NEW SPECIES**

Figures 8, 11, 19, 25, 26, 32

DIAGNOSIS: Resembling *C. lampeli* Cooke and *C. hanseni*, new species, by the possession of a notched pygidium and relatively few tubercles. Dis-



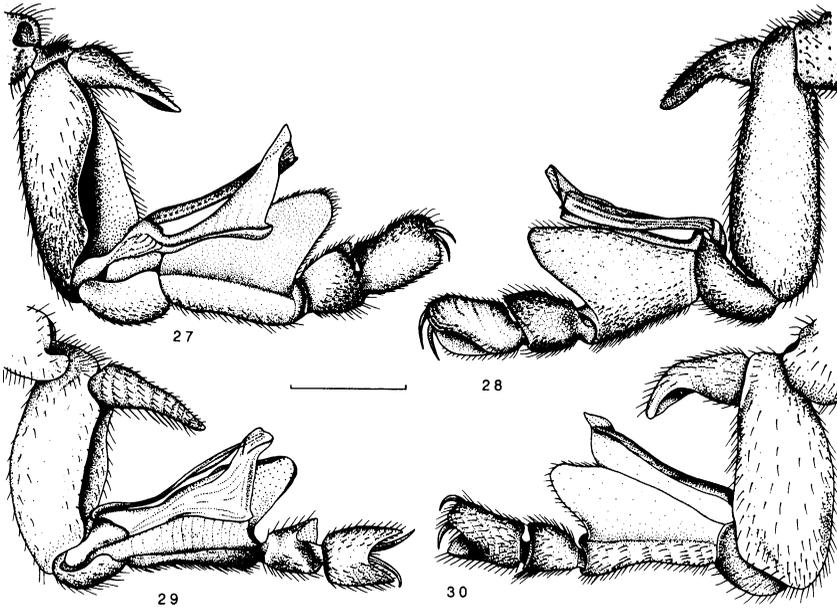
FIGS. 23-26. Male copulatory apparatus. 23. *Cryptocellus striatipes*, new species, anterior view. 24. *C. striatipes*, posterior view. 25. *C. fagei*, new species, anterior view. 26. *C. fagei*, posterior view. Scale line equals 0.5 mm.

tinguished from *C. lampeli* by the form of the male copulatory apparatus and from *C. hanseni* by the possession of more massive legs, fewer tubercles on legs, and less hair on abdomen.

DESCRIPTION OF MALE HOLOTYPE (IN MM.): Body length (total) 5.30; carapace length 1.80; carapace width 2.00; abdomen length 3.08; abdomen width 2.44; cucullus length 0.90; cucullus width 1.07; pedipalp femur length 0.96; pedipalp tibia length 1.43; femur I length 1.02; femur I diameter 0.48; metatarsus I length 1.07; femur II length 1.80; femur II diameter 0.61; metatarsus II length 1.73.

Carapace slightly wider than long; with reddish brown mat surface, rather rugose at high magnifications and clothed in fine pale hairs; ocelli distinct; tubercles confined to median and lateral foveae. Cucullus (fig. 11) same color as carapace but paler along anterior margin; tubercles sparse, confined to median portion of anterior margin and laterally; clothed in long, fine hairs particularly along anterior margin. Chelicerae with fixed finger bearing four teeth, distal one much the largest; movable finger bearing 10 teeth subequal in size. Sternal region (fig. 19) with coxa I not reaching tritosternum, median suture line of coxae II not significantly

longer than those of coxae III or IV. Abdomen same color and texture as carapace; tubercles confined to anterior margin of median tergite 11 and paired tergal foveae; clothed in fine pale hairs. Pygidium with distinct notch on posterior dorsal margin of basal segment. Pedipalps paler than legs and devoid of tubercles. Legs same color as carapace and clothed in

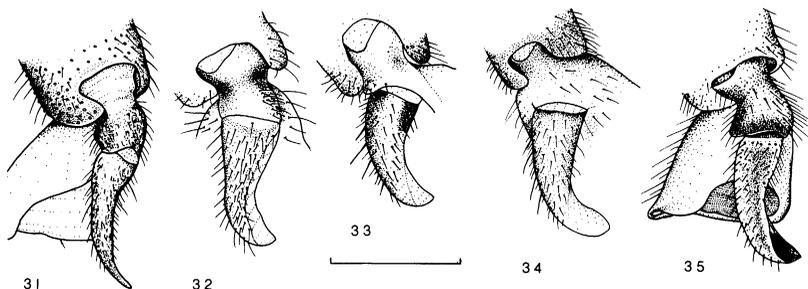


FIGS. 27-30. Male copulatory apparatus. 27. *Cryptocellus glenoides*, new species, anterior view. 28. *C. glenoides*, posterior view. 29. *C. isthmus*, new species, anterior view. 30. *C. isthmus*, posterior view. Scale line equals 0.5 mm.

fine hairs; bearing a few small scattered inconspicuous tubercles. Copulatory apparatus (figs. 25, 26, 32) with accessory piece of tarsal process short and strongly curved; not distinguishable from *C. hanseni*, new species.

DESCRIPTION OF FEMALE ALLOTYPE (IN MM.): Body length (total) 5.60; carapace length 1.99; carapace width 2.14; abdomen length 3.08; abdomen width 2.70; cucullus length 1.02; cucullus width 1.19; pedipalp femur length 1.00; pedipalp tibia length 1.43; femur I length 0.95; femur I diameter 0.48; metatarsus I length 1.02; femur II length 1.72; femur II diameter 0.60; metatarsus II length 1.65.

Resembles holotype in most features but with fewer tubercles. Thus cucullus totally devoid of tubercles and abdominal ones confined to tergal



FIGS. 31-35. Dorsal view of metatarsal process of male copulatory apparatus. 31. *Cryptocellus glenoides*, new species. 32. *C. fagei*, new species. 33. *C. hanseni*, new species. 34. *C. striatipes*, new species. 35. *C. isthmus*, new species. Scale line equals 0.5 mm.

foveae. Legs almost devoid of tubercles, the few present being small and very inconspicuous.

MATERIAL: *Costa Rica:* Golfito, Sept. 17, 1957 (E. Dixon), male holotype and six immature paratypes in the American Museum of Natural History; "Colombiana," 1924 (W. M. Mann), female allotype in the American Museum of Natural History.

HABITAT: In leaf mold.

ETYMOLOGY: Named for Prof. Louis Fage in recognition of his contribution to the study of Ricinulei.

***Cryptocellus hanseni*, NEW SPECIES**

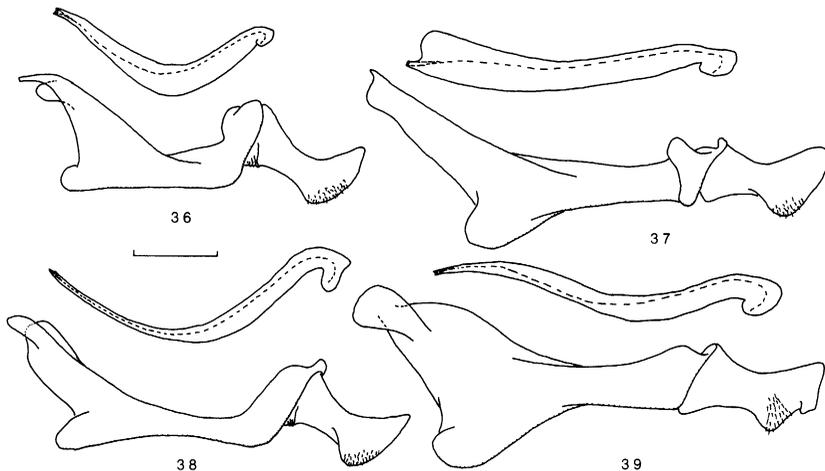
Figures 9, 10, 14, 17, 33, 36

DIAGNOSIS: Closely similar to *C. fagei*, new species, from which it differs by possessing more tubercles on the legs and more hairs on the abdomen and by its less massive legs.

DESCRIPTION OF MALE HOLOTYPE (IN MM.): Body length (total) 4.70; carapace length 1.62; carapace width 1.76; abdomen length 2.56; abdomen width 2.25; cucullus length 0.86; cucullus width 1.00; pedipalp femur length 0.93; pedipalp tibia length 1.37; femur I length 0.86; femur I diameter 0.36; metatarsus I length 0.88; femur II length 1.57; femur II diameter 0.42; metatarsus II length 1.57.

Carapace slightly wider than long; rich mahogany-red in color with rather uneven mat surface and scattered fine, pale hairs; inconspicuous tubercles confined to shallow depressions; pale, opaque ocelli well developed. Cucullus wider than long, same color as carapace; bearing a few scattered tubercles, mainly marginally and some pale, fine hairs. Cheli-

cerae with fixed finger bearing four teeth, distal one much the largest; movable finger with seven teeth subequal in size. Sternal region (fig. 14) with coxa I not reaching tritosternum; median suture line of coxae II not significantly longer than those of coxae III or IV. Abdomen same color and texture as carapace, tubercles similarly restricted to paired depressions. Pygidium with posterior dorsal margin of basal segment notched. Pedipalps lighter in color than body and legs; tibia and distal part of femur



FIGS. 36-39. Anterior view of right tarsal process and accessory piece of male copulatory apparatus. 36. *Cryptocellus hanseni*, new species. 37. *C. glenoides*, new species. 38. *C. striatipes*, new species. 39. *C. isthmus*, new species. Scale line equals 0.2 mm.

devoid of tubercles. Legs same color as body but with scattered dark tubercles. Copulatory apparatus (figs. 33, 36) closely similar to that of *C. fagei*, with accessory piece of tarsal process short and strongly curved.

Male paratypes (2) similar to holotype in most respects but differ as follows: both carapace and abdomen about 0.10 mm. longer but retaining similar proportions. One is of similar color to the holotype but possesses a distinct dark margin around both abdomen and carapace. The other is much lighter in color, being orange-brown, but also possesses a darker margin to both carapace and abdomen.

DESCRIPTION OF FEMALE ALLOTYPE (IN MM.): Body length (with cucullus extended) 5.75; carapace length 1.75; carapace width 1.97; abdomen length 2.82; abdomen width 2.59; cucullus length 0.91; cucullus width 1.06; pedipalp femur length 0.90; pedipalp tibia length 1.35; femur I

length 0.86; femur I diameter 0.36; metatarsus I length 0.93; femur II length 1.50; femur II diameter 0.40; metatarsus II length 1.36.

Carapace slightly wider than long; rich reddish brown in color with mat surface and with a few fine pale hairs; tubercles appearing like flat reflecting buttons confined to foveae and posterior and posterolateral margins. Cucullus same color as carapace with few scattered tubercles. Chelicerae with fixed finger bearing five teeth, distal one much the largest; movable finger with 11 teeth subequal in size. Sternal region (fig. 17) with coxa I not reaching tritosternum; median suture line of coxae II not significantly longer than that of coxae III and IV. Abdomen same color as carapace but with darker border; clothed in fine pale hairs; tubercles mainly on two anterior median tergites. Pygidium with distinct notch on posterior dorsal margin of basal segment. Pedipalps paler than legs, devoid of tubercles except basally on femur. Legs same color as carapace, uniformly covered in scattered tubercles.

MATERIAL: *Nicaragua*: Musawas, Waspuc River, Oct. 29, 1955 (B. Malkin), male holotype in the American Museum of Natural History. *Honduras*: 175 miles up Patuca Rio: (C. W. Cook), female allotype in the American Museum of Natural History; (C. W. Cook) paratypes (two males, three females, six immatures).

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