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A Review of the Ant Genus *Mycocepurus* Forel (Hym. Formicidae)

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**A Review of the Ant Genus *Mycocepurus* Forel, 1893
(Hymenoptera: Formicidae)**

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(With 14 text-figures)

In a paper on the Formicidae of the Antillean island St. Vincent, Forel (1893a: 369-372) created the genus-group name *Mycocepurus* for two new and very small fungus-growing ants (Subfamily Myrmicinae, tribe Attini) described simultaneously, one — *smithi* — from St. Vincent, the other — *goeldii* — from southern Brazil. Since then the group has been growing by steady addition of new forms reaching a total of 8 species, 1 subspecies and 5 varieties.

After amassing a considerable number of specimens, including the types of 8 forms, and studying them carefully, I reached the conclusion that this growth was merely fictitious and that the genus *Mycocepurus* really comprehends at the most 4 species, two of them still beset with grave doubts. In establishing new forms in the genus, most of the preceding myrmecologists seem to have paid excessive attention to minute details, not taking into account that color, sculpture, development, size and direction of the spines, denticles, tubercles on head, thorax and pedicel are extremely variable. As a matter of fact, these characters are unreliable inasmuch as they vary not only from population to population but even to a considerable extent among members of the same colony.

The present review, aside from a generic definition and a characterization of each species, also includes extensive synonymy, many new and seemingly important distributional data, and a summary of what is known of the biology of *goeldii* and *smithi*.

Thanks are due to several persons and institutions for the loan, gift or exchange of specimens which made possible this investigation. The unusually rich material came from the following sources: Borgmeier collection (CTB), presently held by the author; Divisão de Defesa Sanitária Vegetal, Rio de Janeiro (DDSV), courtesy of Prof. C. R. Gonçalves; Departamento de Zoologia do Estado de São Paulo (DZSP), courtesy of the curator Mr. Karol Lenko; Museum of Comparative Zoology at Harvard University (MCZ), courtesy of the curator Dr. Howard E. Evans; private collection of Dr. N. A. Weber at Swarthmore College (NAW); my own collection (WWK). I also gratefully acknowledge the help received from the "Conselho Nacional de Pesquisas" of Brazil in the form of a fellowship.

Mycocepurus Forel

Atta (*Mycocepurus*) Forel, 1893a: 369. — Forel, 1893b: 602-603. — Type of the subgenus: *Atta* (*Mycocepurus*) *smithi* Forel, 1893; designation by Wheeler, 1911.
Mycocepurus: Wheeler, 1911: 167. — Emery, 1913: 251.
Descolemyrma Kusnezov, 1951: 460. — Type of the genus: *Descolemyrma oglobtini* Kusnezov, 1951; monotypical. — NOV. SYN.

Generic characters

Worker. — Monomorphic. Integument opaque. Mandibles rather narrow and elongate, finely striate, chewing border with 5-6 teeth. Antennae 11-segmented; funiculus with ill-defined 3-segmented apical club. Clypeus in front with two carinae diverging forward and strongly laterad, running laterally parallel to the anterior border. Posterior portion of clypeus narrowly wedged in between frontal lobes. The latter are strongly approximated to, and separated from, each other by a deeply impressed narrow groove at the bottom of which lies the posterior portion of the clypeus. Posteriorly the frontal carinae are slightly diverging and gradually weakening, often fading out completely long before reaching the occipital border. Preocular carinule at best vestigial. Compound eyes situated somewhat behind the middle of the sides of head. Occipital angles slightly to more strongly obliquely truncate, the inner angle always dentate. Occipital border emarginate. Antero-inferior corner of pronotum rounded. Dorsum of thorax with many and variably developed teeth or spines: 2-3 pairs on pronotum, 5-6 pairs on mesonotum, 2 pairs on epinotum, the posteriormost pair, the epinotal spines, being longest. Some of the spines on each side connected with each other by faint longitudinal carinules. Front tarsi II-IV dilated. Petiolar node with 2 pairs of spines on dorsum. Antero-lateral border of gaster marginate. Pilosity not very abundant, consisting of short, thin hairs, either erect, or curved, or decumbent.

Female. — Quite similar to the worker except for the differences of the caste. Integument more conspicuously rugulose. Pronotum laterally with 1-2 spines. Scutellum posteriorly bidentate. Epinotal spines well-developed. Wings as in male.

Male. — Mandibles narrow and elongate; chewing border with a few vestigial, or practically without, teeth. Clypeus with the anterior border evenly convex, possessing usually the same oblique carinules of workers and females at each side of a postero-median, often subtruncate tumulus. Eyes large and bulging. Ocelli situated on top of the vertex on a raised tumulus. Antennae 13-segmented; scape almost as long as segments I-III of funiculus combined, greatly surpassing the occipital angles.

Funicular segments: I little longer than broad, II-XI three to four times as long as broad. Pronotum bearing laterally 1-2 usually well-developed scapular teeth. Scutum without prominent ridges and appendages, with broad and moderately impressed Mayrian furrows (notauli) that do not fuse posteriorly into a single stem. Scutellum posteriorly bidentate. Paired epinotal spines present. Petiolar node practically unarmed above. Postpetiole trapezoidal, flattened. Wings infuscated, of the Attine type, with strongly reduced venation in the apical field of forewing and in the hindwing. Forewing: pterostigma small but distinct; discoidal cell (*M1*) absent; submarginal cell as long as marginal; anal vein continuing at least slightly beyond junction of transverse median vein (*cu-a*); cubital (*Mf4*) and subdiscoidal (*Cu1a*) veins vestigial; transverse cubital vein absent, free end of cubital vein (*Mf4*) arising at or beyond apex of submarginal cell (*1st R1*) or transverse vein *2r*. Genitalia: apex of aedeagus with a free lobe set off from the body by a deep excision in front of the serrate ventral border. Volsellae without cusps.

Type-species: *M. smithi* Forel.

Discussion. — So far as *Mycocephurus* is concerned, Emery's keys (1922: 332-333) are still sufficient for the identification of the genus. While the generic classification of tribe Attini is still not altogether satisfactory, it now appears that *Mycocephurus* is a well-differentiated group that by all means deserves recognition as a genus.

Descolemyrma Kusnezov, described on isolated males, was later tacitly sunk by its author. Further details will be found under the discussion of the synonyms of *M. goeldii*.

As all true Attini, *Mycocephurus* is a strictly Neotropical genus, ranging from central Mexico (Jalisco) to the northern Argentine. It also occurs on most of the Caribbean islands.

Following is a list of the presently recognized species in the genus with complete synonymy:

1. *goeldii* Forel, 1893.
 - = *goeldii* var. *schuppi* Forel, 1901 — NOV. SYN.
 - = *goeldii* *gentilis* Santschi, 1924 — NOV. SYN.
 - = *ogloblini* Santschi, 1933 — NOV. SYN.
 - = *Descolemyrma ogloblini* Kusnezov, 1951 — NOV. SYN.
2. *obsoletus* Emery, 1913.
3. *smithi* Forel, 1893.
 - = *smithi* var. *borinquenensis* Wheeler, 1907 — NOV. SYN.
 - = *smithi* var. *toltecus* Wheeler, 1907 — NOV. SYN.
 - = *smithi* var. *eucarnitae* Forel, 1913 — NOV. SYN.
 - = *smithi* var. *trinidadensis* Weber, 1937 — NOV. SYN.
 - = *reconditus* Borgmeier, 1937 — NOV. SYN.
 - = *bolivianus* Weber, 1938.
 - = *manni* Weber, 1938 — NOV. SYN.
 - = *Trachymyrmex attaxenus* Menozzi i. litt. — NOV. SYN.
4. *tardus* Weber, 1940.

***Mycocepurus goeldii* Forel**

(Figs. 1-8)

- Atta (Mycocepurus) goeldii* Forel, 1893a: 370 nota (Worker; Brazil, S. Paulo: Botucatu). — Forel, 1908: 353-354 (Female, male; Brazil: S. Paulo City). — Forel, 1911: 293 (Brazil, Paraná: Castro). — Luederwaldt, 1918: 39, 61, fig. (Fungus garden; Brazil, S. Paulo: Ipiranga).
Mycocepurus goeldii: Luederwaldt, 1926: 266-267 (Bion.). — Menozzi, 1926: 68 (Brazil, S. Paulo: Mogi das Cruzes). — Santschi, 1933: 123, figs. 11, 14 (Worker). — Kerr, 1961: 46-48 (Bion.).
Atta (Mycocepurus) goeldii var. *schuppi* Forel, 1901: 301-302 (Worker; Brazil, Rio Grande do Sul: Porto Alegre). — NOV. SYN.
Mycetoporus goeldii gentilis Santschi, 1924: 17-18 (Worker; Brazil, Minas Gerais: Pirapora). — NOV. SYN.
Mycocepurus goeldii gentilis Santschi, 1933: 123, fig. 10 (Worker).
Mycocepurus ogloblini Santschi, 1933: 119-120, figs. 7, 8, 12, 13 (Worker, female; Argentina. Misiones: Est. Loreto). — Kusnezov, 1956: 48, fig. 70 (Male). — NOV. SYN.
Descolemyrma ogloblini Kusnezov, 1951: 460-461, 1 fig., 1 pl. (Male; Argentina, Misiones: Est. Loreto).

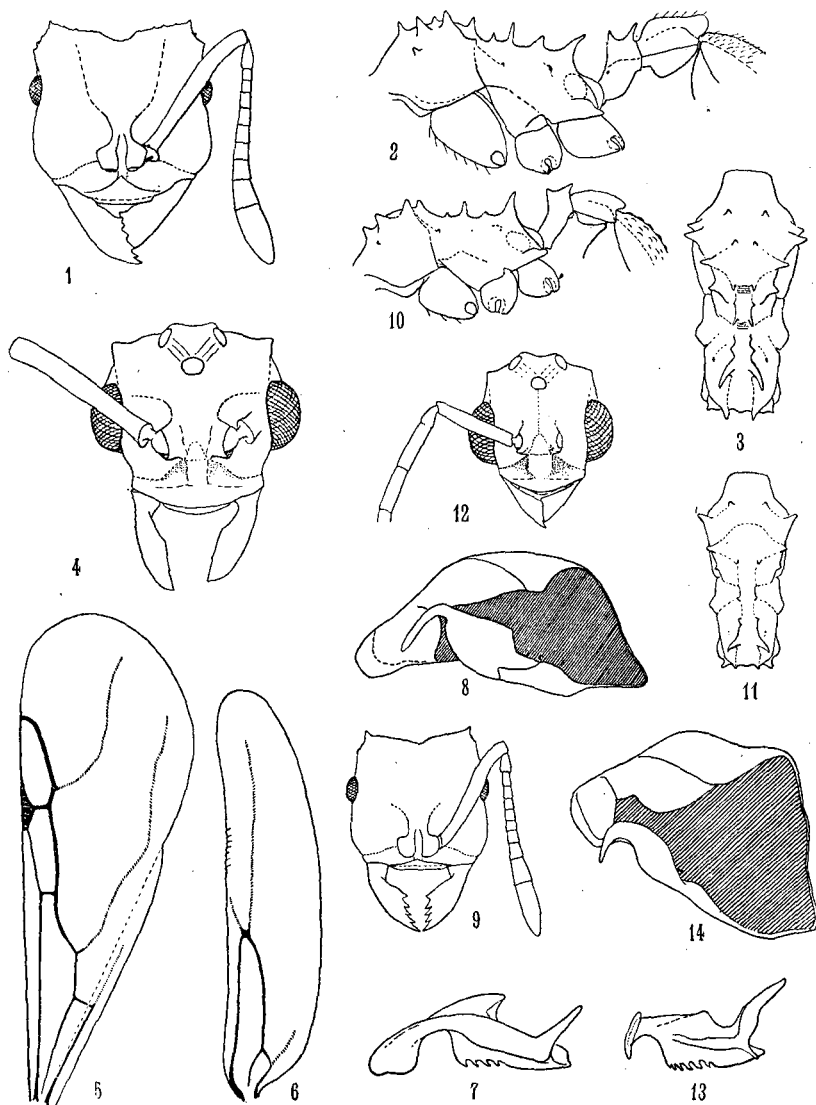
Worker. — Total length 3.0-4.0 mm; head length 0.72-0.96 mm; head width 0.72-0.93 mm; scape length 0.59-0.85 mm; thorax length 0.91-1.20 mm; hind femur length 0.69-0.99 mm. Integument densely punctate, fine reticulation indistinct.

Head as shown in Fig. 1, rather squarish and broad with bulging cheeks. Occipital angles obliquely truncate and denticulate. Frontal carinae more or less distinct on posterior half of head, almost reaching the occipital border. Occiput in side-view perpendicular to dorsum of head, forming an obtuse but distinct angle with gular face. Mandibles relatively broad; chewing border with 6 teeth or, if only 5, there is a noticeable diastema between the first and second basal teeth, occasionally showing a rudimentary denticle. Base of antennal scape dilated into a prominent ringlike lamina.

Thorax and pedicel as shown in Figs. 2 and 3. Promesonotal disc with a circlet of 6 well-developed pairs of teeth or spines, one pair occupying the center of the circlet. Anterior pair of posterior mesonotal spines prominent. Petiole compact, with a short peduncle; node bearing on each side a transverse carinule and on top four conspicuous spines, the anterior pair separated from the posterior pair by a deep excision. Postpetiole relatively deep, lacking a pronounced median furrow on disc.

Erect or suberect hairs on scape, clypeus, dorsum of head, dorsum of postpetiole and gaster, and on extensor face of tibiae.

Female. — The specific characters for this caste are practically the same as for the worker, although some of them may lack an equally distinct expression. The most striking feature is the relatively large size: Total length 5.3-6.0 mm; head length 1.01-1.09 mm; head width 0.98-1.07 mm; scape length 0.80-0.91 mm; thorax length 1.55-1.71 mm. The mandibles present almost

*Mycocepurus* Forel

Figs. 1-8. *M. goeldii* Forel. — Fig. 1. Worker, head. — Fig. 2. Idem, thorax and pedicel in lateral view. — Fig. 3. Idem, thorax in dorsal view. — Fig. 4. Male, head. — Fig. 5. Idem, forewing. — Fig. 6. Idem, hindwing. — Fig. 7. Idem, aedeagus in lateral view. — Fig. 8. Idem, paramere and volsella in lateral view. — Figs. 9-14. *M. smithi* Forel. — Fig. 9. Worker, head. — Fig. 10. Idem, thorax and pedicel in lateral view. — Fig. 11. Idem, thorax in dorsal view. — Fig. 12. Male, head. — Fig. 13. Idem, aedeagus in lateral view. — Fig. 14. Idem, paramere and volsella in lateral view. (Kempf *det.*) All figures drawn to the same scale except Figs. 5-8, 13-14; Figs. 13-14 drawn to a larger scale than Figs. 7-8. — (Kempf *det.*).

always 6 teeth, rarely 5. Pronotum laterally with two well-developed scapular spines. Vermiculate-rugose sculpture coarse on head, thorax, dorsum of postpetiole and on gaster. Pilosity as in worker. Wings as described for male below.

Male. — Total length 5.6-6.2 mm; head length 0.83-0.96 mm; head width 1.01-1.15 (including eyes); scape length 0.69-0.80 mm; thorax length 1.73-1.94 mm. Black; funiculus and tarsi fuscous-brown. Integument reticulate-punctate, opaque. Head as shown in Fig. 4. Occipital angles conspicuously dentate. Funicular segments II-XI at least four times as long as broad. Pronotum with two scapular teeth on each side. Mesonotal scutum and scutellum with longitudinal and spaced costae; rest of thorax more or less completely costate-rugose. Epinotal spines acute. Petiolar node antero-dorsally with or without a pair of small teeth. First gastric tergum about as broad as long. Pedicel and gaster with long, oblique to subappressed hairs. Genitalia as shown in Figs. 7 and 8. Wings (Figs. 5, 6) infuscated, venation as described in generic diagnosis.

Distribution. — *M. goeldii* is known to occur from Santa Fe in the Argentine north to the Amazon river. The westernmost records are of Corumbá, Mato Grosso State and Manaus, Amazonas State, both in Brazil.

Specimens examined. — Several hundred individuals comprehending representatives of all three castes, as follows; **Worker.** — Argentina, Santa Fé: Naré (N. Kusnezov); Misiones: Est. Loreto (A. A. Ogloblin) (CTB, MCZ). — Brazil, Rio Grande do Sul: Pareci Novo (B. Rambo, S.J.) (CTB); Santa Catarina: Chapecó (L. Stock, O.F.M.) (CTB), Nova Teutônia (F. Plaumann); Paraná: Castro (E. Garbe) (CTB, DZSP); São Paulo: Agudos (C. Gilbert, O.F.M., W. W. Kempf, O.F.M., R. Mueller, O.F.M.), Barueri (K. Lenko), Conchas (W. W. Kempf), Guaratinguetá (L. Wzorek, O.F.M., W. W. Kempf), Jacareí (S. B. Pessoa) (CTB), Mogi-Mirim (K. Lenko), Pedreiras (Schwebel) (CTB), Ribeirão Preto (O. Conde) (CTB), Rio Claro (T. Borgmeier, W. E. Kerr) (CTB, WWK), São Paulo (H. Luederwaldt, W. W. Kempf) (CTB, DZSP, WWK), Sorocaba (F. Grossmann) (DZSP); Rio de Janeiro: Itatiaia (T. Borgmeier, O.F.M., C. R. Gonçalves, W. C. Zikán) (CTB, DDSV), Niterói (T. Borgmeier) (CTB), Rezende (C. R. Gonçalves) (CTB); Minas Gerais: Carmo da Cachoeira (E. V. Bretas), Januária (C. R. Gonçalves) (DDSV), Monlevade (E. Luja) (CTB), Paraopeba (R. de Souza) (CTB), Pirapora (E.

Garbe) syntypes of *M. goeldii gentilis* Sa. (MCZ), Mons. Paulo (V. dos Santos), Três Corações (E. Araujo), Varginha (T. Borgmeier, M. Alvarenga & C. A. C. Seabra) (CTB, WWK); Goiás: Anápolis (W. W. Kempf), Catalão (W. W. Kempf); Mato Grosso: Campo Grande (K. Lenko) (DZSP), Chapada (C. Amann, Ö.F.M.), Corumbá (C. R. Gonçalves) (CTB, DDSV), Jardim (R. Mueller), Rondonópolis (C. Gilbert); Pará: Belterra (C. R. Gonçalves) (DDSV, CTB), Óbidos (C. R. Gonçalves) (CTB, DDSV), Santarém (C. R. Gonçalves) (CTB, DDSV); Amazonas: Manaus (C. R. Gonçalves, K. Lenko) (CTB, DDSV). — *Females*. — Argentina, Misiones: Est. Loreto (A. A. Ogloblin) (MCZ). — Brazil, Rio Grande do Sul: Pareci Novo (B. Rambo) (CTB); Santa Catarina: Chapecó (L. Stock) (CTB), Nova Teutônia (F. Plaumann); São Paulo: Agudos (C. Gilbert, W. W. Kempf), Rio Claro (W. E. Kerr), São José dos Campos (H. S. Lopes) (CTB), São Paulo (Luederwaldt) (CTB, DZSP); Rio de Janeiro: Itatiaia (W. C. Zikán) (CTB); Minas Gerais: Carmo da Cachoeira (E. V. Bretas), Paraopeba (R. de Souza) (CTB); Goiás: Leopoldo Bulhões (R. Spitz) (CTB). — *Males*. — Brazil, Santa Catarina: Chapecó (L. Stock) (CTB), Nova Teutônia (F. Plaumann); Paraná: Castro (E. Garbe) (CTB); São Paulo: Agudos (W. W. Kempf, C. Gilbert), Juquiá (J. Lane) (CTB), Rio Claro (W. E. Kerr), São Paulo (Luederwaldt, J. N. Pupo Nogueira) (CTB, DZSP); Minas Gerais: Monlevade (E. Luja) (CTB); Goiás: Leopoldo Bulhões (R. Spitz) (CTB); Mato Grosso: Corumbá (C. R. Gonçalves) (CTB). — (All specimens in WWK unless noted otherwise).

Synonymy. — Following is a brief characterization of each form presently placed into synonymy of *goeldii*, with a justification for the step taken.

1. *M. goeldii* var. *schuppi* Forel, 1901, worker. — Types not seen. In the description they are said to differ from the typical *goeldii* in the stronger tuberculate sculpture principally on head and legs, in the lighter color and the slightly narrower head. According to the aforesaid characters the variety falls well within the normal range of variation of *goeldii* and does not deserve to be named.

2. *M. goeldii gentilis* Santschi, 1924, worker. — Two syntypes (MCZ) examined. These specimens stand out by the strongly developed spinulation on head, thorax and pedicel. The rather narrow and short petiole possesses antero-dorsally a pair of teeth that separate in side-view the anterior from the dorsal face. However, in all other respects these workers exhibit the essential features of *goeldii* and do not constitute a geographical race. Closest specimens in my collection hail from Óbidos, Pará State and Catalão, Goiás State, Brazil. The latter are also otherwise outstanding by the extreme development of the upright pilosity.

3. *M. ogloblini* Santschi, 1933, worker and female. — The worker is characterized by a less rugose head, with frontal carinae rather obsolescent posteriorly, by the mesonotal spines which exceed in length the median pronotal spines, by more depressed postpetiole (Santschi says: petiole!) having the longitudinal carinae better developed than in the typical *goeldii*. No differential diagnosis is given for the female. Examination of three topotype workers and one female prove at once that this is a straight synonym of *goeldii*. The preceding characters do not exceed the variation found often in single nest series.

4. *Descolemyrma ogloblini* Kusnezov, 1951, male. — The types originate from the same locality as *M. ogloblini* Santschi and doubtless represent the male sex of the latter. Kusnezov (1956) tacitly recognized his mistake by dropping altogether *Descolemyrma* in his key to the Argentine ant genera and reproducing the figures of *Descolemyrma* under the heading of *Mycocepurus ogloblini* Santschi. Although I was unable to see the types, the description seems to me sufficiently detailed to show that this is the male of *M. goeldii*. As regards the special emphasis given by Kusnezov to small deviations in the wing venation, it is well to remember that Emery in 1922 already pointed out that the venation in this genus is quite inconstant. Since to my knowledge no formal synonymy has as yet been published for the present form, it is done so at this place.

Bio n o m i c s. — Luederwaldt (1918, 1926) is the only student who observed more closely the habits of the present species. Following is a summary of his findings:

M. goeldii is quite common in the fields in the São Paulo City area. The workers forage on the ground — they never climb up on plants — and have been seen collecting flowers of *Schinus terebinthifolius* and *Bacharis dracunculifolia*, seeds of *Bidens pilosus*, and caterpillar droppings. The booty is taken back to the nest or deposited on the outside round the entrance. The tiny ants are very timid, feigning dead when disturbed. While foraging, they are often attacked by other ants, especially by *Pheidole* spp.

The nest chambers are found in the soil at depths varying between 30 and 120 cm, and consist in round cavities of approximately 10 cm in diameter. The walls look polished and sometimes are lined with the dark feces of the ants.

The fungus-garden bears a peculiar aspect, consisting of narrow and elongate strips, 1.5-4.5 cm in length and 1.5 cm in width, suspended from the ceiling of the cavity like clothes hung up in a closet. The strips are yellowish-brown in color and are made up of tiny bits of plant material woven together by the mycelium of the fungus. Often, in nearby holes, stores of larger pieces of plant material are found piled up in heaps, perhaps to allow for fermentation before being used as substratum for the fungus-culture. Refuse is constantly being removed from the nest and deposited near the entrance.

Generally, there is only a single entrance to each nest, but this number may be increased considerably during the mating season. Luederwaldt counted once a maximum of 21 openings to a single nest. In the dry season, the workers build around the orifice of the entrance mounds of loosely piled up earth crumbs, which are either washed away by the first rain, or cemented together as craters.

The colonies are relatively small and the maximum number of workers to a nest probably does not exceed several hundreds. Nuptial flight takes place at day-time from October to February, the actual mating of both sexes is accomplished sitting on leaves. Occasionally only

males or only females seem to swarm at a given locality. After the mating season is over, the workers resume their regular foraging activity. Further details on the nuptial flight of the species are contained in Kerr's (1961) recent contribution.

According to my own observation at Agudos, São Paulo State, where *goeldii* is exceedingly common, the mating season occurs early in spring after the first warm rain, principally during the month of October. The outward appearance of the nest site, the structure of the mounds and craters, the collecting of flowers and seeds seem to be constant for the species, according to my field experience in São Paulo and Goiás States.

Mycocepurus obsoletus Emery

Mycocepurus obsoletus Emery, 1913: 252, fig. 1 (Worker; Brazil, Pará: Santarém).

Judging from the original diagnosis and figures (thorax in dorsal and lateral aspect), this is indeed a somewhat aberrant form, although otherwise closely related with *smithi*. It is distinguished by a less opaque integument, by more widely spaced tubercles on the rather squarish than elongate head, by relatively shorter scape. The thoracic spines and teeth conform to the pattern of *smithi*, the promesonotal ones being remarkably low and blunt, the anterior pair of both the posterior mesonotal and the epinotal spines is better developed.

I have been unable to secure the type (unique) of this species. Therefore I let it stand even though I suspect that this is just a slightly aberrant *smithi* worker. Both *smithi* and *goeldii* are now known from the lower Amazon river.

Mycocepurus smithi (Forel)

(Figs. 9-14)

- Atta* (*Mycocepurus*) *smithi* Forel, 1893: 370-372 (Worker; St. Vincent Island: Bellisle, Brighton). — Wheeler, 1907: 717-718, 773-774, pl. 50, figs. 15, 16; pl. 52, fig. 44 (Worker; Cuba; Bion.). — Forel, 1912: 187 (Nest; Colombia: Dibulla).
- Mycocepurus smithi*: Wheeler & Mann, 1914: 42 (Haiti: Cape Haitien, Diquini). — Santschi, 1933: 123, fig. 9 (Worker). — Wheeler, 1936: 204 (Dominican Republic: San Lorenzo). — Weber, 1940: 417 (Panama Canal Zone: Gatun). — Weber, 1946: 128-129 (Bion., Distrib., British Guiana). — Kerr, 1961: 47 (Brazil, São Paulo: Rio Claro; Bion.).
- Atta* (*Mycocepurus*) *smithi* var. *borinquensis* Wheeler, 1907: 718 (Worker; Puerto Rico: Vega Baja, Arecibo, Utuado, Monte Mandios). — Wheeler, 1908: 149 (Puerto Rico: Coama Springs). — Weber, 1934: 56 (Cuba: Soledad). — NOV. SYN.
- Atta* (*Mycocepurus*) *smithi* var. *tolteca* Wheeler, 1907: 718-719 (Worker; Mexico, Jalisco: Tuxpan). — NOV. SYN.
- Mycocepurus smithi* var. *eucarnitae* Forel, 1913: 235-236 (Worker; Santiago de Cuba). — NOV. SYN.
- Trachymyrmex ataxenus* Menozzi in Eidmann, 1936: 85-86, fig. 4; pl. 1, fig. X, 1-3 (Worker, female; Brazil, Rio de Janeiro: Mendes; Bion.). — NOV. SYN.
- Mycocepurus reconditus* Borgmeier, 1937: 246-248, figs. 34-36 (Worker, female; Brazil, Baía: Água Preta = Urucúca). — Borgmeier, 1948: 204-205 (Peru: Valle Chanchamayo). — Borgmeier, 1948: 470 (Argentina, Formosa: Mojon de Fierro). — Kusnezov, 1953: 221 (Bolivia; Syn.). — Kusnezov, 1956: 49, fig. 69D (Worker). — NOV. SYN.
- Mycocepurus smithi* var. *trinidadensis* Weber, 1937: 378-379, fig. 1 (Worker, female; Trinidad). — NOV. SYN.
- Mycocepurus bolivianus* Weber, 1938: 155-156, fig. 8 (Worker; Bolivia: Rurrenabaque). — NOV. SYN.
- Mycocepurus manni* Weber, 1938: 156-157, figs. 1, 2 (Female; Bolivia: San Gregorio). — NOV. SYN.

Worker. — Total length 2.8-3.0 mm; head length 0.67-0.75 mm; head width 0.61-0.67 mm; scape length 0.54-0.61 mm; thorax length 0.83-0.93 mm; hind femur length 0.61-0.69 mm. Integument distinctly and finely reticulate-rugulose and punctate.

Head as shown in Fig. 9; somewhat elongate with less bulging cheeks. Occipital angles feebly obliquely truncate, the lateral angle of the truncation often quite indistinct. Frontal carinae usually obsolete on posterior half of head. Occiput in side-view obliquely curving forward and downward, not forming a conspicuous angle with gular face. Mandibles rather narrow; chewing border with 5 teeth. Base of antennal scape not dilated in a ringlike fashion.

Thorax and pedicel as shown in Figs. 10 and 11. Promesonotal disc with a circlet of only 4 well-developed pairs of teeth; the *infero-lateral* pair of pronotum and the pair in the center of the circlet lacking or at best rudimentary; sometimes there is a convex transverse carinule between the *antero-lateral* pair of mesonotal teeth. Anterior pair of postero-mesonotal and epinotal spines very short and toothlike. Petiole rather slender, with a longer peduncle; body of node lacking a lateral horizontal carinule, the anterior pair of teeth on top of node separated from the posterior pair of teeth by a very shallow excision. Postpetiole depressed, with a pronounced postero-median furrow on disc.

Erect hairs confined to dorsum of head, dorsum of scape; clypeus with just a few long hairs on anterior border. Hairs on dorsum of gaster appressed.

Female. — Quite similar to that of *goeldii* but strikingly smaller in size: Total length 4.1-4.4 mm; head length 0.80-0.85 mm; head width 0.75-0.80 mm; scape length 0.64-0.67 mm; thorax length 1.20-1.31 mm. Specific characters as in workers, except for the thoracic spinulation. Pronotum usually with only one well-developed scapular tooth, the *antero-inferior* tooth either rudimentary or completely wanting. Mandibles with 5 teeth on chewing border. Vermiculate-rugose sculpture of body finer, often quite weak, especially on dorsum of postpetiole and on sides of thorax. Wings infumated, venation as stated for the male in the generic diagnosis. Tibiae and dorsum of postpetiole completely lacking erect hairs.

Male. — Still undescribed. Three isolated males taken by Dr. W. E. Kerr at Rio Claro, São Paulo, Brazil, seem to represent this caste of *smithi*.

Total length 3.8 mm; head length 0.64 mm; head width, compound eyes included, 0.69 mm; scape length 0.43 mm; thorax length 1.25 mm. Black; funiculus and farsi brown. Integument densely reticulate-punctate and opaque. Differs from *goeldii* as follows: Much smaller in size (cf. measurements). Head (Fig. 12) more elongate, with less pronounced occipital angles; very little rugulose. Mandibles punctate and without distinct striae. Scape relatively shorter; funicular segments II-XI about three times as long as broad. Pronotum on each side with a single scapular tooth. Mesonotal scutum and scutellum rather faintly longitudinally rugulose. Rest of thorax practically without conspicuous rugae. Epinotal spines rectangular in side-view. Tergum I of gaster distinctly longer than broad. Genitalia quite distinctive (see Figs. 13 and 14). Wings infumated, venation as in *goeldii*. Pilosity of pedicel and gaster appressed.

Distribution. — *M. smithi* is widely dispersed, ranging from central Mexico and the greater and lesser Antilles through Central America to southeastern Brazil (São Paulo State) and northwestern Argentina (Formosa Province).

Specimens examined. — Over a hundred individuals, mostly workers, a few females and tentatively three males, from the following localities: *Workers.* — Argentina, Formosa: Mojón de Fierro (N. Kusnezov) (CTB). — Brazil, São Paulo: Guaratinguetá (W. W. Kempf); Rio de Janeiro: Jardim Primavera (U. Kohnen), Mendes (H. Eidmann) syntypes of *Trachymyrmex attaxenus* Menozzi (CTB), Petrópolis (C. Gilbert), São Bento (C. R. Gonçalves) (CTB, DDSV); Guanabara: Rio de Janeiro (W. W. Kempf, C. R. Gonçalves) (WWK, DDSV); Minas Gerais: Teófilo Otoni (P. Thiemann, O.F.M.) (CTB), Três Poços (T. Borgmeier) (CTB); Espírito Santo: Vila Velha (O. Seifert, O.F.M.); Goiás: Anápolis (W. W. Kempf); Mato Grosso: Dourados (R. Mueller), Jardim (R. Mueller); Baía: Água Preta (= Uruçuca) (G. Bondar) syntypes of *M. reconditus* Borgmeier (CTB); Pará: Belém (C. R. Gonçalves) (CTB, DDSV). — Bolívia: Espia, Rio Beni (W. M. Mann) (NAW), San Antonio (H. Marcus) (CTB), Rurrenabaque (W. M. Mann) syntypes of *M. bolivianus* Weber (MCZ, NAW). — Peru: Valle Chanchamayo (W. Weyrauch) (CTB). — Surinam: Courantyne R. (N. A. Weber) (NAW), Paramaribo (D. C. Geijskes) (CTB). — Trinidad: s. loc. (W. M. Wheeler, N. A. Weber) (MCZ, NAW), Diego Martins (Urich) (MCZ), Mayaro Bay (N. A. Weber) (NAW), Northern Range (N. A. Weber), syntype of

M. smithi var. *trinidadensis* Weber (NAW). — Haiti: Diquini (W. M. Mann) (MCZ). — Dominican Republic: S. Lorenzo (s. coll.) (MCZ). — Puerto Rico: Utuado (W. M. Wheeler) syntypes of *M. smithi* var. *borinquenensis* Wheeler (MCZ). — Cuba: Aspiro Rangel, Pinar del Rio (A. Bierig) (CTB), Bolondron (W. M. Wheeler) (MCZ), Cayajabos (A. Bierig) (CTB). — Costa Rica: Bataan (N. A. Weber) (NAW). — Mexico, Jalisco: Tuxpan (McClendon) syntypes of *M. smithi* var. *tolteca* Wheeler (MCZ). — *Females*. — Brazil, Rio de Janeiro: Mendes (H. Eidmann) syntypes of *Trachymyrmex attaxenus* Menozzi (CTB); Baía: Uruçuca (G. Bondar) syntype of *M. reconditus* Borgmeier (CTB); Mato Grosso: Jardim (R. Mueller). — Bolivia: S. Gregorio (W. M. Mann) holotype of *M. manni* Weber (NAW). — Surinam: Paramaribo (D. C. Geijskes) (CTB). — *Males*. — Brazil, São Paulo: Rio Claro (W. E. Kerr). (All specimens in WWK unless noted otherwise).

Synonymy. — All the forms herewith placed into synonymy of *smithi* are briefly discussed in the following. These comments will also show the range of infraspecific variation of the present species.

1. *M. smithi* var. *borinquenensis* Wheeler, 1907, worker. — Syntypes from Utuado, Puerto Rico, seen. The main distinguishing feature of this form is said to consist in the presence of a small tooth on each side of the occipital furrow at the postero-median border of the head. This character, which is here indeed well-developed, also occurs occasionally in specimens from other often distant localities and is not apt to circumscribe a taxonomically valid form.

2. *M. smithi* var. *tolteca* Wheeler, 1907, worker. — Syntypes from Tuxpan, Jalisco, Mexico, seen. They are of a slightly lighter, yellowish color, have the posterior epinotal spines more acute and upright, a feebler cephalic sculpture; the small denticles flanking the midoccipital furrow in the preceding variant are here substituted by low and pointed ridges. However, none of these characters is significant.

3. *M. smithi* var. *eucarnitae* Forel, 1913, worker. — Types from Santiago de Cuba not seen. According to the description they are of somewhat larger size, have longer promesonotal spines, the anterior pronotal ones being as long as those of the mesonotum. Teeth flanking the midoccipital furrow as in var. *borinquenensis*. Several Cuban specimens examined, although not visibly disagreeing with the afore mentioned diagnosis, do not vouch for the existence of a particular geographical race on that island. Hence *eucarnitae* is just a plain synonym of *smithi*.

4. *Trachymyrmex attaxenus* Menozzi i. litt., worker and female. — The paper by Menozzi supposed to contain the formal proposition of this species never appeared in print. The name was published by Eidmann (1936), who also figured both the worker and the female and gave an important account of the biology of this ant. Syntypes, received by Borgmeier from Eidmann, proved on examination that this is nothing but the common and widespread *M. smithi*.

5. *M. reconditus* Borgmeier, 1937, worker and female. — Syntypes examined. In the original diagnosis this species is differentiated from *obsoletus* according to the description and figures of the latter. The

types, however, confirm that *reconditus* is conspecific with, and a junior synonym of, *smithi*.

6. *M. smithi* var. *trinidadensis* Weber, 1937, worker and female. — A syntype worker seen. According to the description "the workers of this variety differ chiefly in sculpture. The anteriorly directed convex and blunt ridge between the anterior mesothoracic spines is more reduced or practically absent. Between the sharply carinate sides of the first gastric segment the surface is longitudinally and finely rugulose". Since these characters vary at random and the examined syntype does not reveal a tangible difference, the present variety is best relegated to synonymy of *smithi* s. str.

7. *M. bolivianus* Weber, 1938, worker. — Syntypes examined. This species has been correctly synonymized by Kusnezov (1956) with *reconditus* Borgmeier, which in turn is a synonym of *smithi*.

8. *M. manni* Weber, 1938, female. — The holotype was examined. The specimen possesses somewhat heavier reticulate-rugose and vermiculate macrosculpture. The antero-inferior scapular spine is rudimentary. Otherwise, this female is much like *smithi* from which it may not be separated specifically.

Bionomics. — The ensuing data have been compiled from papers by Forel (1893a): 371-372, 1912: 187), Wheeler (1907: 773-774), Wheeler & Mann (1914: 42), Eidmann (1937: 85-86), Borgmeier (1937: 248) and Weber (1946: 128-129). The contribution by Eidmann is by far the most complete.

The small and sluggish workers when foraging carry dry leaves and caterpillar droppings back to their nest. The nesting sites are either in open fields and woods or even in moist gullies. The nest proper is in the soil. On the surface it is marked by craters of earth crumbs, measuring not more than 8 cm in diameter. These superficial structures stand out by their color which is different from that of the top soil, indicating that the nest cavities are at some depth. According to Bondar (Borgmeier, 1937) nest chambers have been dug out at a depth varying from 80 to 100 cm. In Colombia, Forel (1912) found a rather shapeless fungus-garden of this species at very little profundity.

A fact reported by many observers and confirmed by my own field experience is that usually a small area contains many craters of the same species, whereas neighboring areas have none at all. H. H. Smith (Forel, 1893a) who first called attention to the phenomenon, suggested that the craters of a given area represent the entrances of just one common formicarium (as happens with *goeldii* during the mating season, according to Luederwaldt). This, however, has not as yet been established conclusively.

The nest cavity, measuring 4-5 cm in width to 2.5-3 cm in height, possesses a flat ceiling and an excavated bottom. From the ceiling without the support of a framework of plant rootlets hang narrow clusters or threads of fungus material. These threads, which are quite consistent, are made up of finely cut up leaf material connected by the mycelium. The fungus itself has not as yet been identified. Eidmann states that superficially it resembles that of *Atta sexdens*, whereas Forel (1912) glibly states that it is not *Pholiota (Rizotes) gongylophora*. Away from the nest chamber lead several fine and threadlike tunnels barely giving passage to the tiny workers. Eidmann (1936, fig. 4) gives a photograph of a nest chamber with the suspended fungus garden.

While collecting in Puerto Rico, Wheeler (1907: 774) made several attempts at excavation of the fungus garden of *M. smithi* but succeeded

only once. In moist red clay under a stone he found a small irregular chamber with about 30 ants. The fungus garden, a small mass of approximately 2 cc in volume, consisted of caterpillar droppings studded with bromatia that scarcely differed from those of *Cyphomyrmex rimosus* and allies, the only Attine ants known to cultivate a yeast. Wheeler's discordant observation poses an interesting problem, but also needs further confirmation.

According to Eidmann, the colonies are polygynous. At any rate he found several dealated queens in a single nest chamber. The same author proclaims a lestopibiotic relationship between *M. smithi* and *Atta sexdens* because he found a great many nest chambers of the former between the cavities made by the latter. However, if any such relationship exists, it is not obligatory since *M. smithi* also occurs in areas where no sign of an *Atta* sp. could be discovered. Perhaps this association, of which no details are known, dissolves itself in the loose relationship of facultative synoecetes.

In southeastern Brazil *M. smithi* lives occasionally side by side with *M. goeldii* under the same ecological conditions. Kerr (1961) even found 3 males of the former in a swarm of 150 males of the latter species at Rio Claro, São Paulo State, Brazil. None of the *smithi* males attempted to mate with *goeldii* queens.

Mycocepurus tardus Weber

Mycocepurus tardus Weber, 1940: 416-417, fig. 13 (Worker; Panama Canal Zone: Barro Colorado Island).

Worker (lectotype). — Total length 2.9 (3.1) mm; head length 0.68 (0.71) mm; head width 0.64 (0.68) mm; scape length 0.56 (0.56) mm; thorax length 0.88 (0.93) mm; hind femur length 0.67 (0.69) mm. Reddish-brown; opaque.

Resembling quite closely *smithi* in general habitus and sculpture, presenting the following differences: Occipital teeth quite prominent. Base of scape obliquely truncate in front of articular condyle, laterally and ventrally with a prominent carinule around base (incomplete ring). Promesonotum with a prominent pair of teeth in the middle of the circlet; infero-lateral tooth of pronotum small but distinct. Anterior pair of posterior mesonotal teeth practically absent, of epinotal teeth extremely low and blunt; connecting longitudinal carinules between posterior mesonotal and epinotal teeth absent or only vestigial. Clypeus and dorsum of scapes with erect hairs; tibiae and dorsum of gaster with curved not quite appressed hairs.

This species is known only from Barro Colorado Island, Panama Canal Zone.

Specimens examined: Barro Colorado Island, Panama C. Z., June 12, 1938, N. A. Weber leg. n. 749, 1 worker (lectotype); same locality, N. A. Weber leg. June 1956, 1 worker (both in WWK received from NAW).

Discussion. — *M. tardus* combines with the general facies of *smithi* a few characters of *goeldii* (spinulation of promesonotal disc, pilosity of clypeus and scape), but seems for the time being sufficiently distinct from both. Weber (1940, fig. 13) gives a good lateral view of the thorax.

Note. — I have another worker from Barro Colorado Island (NAW n. 3805) which represents still another *smithi*-like variant, lacking completely the pair of anterior mid-pronotal teeth, a feature not observed in any other *Mycocepurus* specimen; its postpetiole is distinctly broader than long. Whether or not it is a still undescribed species may not be decided for the time being.

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