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## A Synopsis of the Pinelii-Complex in the Genus Paracryptocerus (Hym. Formicidae)

By Walter W. Kempf, O. F. M.

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## A Synopsis of the *Pinelii*-Complex in the Genus *Paracryptocerus* (Hym. Formicidae)

By Walter W. Kempf, O. F. M., Agudos, S. P., Brazil

(With 16 figures)

### Introduction

The *pinelii*-complex, a homogeneous species group within the subgenus *Harnedia* M. R. Smith (olim: *Cryptocerus*, s. str.), was recognized and established by Emery in the Myrmicinae section of Genera Insectorum (1922, fasc. 174c, pp. 310-311). The species of this clearly circumscribed natural group are distinctive by the following common characteristics:

**Worker:** Small in size, 2.5-4.5 mm. Depressed and flattened throughout. Frontal carinae membranaceous. Penultimate funicular segment distinctly longer than the antepenult, the latter subequal to the preceding segment (i. e. apical club of funiculus two-segmented). Sides of pronotum and epinotum with a projecting membranaceous border; the epinotal border beginning at the anterior corner of the basal face. Hind femora distinctly angulate dorsally near the middle, or, if not so, the apical half bears a conspicuous longitudinal crest. Hind metatarsi somewhat compressed and prismatic. Peduncular segments with lateral membranaceous projections. Body of petiole not flattened dorso-ventrally, always higher than long, usually with a distinct, more or less truncate, anterior face above the thoracic insertion.

**Soldier:** Size 3.8-6.5 mm. Funiculus, hind femora, metatarsi, and peduncular segments as in worker. Head surmounted by a well developed, excavate disc, the margins of which are excised above the mandibles, upturned and crested laterally and behind. A fringe of clavate setulae projecting anteriorly and laterally from the edge of the cephalic disc.

**Female:** Funiculus as in worker. Cephalic disc as in soldier, but less distinctly excavate and usually more elongate.

Thorax longer than wide. Mesopleura moderately convex, scarcely projecting beyond the maximum width of the pronotum. Hind femora not distinctly angulate dorsally. Gaster nearly twice as long as broad, with subparallel sides.

Since the males of the *pinelii*-complex are little known, it does not seem feasible to make any generalization before sufficient material is at hand.

Heretofore the following forms have been recognized:

1. *P. (H.) foliaceus* (Emery) 1905
2. *P. (H.) grandinosus* (F. Smith) 1860  
*P. (H.) grandinosus* var. *nevadensis* (Forel) 1912  
*P. (H.) grandinosus magdalenensis* (Forel) 1899
3. *P. (H.) incertus* (Emery) 1905
4. *P. (H.) maculatus* (F. Smith) 1876  
*P. (H.) maculatus nanus* (Forel) 1912
5. *P. (H.) pinelii* (Guérin) 1845
6. *P. (H.) scutellatus* (F. Smith) 1867

This review concerns itself chiefly with the species of the *pinelii*-group. The three forms of infraspecific standing, proposed by Forel, are involved in several difficulties. They have been erected solely upon the worker caste — the other castes are still unknown, — and the subspecies have been founded upon a few individuals of a single colony. These two facts alone indicate that the systematic status of these forms is quite dubious and questionable. Unfortunately I find myself in no position to clear up this dark area because I have been unable to see the types or topotypical specimens. The rather scanty diagnoses of the infraspecific forms of *grandinosus* and *maculatus* contain a few elements that provide a base for systematic suggestions which will be taken up further below.

The scope of the present paper coincides with that of my earlier monograph on Cephalotine ants (Kempf, 1951), of which it is a continuation. For a general introduction to the tribe and an explanation of morphological terms the student is referred to that study. Besides keys to species for soldiers and workers of the *pinelii*-complex, the present contribution also contains descriptions and figures, new distributional data, and the original diagnoses of the soldier of *foliaceus* and the female of *incertus*, both hitherto undescribed.

No type specimens of any of the aforesaid forms were available for this investigation. Hence the review is exclusively based upon abundant material from the following collections: Dr. T. Borgmeier, O. F. M., Petrópolis, Rio de Janeiro [CTB];

Dr. W. M. Mann, Washington, D. C. [CWMM]; Dr. A. Reichensperger, Bonn [CAR]; Academy of Natural Sciences of Philadelphia [ANSP], courtesy of Dr. V. S. L. Pate of Cornell University; Instituto Miguel Lillo, Tucumán [CML], courtesy of the collector Dr. N. Kusnezov; Museum of Comparative Zoology, Harvard University [MCZ], courtesy of Dr. J. Bequaert; U. S. National Museum, Washington, D. C. [USNM], courtesy of Dr. M. R. Smith. To all these persons and institutions I wish to express my sincere thanks for their splendid cooperation.

**Ethology.** — In the following I have endeavored to bring together the scarce and scattered information on the habits of the species of the *pinelii*-group, and to add a few original observations.

These ants are costumarily found upon plants. As a rule, they inhabit cavities in vegetable material. The nest may be found either in dead wood, or in living plant tissue, i. e. in the preformed structures of the so-called myrmecophytes or ant-plants. The subsequent records attest the association of the ants of the *pinelii*-group with well-known myrmecophytes of the Neotropical flora:

1. *maculatus*. — Bull's horn Acacia, Honduras [Mann, 1922, p. 34]; *Cordia alliodora*, Costa Rica (F. Nevermann) [CTB].
2. *scutulatus*. — In pseudobulbs of unidentified orchids and *Cattleya*-sp., several lots, originating from Colombia, Venezuela, Costa Rica, Guatemala, and Mexico, taken by U. S. Plant Quarantine inspectors [USNM]; *Schomburgkia tibicinis*, Mexico [Skwarra, 1934, p. 129]; *Acacia cornigera*, Mexico [Skwarra, l. c.]; *Tillandsia*-sp., Costa Rica [Wheeler, 1942, p. 208].
3. *grandinosus*. — *Acacia* (probably *cavenia*), Paraguay [Emery, 1896, p. 636; Wheeler, 1942, p. 207].

Since, however, the same species are found not less frequently as tenants in cavities of dead twigs and vines, the relationship between these ants and the myrmecophytes is only fortuitous and facultative.

The question of relative frequency of these species in divers terrestrial environment has hardly been touched. There are, however, such data on *scutulatus* for a restricted area in Mexico in the paper of Miss Skwarra (1934, pp. 129-130). Information on size and growth of the colonies are not available except for Luederwaldt's report (1925, p. 269) on *pinelii*. He states that one nest, opened in November, contained about 30 workers (+ soldiers?); another nest, examined during the same month, sheltered approximately 100 workers. A third nest of *pinelii*, which was opened in June, consisted of two chambers, one of which

inclosed nearly 80 workers, a few pupae and about 30 larvae of workers.

The presence of alate or sexuete offspring in a colony of *pinelii* was observed during November, in the State of S. Paulo. In the beginning of the same month I have found alate females in a nest of *maculatus*, in Rolândia, State of Paraná. Father Borgmeier's collection contains alate females of *maculatus*, from Caruaru, State of Pernambuco, taken in November, and males of the same species, from Porto das Caixas, State of Rio de Janeiro, collected during June 1928. Dr. Reichensperger sent me males of this form, taken on August 2, 1936 in Costa Rica, Limón planes. Nothing is known of the food habits of these ants.

Recently, while visiting the town of Rolândia, in the Northwest of the State of Paraná, Brazil, from November 1-15, 1951, I had a chance of observing a colony of *maculatus*, nesting in a small unidentified tree. A number of workers were running up and down the tree, a few even went to the ground. Although I watched them for nearly two hours, I could not detect the goal of their excursions. No soldier was visible on the outside. On a point where a larger branch had been broken off the trunk, about 3 feet above the ground, was the nest entrance, a small, rounded orifice, which was rather difficult to see and not much larger than the head disc of the soldier, even though no soldier appeared at the entrance during my observation. With the tweezers I broke off the edges of dead wood around the opening and noticed that the nest was widening on the inside. At less than 10 mm below the orifice I noticed four soldiers, forming with their disc-shaped heads put side on side a wall that prevented me from seeing any further. I removed the soldiers, one by one, and started to introduce cigar smoke into the cavity. This resulted in a few more workers and five alate females coming forth. After this all was quiet. Since the tree was an ornamental one, it did not seem feasible to cut open the entire nest and to extract the rest of the colony.

The particular behavior of these soldiers of *maculatus* seems both to confirm and to extend Wheeler's hypothesis (1905, p. 104; 1942, pp. 210-211) concerning the function of the soldier of *Paracryptocerus* (*Cyathomyrmex*) *varians* (F. Smith). Wheeler ventured the opinion that the soldier or dinergate of this species uses his saucer-shaped head as a living door for closing the nest entrance, in the fashion of the major worker of the *Colobopsis* ants in the genus *Camponotus*. Whereas this assumption

rested more or less upon indirect evidence, the above mentioned fact, although concerning a different, yet related, species, no doubt, increases its probability. Incidentally, a similar phenomenon had already been witnessed by Prof. Bugnion and Dr. Santschi in Carisco, Venezuela (Forel, 1912, p. 199; Santschi, 1929, pp. 44-45). In this particular instance workers of *Cephalotes atratus* (L.) likewise occluded the nest entrance against the attacking army-ants *Eciton* (*Nomamyrmex*) *crassicornis* (F. Smith) by forming an obstructing wall with their flattened heads put side on side. It might be interesting to point out that in *Cephalotes atratus* the monomorphic worker is structurally capable of performing this service. In the higher Cephalotini, such as the ants of the present group, the minor worker would be less adapted for this performance, on account of the extreme prognathism of the head. Hence this function appears to be reserved to the major worker, the dinergate or soldier, which, as a matter of fact, is seldom seen outside of the nest and possesses in the disc-shaped head a structural adaptation for this role. Of course, this hypothetical explanation of the functional value of the peculiar head shape in the soldier caste of the higher Cephalotini still needs more factual evidence before it can be accepted. I leave it here as a mere suggestion for further observation.

**Distribution.** — This group occurs both in Central America and in the Guiana-Brasilia, subregions of the Neogaea. Two species, *maculatus* and *grandinosus*, appear to be more universally distributed over this area. The remaining species occupy rather restricted realms; *incertus* and *pinelii* are strictly southern forms, whereas *foliaceus* is confined to the western, subandean territory of South America, and *scutulatus* is essentially a Central American species, that scarcely penetrates into South America proper.

#### Key to the species

(Subgenus *Harnedia* M. R. Smith)

**Note.** — The correct genus and subgenus may be obtained through the keys in my earlier monograph on Cephalotine ants (Kempf, 1951, pp. 13, 156-157).

1. Hind femora distinctly angulate or denticulate dorsally near the middle, or, if not so, the apical half bears a longitudinal crest... 2
- Hind femora slightly and evenly curved dorsally, never forming an angle nor having a longitudinal crest..... [*angustus*-group]
2. Penultimate funicular segment not longer than the antepenultimate, the latter distinctly longer than the preceding segment (apical club of funiculus three-segmented); petiole depressed, longer than deep.. [*umbraculatus* (Fabricius)]

- Penultimate funicular segment longer than antepenultimate, the latter subequal in length to the preceding segment (apical club of funiculus two-segmented); body of petiole not depressed, always deeper than long . . . . . [*pinelii*-group] 3
- 3. Head surmounted by a disc; transverse pronotal carina present. . . . . [soldiers] 9
- Head not surmounted by a disc; transverse pronotal carina absent. . . . . [workers] 4
- 4. First gastric tergite completely surrounded by a membranaceous border, interrupted only by the postpetiolar insertion; head much wider than long (Fig. 2) . . . . . 1. *foliaceus* (Emery)
- First gastric tergite not completely surrounded by a membranaceous border; head approximately as long as, or longer than, the interocular width . . . . . 5
- 5. Lateral border of mesonotum rounded, without projecting tooth; membranaceous border of epinotum very narrow (Fig. 1) . . . . . 3. *incertus* (Emery)
- Lateral border of mesonotum toothed or spinose; membranaceous border of epinotum broad . . . . . 6
- 6. Apical half of hind femora with a longitudinal crest above and below; integument uniformly ochraceous (Fig. 3) . . . . . 2. *grandinosus* (F. Smith)
- Apical half of hind femora without a longitudinal crest above and below, at most distinctly marginate; integument usually much darker . . . . . 7
- 7. Greatest diameter of eyes almost one third of maximum head length; lateral border of thorax not forming a reentrant angle at mesonotum; declivous face of epinotum and sides of thorax usually longitudinally striated (Fig. 5) . . . . . 4. *maculatus* (F. Smith)
- Greatest diameter of eyes one fourth or less of the maximum head length; lateral border of thorax forming a distinct reentrant angle at mesonotum; declivous face of epinotum and sides of thorax shagreened . . . . . 8
- 8. Lateral border of head straight, scarcely upturned and not projecting above eyes; lateral projections of peduncular segments flattened, plate-like and membranaceous (Fig. 6) . . . . . 5. *pinelii* (Guérin)
- Lateral border of head somewhat sinuous, concave in front of, projecting and upturned above eyes; lateral projections of peduncular segments spine-like, those of petiole not quite membranaceous (Fig. 4) . . . . . 6. *scutulatus* (F. Smith)
- 9. First gastric tergite completely surrounded by a membranaceous border, interrupted only by the postpetiolar insertion; head much broader than long (Fig. 9) . . . . . 1. *foliaceus* (Emery)
- First gastric tergite not completely surrounded by a membranaceous border; head length subequal to its width . . . . . 10
- 10. Side of head separated from the truncate occiput by a ridge extending from the tip of the occipital lobes to the disc; hind femora with a longitudinal crest on the apical half above (Fig. 12) . . . . . 2. *grandinosus* (F. Smith)
- Side of head continuous with the truncate occiput, not separated by a ridge or margination; hind femora without a longitudinal crest on the apical half above . . . . . 11
- 11. Postpetiole distinctly wider than petiole, with a recurved spine on each side; fore coxae with an acute, conical process anteriorly at the base; head bicolor, the upper face yellowish-brown, the lower

- face black; first gastric tergite sordid-white, except for a large, lozenge-shaped black area on the disc (Fig. 8).....  
 6. *scutulatus* (F. Smith)
- Postpetiole scarcely wider than petiole, with the lateral lobes pointing obliquely cephalad; base of fore coxae rounded anteriorly; color of head and gaster different..... 12
12. Head disc subcircular, with a deep median groove on vertex next to the occipital border, flanked by ridges projecting cephalad; lateral lobes of mesonotum more or less rounded (Fig. 10).....  
 5. *pinellii* (Guérin)
- Head disc less rounded, subrectangular, without groove and ridges on vertex; lateral lobes of mesonotum dentate or angulate (Figs. 7, 11)..... 4. *maculatus* (F. Smith)

1. *Paracryptocerus* (*Harnedia*) *foliaceus* (Emery)

(Figs. 2, 9)

*Cryptocerus foliaceus* Emery, 1905, Bull. Soc. Ent. Ital. vol. 37, p. 172 nota, fig. 32 [worker; Peru: Pachitea R.]. — Forel, 1912, Mém. Soc. Ent. Belg. vol. 19, p. 199 [Colombia: Dibulla].  
*Cryptocerus* (*Cryptocerus*) *foliaceus* Emery, 1922, Gen. Insect. Hym. fasc. 174c, p. 310.

Both soldiers and workers of this interesting species are at once recognized by the transverse, broad head and the membranaceous border around the first gastric tergite.

*Type*. — Worker (holotype); Peru: Pachitea River, a left-side tributary of the Alto Ucayali River (Staudinger & Bang-Haas) [presumably in the Museo Civico di Storia Naturale, Genova].

*Worker* [Fig. 2]; Peru: Chanchamayo valley [CTB].  
 — Length 4.2 mm. Median head length 1.07 mm. Weber's length of thorax 1.12 mm. Yellowish-brown, the anterior portion of the first gastric tergite much paler. Membranaceous borders and frontal carinae yellowish-white.

Head longer than thorax (52:46), broader than long (59:52), convex discally above. Supramandibular excision broad, subrectangular. Borders of frontal carinae and occipital corners finely denticulate. Lateral border of head slightly concave, scarcely upturned above eyes. Occipital corners rounded and membranaceous. Greatest diameter of eyes about 1/5 of maximum head length (11:52).

Thorax, in dorsal view, subquadrate, depressed; sides parallel. Anterior corners of pronotum obtusely angulate, posterior corners rounded. Mesonotum with a broad, apically truncate, membranaceous plate on each side. Mesoepinotal suture distinct laterad, obsolete mesally. Epinotum as wide as pronotum, both



with broad membranaceous border. Declivous face not differentiated from the basal face. Femora with a strong longitudinal membranaceous crest apically above and below.

Petiole slightly wider than postpetiole, not impressed anteromesally, without distinctly truncate anterior face above the thoracic insertion, the lateral membranaceous expansions containing a solid recurved spine.

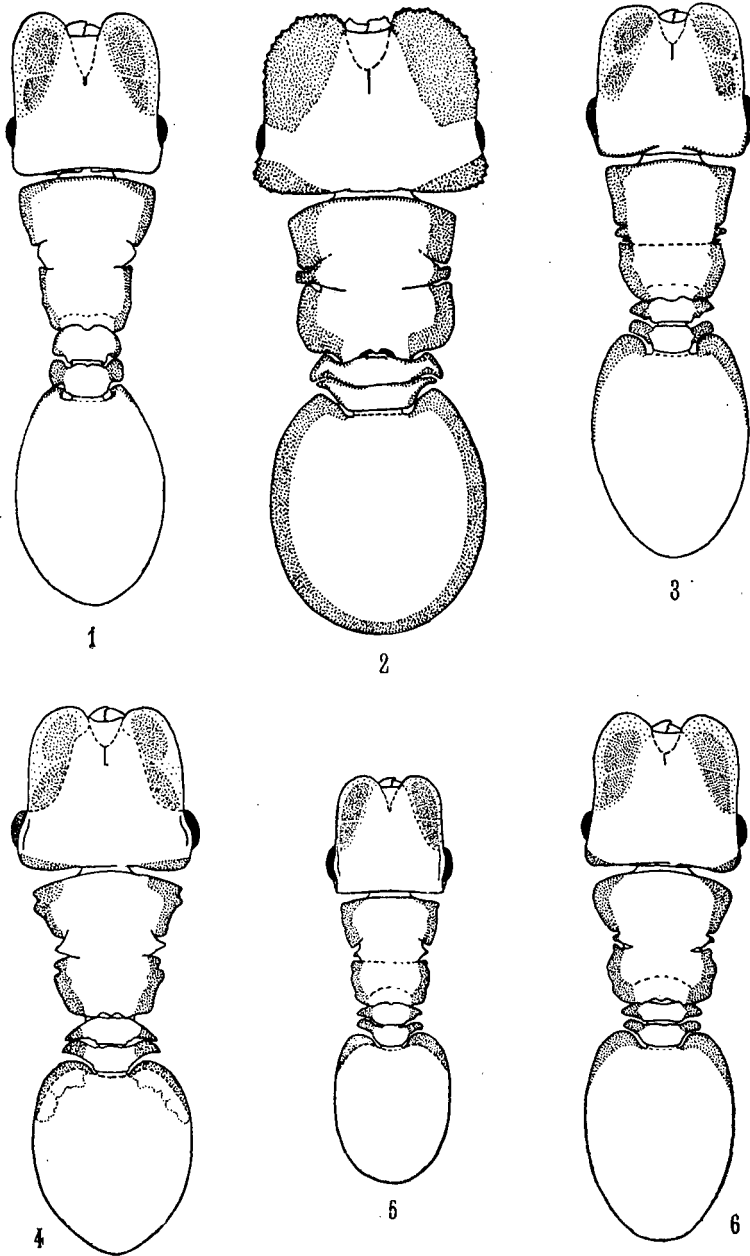
Gaster subcircular, about as wide as long. First gastric tergite surrounded by a broad circular membranaceous border, interrupted only at the postpetiolar insertion.

Head and thorax somewhat shiny; the gaster and appendages subopaque, finely shagreened. Dorsum of head and thorax with squamiferous foveolae. Gaster without conspicuous foveolae. Scales short, rounded and canaliculate. No erect setae on first gastric tergite.

**Soldier** (undescribed) [Fig. 9]; Bolivia: Rosario, Rogagua Lake, Nov. 1921 (W. M. Mann) [CWMM]. — Length 5.0 mm. Median head length 1.27 mm. Weber's length of thorax 1.44 mm. Ferruginous-yellow. Funicular segments 2-9, tarsi, basal end of femora ferruginous. Anterior portion of pronotum, first gastric tergite, except a large circular ferruginous-yellow central area, pale orange to creamy. Marginal foliaceous crests glassy, semitransparent, dark orange around cephalic disc, paler on thorax and femora, almost colorless around gaster.

Head broader than long (80:63), surmounted by an elliptical, excavated disc, the borders of which are subperpendicularly upturned, having two vestigial denticles projecting from the mesal portion above occiput. Supramandibular excision about twice as broad as deep. Apical part of mandibles deflected downward, forming a distinct angle, visible from above as a crest running obliquely across the mandibles. Center of cephalic disc with a median convexity having a pair of anterolateral extensions and a single postero-median branch. Posterolateral portion of disc excavated and concave. Occipital lobes crested and obliquely truncate. Antennal scrobes ventral in position; part of cephalic disc above it semitransparent and membranaceous.

Thorax broader than long (69:56), with marginal membranaceous crests. Transverse pronotal carina strongly



*Paracryptocerus (Harnedia)*; workers in dorsal aspect. Fig. 1. *P. (H.) incertus* (Emery). — Fig. 2. *P. (H.) foliaceus* (Emery). — Fig. 3. *P. (H.) grandinosus* (F. Smith). — Fig. 4. *P. (H.) scutulatus* (F. Smith). — Fig. 5. *P. (H.) maculatus* (F. Smith). — Fig. 6. *P. (H.) pinelli* (Guérin). — (Kempf del.)

crested, interrupted mesally. Promesonotal suture obsolescent mesally. Sides of mesonotum with a flattened, rounded and crested lobe. Mesoepinotal suture distinct. Epinotum broader than mesonotum, longitudinally convex with scarcely differentiated basal and declivous faces. A solid upturned tooth on each posterior corner of the basal face. Femora compressed, the apical half with a conspicuous dorsal and ventral crest. Tibiae short and stout, about twice as long as broad. Tarsi very short, the first and fifth segments less than twice as long as broad, segments 2-4 broader than long.

Petiole with a recurved and rather slender spine on each side, contained within the broad membranaceous border. Anterior and dorsal face of petiole continuously curved in profile. Postpetiole with a foliaceous spine on each side, projecting laterad and slightly cephalad.

Gaster subcircular, the median length subequal to the maximum width (67:69); excised antero-mesally, the remaining margin of the first tergite with a continuous membranaceous border.

Horizontal part of mandibles finely shagreened, deflected portions coarsely rugulose. Head except the excavated part of the disc, coarsely reticulate-rugose. Excavation smooth along the margins, finely reticulate-punctate in the center, with large, sparse, rounded, squamiferous foveolae. Dorsum of thorax and peduncular segments similarly sculptured, the foveolae being somewhat denser and the intervals almost smooth and shiny. Sides of thorax finely reticulate-striated. Appendages finely reticulate-punctate. Dorsum of gaster reticulate-punctate, the squamiferous foveolae very small, shallow, and vestigial.

Female and male: Unknown.

*Distribution.* — This rare and little known species appears to be restricted to the subandean portions of South America. Its range extends from northern Bolivia to the Caribbean shore of Colombia.

*Specimens examined:* 3; 2 workers and 1 soldier, as follows: *Bolivia:* Rosario, Rogagua Lake, Nov. 1921 (W. M. Mann): 1 soldier [CWMM]. — *Peru:* Chanchamayo valley (Rio Perené), elev. 800 m (W. Weyrauch): 2 workers [CTB].

2. *Paracryptocerus (Harnedia) grandinosus*  
(F. Smith)

(Figs. 3, 12, 13)

- Cryptocerus grandinosus* F. Smith, 1860 (excl. var.), Journ. Ent. vol. 1, pp. 76-77, Pl. 4, fig. 5 [worker; Brazil: State of Amazonas, Egas (=Tefé)]. — Emery, 1894, Bull. Soc. Ent. Ital. vol. 26, pp. 219-220, Pl. 4, figs. 22-26 [worker, soldier, female; Brazil: State of Pará, Belém; State of Mato Grosso]. — Emery, 1896, Zool. Jahrb. Syst. vol. 9, p. 636 [soldier; Paraguay: San Salvador]. — Forel, 1899, Biol. Centr.-Am. Hym. vol. 3, p. 50, Pl. 3, fig. 12 [soldier; Panama: Bugaba, David in Chiriqui]. — Forel, 1907, Ann. Mus. Nat. Hung. vol. 5, p. 12 [Paraguay: Asunción]. — (?) Forel, 1908, Verh. Zool.-bot. Ges. Wien. vol. 58, p. 354 [female; Brazil: State of S. Paulo, S. Paulo]. — Wheeler, 1942, Bull. Mus. Comp. Zool. Harvard, vol. 90 (1), p. 207.
- Cryptocerus (Cyathocephalus) grandinosus* Santschi, 1919, An. Soc. Cient. Argent. vol. 87, p. 47 [Argentina: Formosa Province, Laishi].
- Cryptocerus (Cryptocerus) grandinosus* Emery, 1922, Gen. Insect. Hym. fasc. 174c, p. 310.
- Cryptocerus grandinosus* var. *nevadensis* Forel, 1912, Mém. Soc. Ent. Belg. vol. 19, p. 202 [worker; Colombia: Burithaka, foot of Sierra Nevada de S. Marta; Brazil: State of Pará, Belém].
- ?*Cryptocerus grandinosus magdalenensis* Forel, 1899, Ann. Soc. Ent. Belg. vol. 43, p. 303 [worker; Colombia]. — Forel, 1899, Berl. Ent. Zeitschr. vol. 44, p. 275, fig. [worker; Colombia: San Pablo, Magdalena R.].

The ferruginous-yellow color and the longitudinal dorsal and ventral crest on the apical half of the hind femora distinguish this species from *maculatus* and *pinelii*, its nearest relatives.

*Type.* — Worker; Brazil: State of Amazonas, Egas (=Tefé) [British Museum (Natural History)].

*Worker* [Fig. 3]. — Length 3.5-4.0 mm. Yellow-ferruginous. Frontal carinae and membranaceous borders of thorax, peduncle and gaster pale testaceous to yellowish-white.

Head subquadrate, about as wide as long; the median head length always shorter than the interocular width. Supramandibular excision semicircular. Sides of head scarcely sinuous, scarcely or not upturned above the eyes. Occipital corners rectangular and narrowly crested. Occipital border forming a fine crest, which is interrupted mesally. Greatest diameter of eyes about one fourth of the maximum head length.

Thorax as long as head, longer than maximum width across the pronotum. Sides of pronotum and epinotum with a broad membranaceous border, converging caudad, usually not forming a reentrant angle at mesonotum. Anterior angle of pronotum subacute. Mesonotum on each side with a strong membranaceous tooth, which is usually followed by another small, delicate, membranaceous denticule. Mesoepinotal suture impressed. Epinotum narrower than pronotum. Declivous face differentiated, impressed, the lateral membranaceous borders first projecting upward and then laterad. Hind femora with a dorsal and ventral longitudinal crest on the apical half.

Petiole less than four times as broad as long, with a

conspicuous median excavation on the anterior, subtruncate face. Membranaceous lobes of peduncular segments greatly expanded, often subcircular.

Gaster much longer than broad, subovate. Antero-lateral membranaceous border often angulate or subdentate mesad.

Integument subopaque. Dorsum of head, thorax and peduncle with small squamiferous foveolae. Longitudinal rugae on thorax and cephalic end of first gastric tergite. Declivous face and sides of thorax less elongate, decumbent, not quite appressed.

**Soldier** [Fig. 12]. — Length 4.2-5.4 mm. Ferruginous yellow to ferruginous, with membranaceous portions usually lighter. Gaster somewhat paler.

Head slightly broader than long. Cephalic disc subcircular to subquadrate, especially in smaller specimens, slightly excavate, median portion often somewhat convex. Border of disc crenulate and glassy. Supramandibular excision subsemicircular. Occipital border often with a pair of vestigial denticles in the middle. Occipital lobes angulate and crested. Sides of head separated from the truncate occiput by a ridge extending from the tip of the occipital lobe to the cephalic disc.

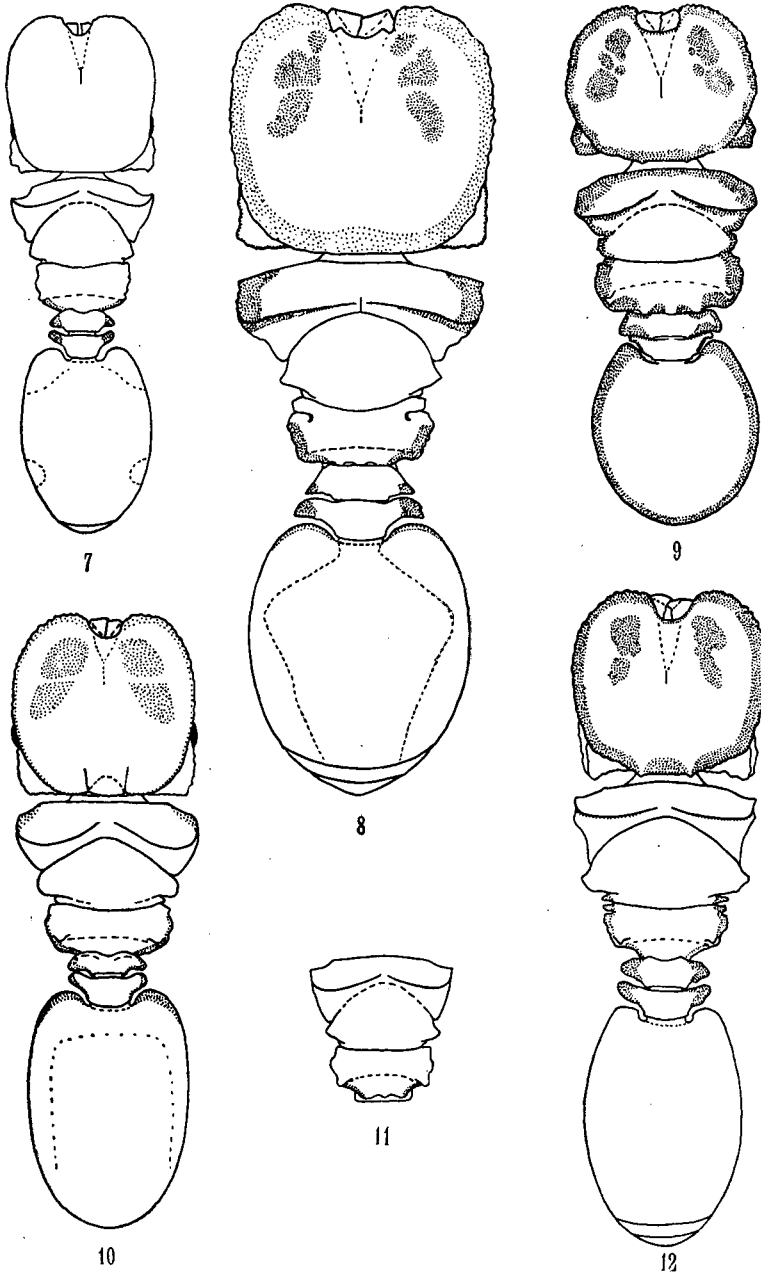
Thorax slightly longer than broad. Transverse pronotal carina crested, interrupted mesally. Mesonotum almost as wide as pronotum, with laterally projecting, obliquely truncate lobes, followed by a minute membranaceous denticule. Basal face of epinotum much narrower than mesonotum, the sides with a narrow membranaceous crest and often, on the posterior corner, with a small upturned tooth. Hind femora as in worker.

Peduncular segments similar to those of worker, the membranaceous expansions less prominent.

Gaster much longer than broad, the antero-lateral lobes without a distinct crest, especially in larger specimens; the mesal corner of the lobes usually angulate.

Head disc shiny and foveolate, the squamiferous foveolae usually sparse, but sometimes crowded, in this latter case the interstices form a raised reticule. Dorsum of thorax foveolate and shagreened. Gaster shagreened without conspicuous foveolae. Scales usually finer and glistening.

**Female** [Fig. 13]; Bolivia: Reyes [CWMM]. — Length 8 mm. Ferruginous-yellow. First gastric tergite with a faint, ill-circumscribed, dark brownish median area, more infuscated laterad than mesad, setting off a lighter area on each antero-lateral corner.



*Paracryptocerus (Harnedia)*; soldiers in dorsal aspect. Fig. 7. *P. (H.) maculatus* (F. Smith). — Fig. 8. *P. (H.) scutulatus* (F. Smith). — Fig. 9. *P. (H.) foliaceus* (Emery). — Fig. 10. *P. (H.) pinelii* (Guérin). — Fig. 11. *P. (H.) maculatus* (F. Smith), thorax of southwestern form. — Fig. 12. *P. (H.) grandinosus* (F. Smith). — (Kempf del.)

Head longer than wide. Supramandibular excision broad and shallow. Cephalic disc rounded, widest in front of the eyes, moderately convex; the antero-lateral portions, covering the antennal scrobe, distinctly excavate and partly membranaceous. Rim of disc with a narrow membranaceous crest, which is crenulate behind the eyes.

Thorax much longer than wide. Shoulders angulate and crested. Transverse pronotal carina not interrupted mesally. Lower portion of mesopleura with an anterior tooth. Basal face of epinotum with a lateral rounded lobe and a posterior stout, blunt tooth. Femora without longitudinal crest, nor forming an angle near the middle of the upper face.

Petiole with a narrow lateral membranaceous crest. Post-petiole with lateral crested lobes, projecting laterad and cephalad.

Gaster very elongate, the antero-lateral lobes as in soldier.

Subopaque. Dorsum of head, thorax and peduncular segments covered with squamiferous foveolae. Declivous face and side of epinotum and venter of petiole longitudinally striated. Pilosity as in soldier, but less conspicuous. Scale-like appressed setae of gaster very fine and glistening.

Male: Unknown.

*Distribution.* — Despite the fragmentary collecting record the range of this widespread and distinctive species appears to coincide with the Guiana-Brasilia subregion. It has also been recorded from Panama.

*Specimens examined:* 40; 30 workers, 8 soldiers and 2 females, as follows: *Argentina:* Formosa Province, Ing. Juarez (N. Kusnezov): 1 worker [CML]. — *Bolivia:* Beni Province, Reyes, Oct. 1921 (W. M. Mann): 13 workers, 4 soldiers, 2 females [CWMM]. Rurrenabaque, October 1921 (W. M. Mann): 2 workers [CWMM]. — *Brazil:* State of S. Paulo, Pirapora, June 1912 (E. Garbe): 9 workers, 3 soldiers [CTB]. State of Ceará (W. M. Mann): 2 workers [CWMM]. State of Pará, cachoeira do Breu, forest zone of Rio Cuminá, 1928 (A. J. de Sampaio): 1 worker, 1 soldier [CTB]. — *Trinidad:* St. Augustine, April 1929 (P. J. Darlington, Jr.): 2 workers [CTB].

*Variation.* — The present species is rather inconstant as regards minute details of body outline, structure, sculpture and pilosity. In the worker caste the head becomes proportionally broader with larger body size. The mesal corners of the antero-lateral lobes of the gaster are sometimes rounded instead of angulate. The second delicate,

membranaceous denticule of the mesonotum is sometimes absent. The lateral membranaceous lobes of the peduncular segments are often, especially in southern specimens, greatly expanded and subcircular in shape. The worker specimens from Bolivia lack any kind of longitudinal rugosities on the dorsum of the thorax and the scales are very short, white, thick and opaque. In the soldier the foveolae on the cephalic disc may be exceptionally very dense and crowded, the intervals forming a coarse network of raised and intertwining rugulae. In the Bolivian soldiers the cephalic disc is less shiny than stated above in the description.

**Synonymical notes.** — In 1908 Forel described a female from S. Paulo as doubtfully belonging to the present species. To judge from his description alone, it is hard to say exactly what species did he have in his hands. I have not seen that specimen, yet, on account of the small size (5 mm) and the dark color of this female I suspect that it does not belong to *grandinosus*.

Similarly the Forelian race *magdalenensis*, founded upon one or a few workers from San Pablo, Colombia, disagrees remarkably with *grandinosus* by the small size (2.5 mm), black body, reddish appendages and short gaster. I suspect that it is related with *maculatus*, if not identical with that species.

On the other hand the variety *nevadensis*, no doubt, belongs to *grandinosus*, differing from the typical form, according to Forel's statement, by denser pilosity and the broad promesonotum. Two reasons prevent me from raising it to subspecific status: First of all, the differential characters mentioned in the original diagnosis do not seem sufficiently pronounced to warrant this step. Furthermore this variety is said to occur both in Colombia and Pará, whereas the locality of the typical form, which is from Egas (=Tefé), on the Amazon River, in the State of Amazonas, lies approximately inbetween the extremes of the range of *nevadensis*. On these grounds the latter can hardly be considered a geographical race. Consequently I propose to drop the infraspecific forms of *grandinosus* until a thorough study based upon abundant material from many localities and of all castes will prove their validity.

### 3. *Paracryptocerus (Harnedia) incertus* (Emery)

(Figs. 1, 16)

*Cryptocerus incertus* Emery, 1905, Bull. Soc. Ent. Ital. vol. 37, pp. 171-172, fig. 31 [worker; Argentina: Corrientes].  
*Cryptocerus (Cyathocephalus) incertus* Santschi, 1921, Ann. Soc. Cient. Argent. vol. 92, p. 125 [worker; Argentina: Corrientes province, San Roque].  
*Cryptocerus (Cryptocerus) incertus* Emery, 1922, Gen. Insect. Hym. fasc. 174c, p. 310.

The present species is distinctive by the shape of the peduncular segments. The worker, furthermore, differs from all other members of the group by the blunt, more or less rounded, lateral lobes of the mesonotum and the very narrow membranaceous border of the epinotum.

**Type.** — Worker (holotype); Argentina: Corrientes (province or homonymous town in that province?) [Presumably in the Museo Civico di Storia Naturale, Genova].

**Worker** [Fig. 1]; Argentina: Corrientes province, Paso



de la Patria (N. Kusnezov) [CML]. — Length 4.0 mm. Median head length 0.90 mm. Weber's length of thorax 1.10 mm. Ferruginous; the head slightly darker. Membranaceous borders of thorax and the frontal carinae pale yellow-ferruginous.

Head subquadrate, longer than wide (45:39), as long as thorax. Sides of head straight, not upturned above eyes. Occipital corners rounded, not membranaceous. Occipital border scarcely emarginate. Greatest diameter of eyes less than one fourth of maximum head length.

Thorax longer than wide across the pronotum. Membranaceous border of pronotum and epinotum much narrower than in the other species of the group. Anterior angle of pronotum obtuse, the sides converging caudad. Mesonotum with a broad, blunt, more or less rounded, marginate lobe on each side. Mesoepinotal suture obsolete mesally. Epinotum as broad as mesonotum, narrower than pronotum. Declivous face differentiated from basal face. Hind femora not longitudinally marginate nor crested above on the apical half.

Peduncular segments massive. Petiole excavate antero-mesally, with narrowly crested lateral lobe. Postpetiole with an elliptical, membranaceous lobe on each side, the lobes constricted at their base.

Gaster longer than broad, ovate, broadest behind the half of its length. Antero-lateral lobes angulate and narrowly crested.

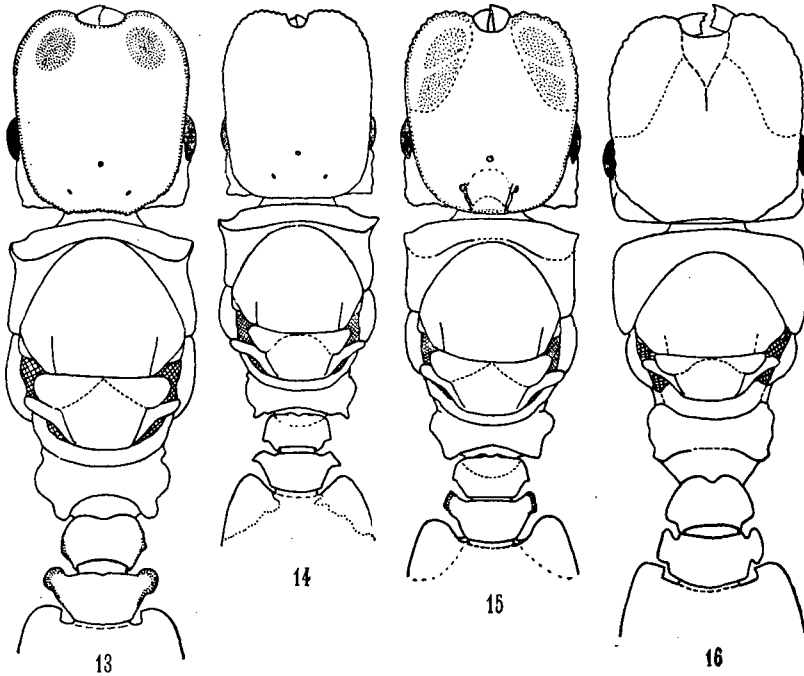
Subopaque, finely shagreened. Dorsum of head, thorax and peduncular segments foveolate, each foveola containing an elongate, oval, canaliculate, golden, appressed scale. No erect setae on first gastric tergite.

**Soldier:** Unknown.

**Female** [Fig. 16], dealate (undescribed); Argentina: Santa Fé province, Fives Lille, Aug. 2, 1934 (J. B. Daguerra) [USNM]. — Length 6.1 mm. Median head length 1.20 mm. Weber's length of thorax 1.68 mm. Subopaque. Ferruginous. Disc of head with reddish tinge, frontal carinae, membranaceous border of pronotum and epinotum, lateral projections of petiole lighter, with yellowish or lurid hues. Mandibles, funicular segments and tarsi ferruginous.

Head subquadrate, the maximum length slightly exceeding the interocular width. Mandibles finely punctured, except the chewing border, which is smooth and shiny, with four distinct teeth toward apex. Supramandibular excision about twice as broad as deep. Clypeus vestigial, elongate. Frontal carinae

prolonged caudad above eyes in the form of a very slightly raised carina, which bends obliquely mesad behind the eyes in order to join with the transverse crest of the vertex. Head disc somewhat convex. Ocelli small, amber in color, the median ocellus somewhat larger than the lateral ones. Occipital corners flattened, rounded



*Paracryptocerus* (*Harnediidae*); females in dorsal aspect. Fig. 13. *P. (H.) grandinosus* (F. Smith). — Fig. 14. *P. (H.) maculatus* (F. Smith). — Fig. 15. *P. (H.) pinetii* (Guérin). — Fig. 16. *P. (H.) incertus* (Emery). — (Kempf del.)

and crested. A crest, rising shortly behind the posterior condyle of the mandible runs backwards beneath the eye to the occipital corner. Funicular segments 2-8 much broader than long. Penultimate funicular segment conspicuously longer than the preceding segment. Integument finely reticulate-punctate with sparse, large and somewhat elongate squamiferous foveolae, shallow and very sparse on anterior half of cephalic disc, larger, more deeply impressed and crowded, toward the occiput. Cheeks very densely foveolate rugose with crowded scales. All scales are decumbent and silvery.

Thorax longer than broad across the pronotum. The latter sharply marginate anteriorly and laterally; the anterior border transverse and almost straight, the lateral borders subparallel and crested, the shoulders rounded. Transverse pronotal carina

absent. Scutum broader than long and flat. Thorax distinctly constricted in front of the epinotum. Basal face of epinotum transversely convex, half as broad as maximum length of thorax; its lateral borders being crested and its posterior corners having a blunt short tooth. Declivous face at right angle to basal face, with a lateral crest arising from beneath the posterior teeth of the basal face. Dorsum of thorax and mesopleura finely reticulate-punctate with sparse, squamiferous foveolae, less conspicuous than those on the cephalic disc. Laterotergites of pronotum and sides of epinotum shagreened, without scales. Declivous face finely punctate and perpendicularly striolated. Femora fusiform, without a distinct angle near the middle of the upper face.

Petiole broader than long; each side with a projecting lobe, which is continuous anteriorly with the anterior border of the petiole, but distinctly set off posteriorly. Anterior face of petiole perpendicularly excavated; dorsum transversely convex. Postpetiole wider than petiole, wider than long. Lateral lobes as in worker, but not quite membranaceous. Dorsum and sides of peduncular segments sculptured as thorax, with appressed scales.

Gaster elongate, nearly twice as long as broad, with sub-parallel sides. Antero-lateral lobes angulate mesally, not distinctly crested. Finely shagreened, without conspicuous foveolae, but with sparse, short, minute, appressed, silvery scales. Sternites and terminal tergites of gaster with sparse, short and erect setae.

Male: Unknown.

So far this interesting species is known from the Argentine provinces of Corrientes and Santa Fé. I have seen only the single worker and the single female described above.

#### 4. *Paracryptocerus (Harnedia) maculatus* (F. Smith)

(Figs. 5, 7, 11, 14)

*Cryptocerus maculatus* F. Smith, 1876, Trans. Ent. Soc. London, p. 607, Pl. 11, fig. 6 [female; Brazil: State of Bahia, S. Salvador]. — Emery, 1894, Bull. Soc. Ent. Ital. vol. 26, pp. 207-208, Pl. 4, figs. 18-21 [worker, soldier, female; Brazil: State of Mato Grosso and Pará; Venezuela; Paraguay; Trinidad; Costa Rica: Alajuela]. — Forel, 1905, Ann. Soc. Ent. Belg. vol. 49, p. 158 [male; Venezuela: Las Trincheras]. — Forel, 1911, Sitz.-ber. Bayer. Akad. Wiss. p. 258 [female; Paraguay: San Bernardino]. — Forel, 1912, Mém. Soc. Ent. Belg. vol. 19, p. 201 [Brazil: State of Ceará; Colombia]. — Forel, 1914, Bull. Soc. Vaud. Sci. Nat. vol. 50, p. 281 [Argentina: Tucumán]. — Mann, 1922, Proc. U. S. Nat. Mus. vol. 61, p. 34 [Honduras: San Juan Pueblo, Choloma]. — Luederwaldt & Pinto da Fonseca, 1922, Rev. Mus. Paul. vol. 13, p. 468 [Brazil: State of S. Paulo, Ilha dos Alcatrazes]. — Menozzi, 1927, Ent. Mitt. vol. 16, pp. 316-317, fig. 5 [male; Costa Rica: San José].  
*Cryptocerus (Cryptocerus) maculatus* Wheeler, 1916, Bull. Am. Mus. Nat. Hist. vol. 35, p. 11 [British Guiana: Tumatumari]. — Mann, 1916, Bull. Mus. Comp. Zool.

Harvard, vol. 60, p. 450 [Brazil: State of Rio Grande do Norte, Natal; Bolivia: Abuná]. — Emery, 1922, Gen. Insect. Hym. fasc. 174c, p. 311.  
*Cryptocerus grandinosus* [in part] F. Smith, 1860, Journ. Ent. vol. 1, p. 77 [worker; Brazil: State of Amazonas, Egas (=Teté)].  
 ?*Cryptocerus maculatus nanus* Forel, 1912, Mem. Soc. Ent. Belg. vol. 19, p. 202 [worker; Trinidad: zone of savannas].

This rather common and widespread species is the smallest representative of the present group. The worker is distinctive by the comparatively large eyes and the short gaster. The soldier and the female may be recognized by their fuscous color, the lack of a groove on the vertex, and the opaque frontal carinae, which are not partly membranaceous nor in any other way differentiated from the remaining portions of the cephalic disc.

*Type.* — Female (holotype); Brazil: State of Bahia, S. Salvador [British Museum (Natural History)].

*Worker* [Fig. 5]. — Length 2.6-3.0 mm. Fuscous reddish-brown to black. Outer face of tibiae pale brown. Rest of legs ferruginous. Frontal carinae and membranaceous borders of thorax, peduncle and gaster whitish.

Head subquadrate, longer than wide, the median head length as long as, or longer than, the interocular width. Edge of lateral border smooth. Sides of head slightly convex and upturned above eyes. Occipital corner little or not membranaceous, sharply angulate to subdentate. Occipital border straight. Greatest diameter of eyes almost one third of maximum head length.

Thorax longer than wide. Membranaceous border of pronotum and epinotum broad, not forming a reentrant angle at the mesonotum. Shoulders subacutely angulate. Sides of mesonotum with a small projecting tooth, the tip of which is often membranaceous. Mesoepinotal suture distinct. Declivous face of epinotum differentiated from the basal face. Dorsum of hind femora longitudinally marginate, not crested, on the apical half; no crest on the lower face.

Peduncular segments subequal in width to the width of the epinotum, with conspicuous lateral membranaceous appendages. Anterior face of petiole usually notched mesally.

Gaster longer than wide, proportionally shorter than in *pinellii* and *grandinosus*. Antero-lateral membranaceous border rounded.

Subopaque, finely shagreened. Dorsum of head, thorax and peduncle with small squamiferous foveolae. Dorsum of thorax, especially on the region of the mesoepinotal suture usually with distinct longitudinal rugosities. Sides of thorax, except the laterotergite of the pronotum, and the declivous face longitudinally

striated. Scale-like hair small, shiny, appressed. No erect setae on the first gastric tergite.

**Soldier** [Fig. 7]. — Length 3.9-4.2 mm. Color as in worker. Head disc uniformly fuscous reddish-brown to black, the portion overlying the antennal scrobe not membranaceous nor differently colored. First gastric tergite, especially in larger specimens, with lighter yellowish-brown spots, one toward each corner, the anterior pair often fusing mesally into a transverse band, the posterior pair usually small, somewhat removed from the posterior border.

Head slightly longer than wide; disc not well rounded, subrectangular, excavate, flat to scarcely convex mesally. Supramandibular excision subsemicircular. Border of disc not glassy nor membranaceous. Occipital border of cephalic disc usually straight and without a pair of small, projecting denticles. Sides of head continuous with the truncate occiput, not separated by a margination or ridge.

Thorax as long as wide across the pronotum. Anterior border of pronotum broadly excised laterad, the shoulders acute and spine-like. Transverse pronotal carina slightly interrupted mesally. Mesonotum much narrower than pronotum, with a projecting, usually angulate lobe on each side. Basal face of epinotum with a small rounded lobe laterally and an upturned tubercular tooth on each posterior corner. Sides of declivous face narrowly crested. Hind femora without a dorsal and ventral crest on the apical half.

Peduncular segments as in worker; the lateral membranaceous appendages less prominent.

Gaster elliptical. The antero-lateral lobes rounded, the crests lacking in large soldiers.

Integument opaque, finely shagreened. Head disc coarsely and densely foveolate. The foveolae are much smaller on the dorsum of the thorax and the peduncular segments. Gaster and sides of thorax without any conspicuous foveolae. Scales as in worker, absent on the declivous face.

**Female** [Fig. 14]. — Length 5.6-6.4 mm. Color as in soldier. The four maculae of the first gastric tergite better delimited and usually more prominent than in soldier, yellowish to ferruginous-yellow.

Head elongate, one and one fourth times as long as wide. Supramandibular excision narrow, subsemicircular. Cephalic disc elongate, subrectangular, moderately convex, slightly excavated,

but not membranaceous, above the antennal scrobe; the sides subparallel, scarcely curved, often somewhat converging caudad; the edges of the disc scarcely crenulate, very little upturned, forming only a slightly prominent ridge postero-laterally above the occipital lobes.

Thorax elongate. Anterior border of pronotum somewhat excised laterally, not quite as prominently as in soldier. Shoulders acute. Transverse pronotal carina uninterrupted. Lower plate of mesopleura anteriorly with a tooth. Basal face of epinotum with a rounded lateral lobe and a rather sharp tooth on the posterior corner. Hind femora neither crested nor angulate above near the middle.

Peduncular segments massive, with the lateral projections scarcely membranaceous. Petiole with a lateral small tooth, pointing obliquely caudad, the postpetiole with a lateral obliquely truncate lobe, similar to that of soldier.

Gaster with the anterior border deeply emarginate, the antero-lateral lobes rounded to subangulate.

Sculpture and pilosity as in soldier. The scales of the gaster are glistening and minute.

Wings hyaline. The venation of the fore wing of the usual pattern: a closed and appendiculate marginal cell; transverse cubital vein present.

Male. — Diagnostic features are contained in the papers of Forel (1905) and Menozzi (1927). A systematic treatment of this caste will be taken up in a future study that will deal with all the known males of the genus *Paracryptocerus*.

*Distribution.* — The present species occupies by far the largest area, its range extending from Honduras to northern Argentina.

*Specimens examined:* 99; 59 workers, 23 soldiers, 11 females, and 6 males, as follows: *Argentina:* Misiones province, Loreto, Estación experimental (A. A. Oglobin): 1 worker, 1 soldier [CTB]. — *Bolivia:* La Paz province, Huachi, Beni River, Sept. 1921 (W. M. Mann): 3 workers [CWMM]. — *Brazil:* State of Paraná, Rolândia, Nov. 4, 1951 (W. W. Kempf): 20 workers, 4 soldiers, 4 alate females [CTB]. State of S. Paulo, Ilha dos Alcatrazes (H. Luederwaldt): 1 worker, 1 dealate female [CTB]. — State of Rio de Janeiro, Porto das Caixas, in gall, April 1928 (O. Conde): 8 workers, 1 soldier, 5 alate females [CTB]. State of Espírito Santo, Afonso Cláudio, Sept. 1928 (O. Conde): 1 worker [CTB]. State of Pernambuco, Caruaru, Nov. 30, 1927

(B. Pickel, O. S. B.): 7 workers, 2 soldiers, 2 males [CTB]. — *British-Guiana*: Kartabo, July-August 1920 (W. M. Wheeler): 5 workers, 4 soldiers [CTB]. — *Costa Rica*: Hamburg Farm, in *Cordia alliodora*, Jan. 22, 1938 (F. Nevermann): 6 workers, 3 soldiers [CTB]. Matina, Aug. 2, 1936 (A. Alfaro): 2 soldiers, 1 worker, 2 males [CTB, more in ANSP]. Orotina, Dec. 1927 (A. Alfaro): 2 workers, 2 soldiers [CTB, more in ANSP]. Reventazón, Limón planes (F. Nevermann): 4 workers, 4 soldiers, 2 males, 1 female [CAR].

Variation. — In the foregoing descriptions I have already taken into consideration the common phenomena of variability. We may therefore go directly to the more strikingly aberrant forms. These, one worker and one soldier, from Loreto, Misiones province, Argentina, and a colony, containing workers, soldiers and alate females, from Rolândia, northwestern Paraná, Brazil, present the following diverging features: The workers lack the distinct striation of the sides of the thorax and on the declivous face of the epinotum — otherwise a remarkably constant character of *maculatus*; — the soldiers are distinctive by a more massive and compact thorax, the outline of which is given in figure 11. Since only this material is available, it is impossible to tell whether or not these divergent characters account for a subspecific differentiation.

Synonymical notes. — The race *nanus* from Trinidad was described by Forel in 1912, upon one or a few workers from a single colony. These specimens are said to differ from the "typical" *maculatus* by the following characters: Scales finer, not quite as conspicuous, scarcely masking the sculpture of the integument; size small, 2.2 mm; lateral appendages of peduncular segments more foliaceous, the bodies of the same segments smaller and shorter; gaster almost round, very short; ridges of epinotum very apparent. As regards the short, rounded gaster, I have seen a specimen from Espirito Santo, that possesses the same characteristics. In general the gaster of this species is very short, although the proportions of length and width are quite variable, not only from colony to colony, but even among individuals of the same nest. The other differential characters of *nanus* are likewise very little significant and scarcely apt to differentiate a race from the typical form. However, only more material of this species from the Island of Trinidad will enable us to tell whether this race can be maintained or should be dropped as a synonym.

The biology of *maculatus* has already been discussed in the introduction.

## 5. *Paracryptocerus (Harnedia) pinellii* (Guérin)

(Figs. 6, 10, 15)

*Cryptocerus pinellii* Guérin, 1845, in: Cuvier, Iconogr. Règne Anim. vol. 7, Insects, pp. 425-426 [worker; Brazil: "Morro Queimado" province]. — Emery (excl. syn.), 1890, Bull. Soc. Ent. Ital. vol. 22, pp. 75-76, Pl. 9, figs. 10a-c [worker, soldier, female; Brazil: State of Rio Grande do Sul]. — Emery, 1894, Bull. Soc. Ent. Ital. vol. 26, pp. 207-208 [worker, soldier; Brazil: State of Rio Grande do Sul]. — Emery, in: H. von Ihering, 1894, Berl. Ent. Zeitschr. vol. 39, p. 385 [Brazil: State of Rio Grande do Sul, S. Lourenço]. — Emery, 1905, Bull. Soc. Ent. Ital. vol. 37, p. 171 [soldier, female; Argentina: Cordoba province, La Carlota]. — Forel, 1908, Verh. Zool.-bot. Ges. Wien, vol. 58, p. 354 [worker (soldier, female, male); Brazil: State of S. Paulo, S. Paulo]. — Forel, 1912, Mém. Soc. Ent.

Belg. vol. 19, p. 202 [Brazil: State of S. Paulo, Botucatu; State of Rio de Janeiro, Colônia Alpina (Teresópolis)]. — Luederwaldt, 1918, Rev. Mus. Paul. vol. 10, p. 41 [Brazil: State of S. Paulo, Ipiranga, Piracicaba, Botucatu]. — Luederwaldt, 1925, Rev. Mus. Paul. vol. 14, p. 269.  
*Cryptocerus (Cyathocephalus) pinellii* Santschi, 1916, Physis, vol. 2, p. 283 [Argentina: Entre Rios province, Estación Sosa].  
*Cryptocerus (Cryptocerus) pinellii* Emery, 1922, Gen. Insect. Hym. fasc. 174c, p. 311.  
*Cryptocerus grandinosus* Emery (nec F. Smith), 1887, Bull. Soc. Ent. Ital. vol. 19, p. 361 [Brazil: State of Rio Grande do Sul].

The present species is involved in many difficulties for which there seems to be no altogether satisfactory solution at present. According to Emery (1894) the type specimen of *pinellii*, a minor worker, cannot be located and appears to be lost. Hence the positive recognition of the species rests solely upon the very superficial original description. Two characters mentioned by Guérin, the size (3.5 mm) and the brownish-black color, lead Emery to surmise that it is identical with a rather common form of southern Brazil, which until then had not been described under any other name. Although this interpretation, as Emery himself confesses, is based upon very weak arguments, it still seems acceptable.

The type locality of the species, according to Guérin, is "province de Moro Queimado au Brésil". The correct Portuguese spelling of this name is Morro Queimado, which, indeed, is a geographical designation, applying, however, not to a province or state, but to a mountain range, a ramification of the better known Serra dos Órgãos, on the right side of the Macacu river, in the State of Rio de Janeiro, northeast of the city of Rio.

The soldiers and female of *pinellii*, in the sense of Emery, differ from all other members of the present complex by the median groove, flanked by ridges, in front of the occipital border of the cephalic disc. The worker may be distinguished from *maculatus* by the larger size and the comparatively smaller eyes, and from *grandinosus* by the brownish-black color, the lack of a distinct dorsal and ventral crest on the apical half of the hind femora.

*Type.* — Worker; Brazil: State of Rio de Janeiro, Morro Queimado mountains [The type appears to be lost].

*Worker* [Fig. 6]. — Length 3.5-4.1 mm. Color variable. Brownish-black to ferruginous; callows may be ochraceous as *grandinosus*. Funiculus and legs ferruginous. Frontal carinae and membranaceous borders of thorax, peduncle and gaster pale testaceous. In fully colored specimens the peripheral portions of the first gastric tergite are distinctly paler than the discal portions.

Head subquadrate, slightly longer than wide, longer than



thorax, scarcely tapering cephalad; the interocular width greater than the median head length. Sides of head straight, scarcely upturned above eyes. Occipital corners rounded and membranaceous. Occipital border scarcely emarginate. Greatest diameter of eyes less than one fourth of maximum head length.

Thorax as long as broad across the pronotum. Shoulders rounded or obtusely angulate. Sides of thorax forming a reentrant angle at mesonotum, which has, on each side, a submembranaceous, projecting denticule. Mesoepinotal suture vestigial mesally. Epinotum narrower than pronotum, with distinct basal and declivous faces. Dorsum of hind femora longitudinally marginate distad of the angle, but without a dorsal and ventral crest.

Petiole shallowly and broadly impressed antero-mesally. Membranaceous lobes of peduncular segments less expanded than in *grandinosus*.

Gaster ovate, usually elongate, with antero-lateral, rounded, membranaceous borders.

Opaque, finely shagreened. Head and thorax with squamiferous foveolae on dorsum. First gastric tergite with fine, more or less longitudinal rugulae on the basal half. Sides of thorax and the declivous face without striae. Scales shiny and appressed, smallest on gaster. No erect setae on first gastric tergite.

**Soldier** [Fig. 10]. — Length 4.8-5.7 mm. Head, thorax, peduncle and appendages ferruginous, often somewhat infuscated. Gaster slightly darker, the first tergite with a broad, pale band toward the anterior border and along the sides, the disc brownish-black. Membranaceous portions of frontal carinae, shoulders, epinotum and peduncular segments pale testaceous.

Head about as long as wide, surmounted by a circular, strongly excavate, disc, the border of which is crenulated. Cephalic disc with a median longitudinal convexity, and a deeply excavate groove mesally on the occipital border, flanked by strong ridges. Supramandibular excision subsemicircular. Part of disc covering the antennal scrobe membranaceous.

Thorax shorter than head, slightly broader than long. Shoulders membranaceous, obtusely angulate. Sides of pronotum moderately convex. Transverse pronotal carina crested. Mesonotum about twice as broad as long, with a more or less rounded, projecting lobe on each side. Basal and declivous faces of

epinotum narrowly crested, the posterior corners of the basal face having an upturned tubercular tooth. Femora as in worker.

Peduncular segments similar to those worker.

Gaster elongate, the antero-lateral borders evenly rounded.

Disc of head somewhat shiny, less so on dorsum of thorax. Both strongly, coarsely, and densely foveolate. Gaster with the same minute rugulae as in worker.

**Female** [Fig. 15]. — Length 6.5-7.0 mm. Color as in soldier with the following differences: Occipital lobes, shoulders, basal face of epinotum, orange-brown; disc of head, scutum, sides of thorax, and gaster infuscated. The portion of the cephalic disc covering the antennal scrobe is partly membranaceous. First gastric tergite with an elongate, yellowish macula on each corner, the pair on each side nearly fusing.

Head as in soldier, but more elongate. Cephalic disc elliptical, excavate laterad, moderately convex discally. Borders of disc distinctly crested and submembranaceous. Median groove on vertex as in soldier.

Thorax longer than wide. Shoulders angulate. Transverse pronotal carina vestigial to obsolete. Anterior tooth of lower mesopleura small or absent. Basal face of epinotum with a blunt rounded, lateral lobe and a strong, rather blunt tooth on the posterior corner.

Petiole with a small denticule on each side, pointing obliquely caudad. Antero-lateral lobes of gaster rounded.

Wings hyaline, the venation brunneous. Marginal cell of fore wing closed and appendiculate. Transverse cubital vein present.

Sculpture and pilosity as in soldier. Scales on gaster minute, appressed.

**Male.** — This caste was mentioned, yet not described, by Forel in 1908. Although I possess several specimens I reserve the diagnosis for a future study dealing with males of *Paracryptocerus* in general.

**Distribution.** — The range of *pinellii* extends from Minas Gerais to Rio Grande do Sul, in southern Brazil; it has also been recorded from the Argentine provinces of Cordoba and Entre Rios.

**Specimens examined:** 69; 54 workers, 7 soldiers, 3 females, and 5 males, as follows: *Brazil*: State of Rio Grande do Sul, Porto Alegre, July 25, 1930 (Buck, S. J.): 14 workers, 3 soldiers [CTB]. Pareci Novo, Aug. 8, 1926 (Rambo, S. J.): 12 workers,

2 soldiers [CTB]. State of Paraná, Rolândia, Nov. 10, 1951 (W. W. Kempf): 3 workers [CTB]. State of S. Paulo, Ipiranga, 1908 (H. Luederwaldt): 15 workers, 2 soldiers, 2 females, 5 males [CTB]. State of Rio de Janeiro, Petrópolis, Dec. 14, 1944 (W. W. Kempf): 7 workers [CTB]. State of Minas Gerais, Palmira, Jan. 1929: 1 female [CTB]. São João d'El-Rei, Oct. 1925 (Frei Zacarias, O. F. M.): 1 worker [CTB]. "Minas Gerais" (locality unknown), Nov. 1923: 2 workers [CTB].

Variation. — Emery (1905) states that soldiers and a single female received from La Carlota, Cordoba Province, Argentina, are distinctive by smaller size, and smaller, shallower groove on the vertex of the cephalic disc. The seven workers from Petrópolis, unfortunately not accompanied by soldiers or females, diverge considerably from the above description, by the strictly black color, a distinct and impressed mesoepinotal suture, a much narrower thorax, the maximum width of which is less than the width of the head, a narrow epinotum, and a light spot on the antero-lateral lobes of the gaster, inside of the membranaceous crests; the gaster is also shorter and less depressed than in the typical form. Otherwise, the general habitus is of *pinellii*.

## 6. *Paracryptocerus (Harnedia) scutulatus* (F. Smith)

(Figs. 4, 8)

*Cryptocerus scutulatus* F. Smith, 1867, Trans. Ent. Soc. London, (3) vol. 5, p. 524, Pl. 26, figs. 3, 3a [soldier; Mexico]. — Emery, 1890, Bull. Soc. Ent. Ital. vol. 22, p. 76 [Costa Rica: Jiménez]. — Skwarra, 1934, Oekol. Stud. Koenigsberg, pp. 129-130 [Mexico: Vera Cruz province, S. Francisco].  
*Cryptocerus angulosus* F. Smith, 1867, Trans. Ent. Soc. London (3) vol. 5, p. 524, Pl. 26, figs. 7, 7a [worker; Mexico]. — Emery, 1890, Bull. Soc. Ent. Ital. vol. 22, p. 76, Pl. 9, fig. 9 [worker; Costa Rica]. — Wheeler, 1907, Bull. Am. Mus. Nat. Hist. vol. 23, pp. 273-274, Pl. 11, figs. 1-3 [worker, soldier, male; British Honduras: Manatee].  
*Cryptocerus jucundus* F. Smith, 1876, Trans. Ent. Soc. London, p. 606, Pl. 11, fig. 2 (not 3!) [worker; Mexico].  
*Cryptocerus (Cryptocerus) scutulatus* Emery, 1922, Gen. Insect. Hym. fasc. 174c, p. 311.

The membranaceous border of the pronotum and epinotum, scalloped next to the anterior corner, and the spine-like lateral projections of the peduncular segments help to distinguish the worker of *scutulatus* from the other species of the present group. The soldier may be recognized by the bicolored head, being yellowish-brown above and black beneath, and the distinctive coloration of the gaster.

*Type*. — Soldier; Mexico (locality and collector unknown) [Coll. W. Wilson Saunders].

*Worker* [Fig. 4]. — Length 3.5-4.0 mm. Black; frontal carinae, occipital corners, lateral border of thorax, spines of petiole and postpetiole, antero-lateral corners of first gastric

tergite, knees, outer face of tibiae sordid or brownish white. Antennae and tarsi ferruginous.

Head subquadrate, the maximum length subequal to the interocular width. Frontal carinae and the rounded or subangulate occipital corners membranaceous. Sides of head upturned and projecting above the eyes. Greatest diameter of eyes less than one fourth of maximum length of head.

Thorax narrower than head, somewhat longer than wide; the anterior border convex. Pronotum and epinotum with a membranaceous border on each side, each with a notch just behind its anterior corner. Mesonotum produced on each side into a short spine. Mesoepinotal suture indistinct, especially mesally. Hind femora not marginate above.

Peduncular segments with well-developed, partly membranaceous and recurved lateral spines, those on petiole being, however, distinctly narrower, more acute and less flattened than those on postpetiole. Anterior face of petiole perpendicular to the dorsal face, not impressed.

Gaster cordate-elliptical, comparatively short, the first gastric tergite with a membranaceous, evenly rounded border on the antero-lateral lobes.

Opaque; finely and densely shagreened. Head, thorax and peduncle with squamiferous foveolae, which are at most vestigial on gaster. Hairs glistening white, very short, scale-like and appressed, one to each foveola on head and thorax, much smaller and denser on remainder of the body.

**Soldier** [Fig. 8]. — Length 4.5-6.5 mm. Black; cephalic disc, and shoulders brownish yellow. Scapes, basal funicular segments, and tarsi ferruginous. Lateral borders of epinotum, spines of petiole and all, but a lozenge-shaped area on the disc of the first gastric tergite, sordid-white, as are also the posterior borders of the remaining gastric tergites.

Head about as long as wide, longer than thorax. Supramandibular excision broad, not semicircular. Cephalic disc subquadrate, with rounded corners. Edge of disc and the part overlying the antennal scrobe, submembranaceous. Edge upturned, glassy, and crenulate. Median portion of disc distinctly convex. Occipital lobes turned upward apically, irregularly crenate. Sides of head not separated from the truncate occiput by a ridge or margination.

Thorax wider than long. Pronotum much wider than meso- and epinotum, the latter two subequal in width. Anterior border

of pronotum slightly arched, shoulders and sides of pronotum membranaceous and crested. Transverse pronotal carina strongly crested, narrowly interrupted in the middle. Mesonotum produced on each side into a short, sharp angle. Sides of epinotum narrowly crested, except in front where it is suddenly narrowed and produced into a small rounded lobe.

Peduncular segments as in worker, but somewhat stouter, the postpetiole much wider than the petiole.

Gaster as in worker, scarcely longer than broad, bluntly pointed behind.

Subopaque; upper face of head shining. Head and thorax foveolate, the former more coarsely and much more sparsely so, especially on the concave portions of the cephalic disc. Petiole, postpetiole, gaster, and legs finely and densely shagreened. Hairs as in worker.

Female: Unknown.

Male. — There is a description by Wheeler (1907) which however, does not give any details on wing venation and the structural features of the genitalia. I have not seen any specimen of this caste.

*Distribution.* — This species ranges from Mexico to Northern Colombia and Venezuela.

*Specimens examined:* 35; 23 workers, and 12 soldiers, as follows: *Mexico:* San Luis Potosi, Tomazunchale, Oct. 7, 1946 (on orchids): 2 workers, 1 soldier [USNM 46-17273]. Vera Cruz, May 13, 1946 (on orchids): 2 workers [USNM 46-7256]. — *Honduras:* La Ceiba, Sept. 10, 1916 (F. J. Dyer): 3 workers [USNM]. — *Guatemala:* loc. unknown, July 13, 1937 (on orchid): 2 workers, 1 soldier [USNM 37-20986]. — *Costa Rica:* loc. unknown, April 17, 1943 (on orchids): 6 workers, 6 soldiers [USNM 43-3783]. Alajuela, Nov. 28, 1911 (W. M. Wheeler): 6 workers, 4 soldiers [MCZ]. — *Colombia:* loc. unknown, Aug. 14, 1945 (on *Cattleya*-sp.): 1 worker [USNM 45-15819]. — *Venezuela:* loc. unknown, Aug. 26, 1946 (on *Cattleya*-sp.): 1 worker [USNM 46-13895]. (The specimens taken on orchids were collected in U. S. seaports by Plant Quarantine inspectors).

Wheeler in his otherwise excellent description and figures (1907) appears to exaggerate the narrowness of the worker, since all the specimens which I have examined have the head scarcely longer than broad, and the thorax never one and one half times as long as broad. Likewise the occipital corners seem to be more rounded than angulate.

*Synonymical notes.* — The synonymy concerning the present species has been proposed by Emery (1922). Even though he did not

have any direct knowledge of the types, which probably still exist, he surmised that F. Smith had described the same species under three different names. In this case, *scutulatus* (soldier) and *angulosus* (worker), which have priority over *jucundus* (worker), are nomenclatorially equal, since both were proposed in the same publication and on the same page. In 1907 Wheeler described the soldier and the male as of *angulosus*. This procedure does not constitute a validation of this name, since Wheeler did not suspect, or at least, not mention, the synonymy involved. The determining choice was made by Emery (1922) who, as the first revisor of the species, selected the name of *scutulatus*.

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