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A Revision of the Neotropical Ponerine Ant Genus Thaumatomyrmex Mayr (Hymenoptera: Formiciade)

Walter W. Kempf, O.F.M.
Departamento de Biologia Animal, Universidade de Brasília, Brasília, DF

(With 38 text-figures)

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Introduction

The fascinating ants of genus *Thaumatomyrmex,* a strictly Neotropical group of rare Ponerine ants, are at once recognized by the bizarre, three-pronged mandibles in the worker and female castes. The genus now consists of seven legally diagnosed and named species. Keys and synoptic notes are contained in the papers by Weber (1939, 1942) and M. R. Smith (1944). In 1953 I discovered the first male and the larvae known in the genus and published (Kempf, 1954) the description of the male which proved that *Thaumatomyrmex* belongs to the higher Ponerinae, i. e. the tribe Ponerini in the sense of Emery (1911). The larvae were diagnosed by G. C. and Jeanette Wheeler in 1964.

In spite of the relative wealth of information already made public, the taxonomy of the genus is still very primitive if not downright poor. Tris is due, in the first place, to the scanty material available. If I am not mistaken, the *Thaumatomyrmex* specimens hitherto collected and existing in the collections hardly surpass the number of 70. Nearly one third of this number

refers to *mutilatus*, still the best known species in the genus; almost another third is represented by stray and isolated male specimens, whereas of *ferox*, *atrox* and *manni* solely the types are known.

The second obstacle against a better knowledge of these ants consists in the presently available keys. Their authors, while compiling them, did not have at hand representatives of all described forms, and part of their information was gleaned from the often insufficient descriptions. In addition, some of the characters used for discrimination in the keys are either to vaguely formulated, or do not give a clear-cut separation, or were even misapprehended.

The splendid cooperation (to be more fully acknowledged further below) of several collectors and colleagues with access to collections in the United States, where most of the types of the known species are stored, enabled me to perform a critical study of characters apt for the separation of the species, and produce a fullfledged revision of the genus.

During the present study 28 workers and 18 males were at hand, including the types of all hitherto described species with the exception of *mutilatus* and *cochlearis*. These were not requested on loan because they did not seem to offer any problem as regards their identity and were represented by sufficient specimens other than the types. This revision uses for the first time more accurate meristic characters, based on 11 measurements and 5 indices. Likewise, more structural separatory characters were discovered, and the characters already known were more precisely defined. The result, as presented in this paper, consists of a revised diagnosis for each species, the description of a species new to science, and an up-dated key to the species for the workers.

Acknowledgments. I express my thanks to Mr. Fritz Plaumann of Nova Teutônia, SC, Brazil; Col. Moacyr Alvarenga of Rio de Janeiro, GB, Brazil; Mr. Raúl Montenegro of the Univesidad Nacional de Córdoba, Argentina, for the interesting material which they collected and deposited in my collection (henceforth quoted as WWK). Dr. R. R. Snelling of the Los Angeles County Museum graciously studied the type of *cochlearis* for me, deposited in that institution (LACM). Dr. David R. Smith, of the U. S. Department of Agriculture, first sent me precise information on the types contained in the U. S. National Museum in Washington (USNM) and later sent me the types themselves, because a direct examination proved necessary in the course of my studies. Dr. W. L. Brown, Jr., of Cornell University, Ithaca, N. Y., arranged for the loan of the types of the Weber collection, now at the Museum of Comparative woology at Harvard University (MCZ), together with

other critical specimens, which were forwarded to me by the curator J. C. White. Mr. Karol Lenko, while still at the «Museu de Zoologia da Universidade de São Paulo» (MZUSP), placed at my disposal the only specimen in the collection under his care. Dr. R. W. Taylor, Division of Entomology, CSIRO, Canberra City, Australia, kindly sent me micrographs of *T. zeteki* prepared by himself and Mr. C. D. Beaton, using a J. E. O. L. JSM-U3 Scanning Electron Microscope. The revision was performed with the aid of a fellowship granted by the Brazilian «Conselho Nacional de Pesquisas» (Proc. 6836/68), and in part with equipment donated by the «Fundação de Amparo à Pesquisa do Estado de São Paulo (71/543).

Note on Measurements

A clear definition of the measurements and indices used in the present revision seems necessary to avoid misunderstanding.

Total length (TL) is the sum of head length with closed mandibles + thorax length (WL) + petiole length + length of normally extended gaster excluding the exserted sting. This measurement is rather approximate than accurate.

Head length (HL) of workers is the distance between two parallels drawn through the anteriormost point of projecting frontal lobes and the posteriormost point of occiput or occipital carina, in full-face view. Note that this measurement does not represent necessarily the maximum ascertainable head length.

Head width (HW) is the maximum width of head proper *in front* of the eyes, in full-face view. It does not represent the maximum ascertainable width of head which usually is at level of eyes, if the latter are included.

Mandible length (ML) is the chord length of mandibles measured *in situ*, i. e. excluding the basal articular condyle contained in the acetabulum at anterior corner of head.

Interfrontal width (IfW) is the maximum distance between the outer borders of the frontal lobes across the frons.

Scape length (SL) is the chord length of antennal scapes, excluding the ball-shaped articular condyle and the thin stalk that connects it with the scape proper.

Weber's length of thorax (WL) is the length of thorax as obtained from side-view, between the anteriormost point of pronotum, excluding the collar-shaped neck, and the metasternal angle, i. e. the postero-infero-lateral corner of thorax just behind the metasternal gland.

Pronotum width (PnW) and *Petiole width* (PW) represent the maximum width of the respective parts as seen from above.

Hind femur length (HfL) is the chord length of hind femur, excluding of course the trochanter.

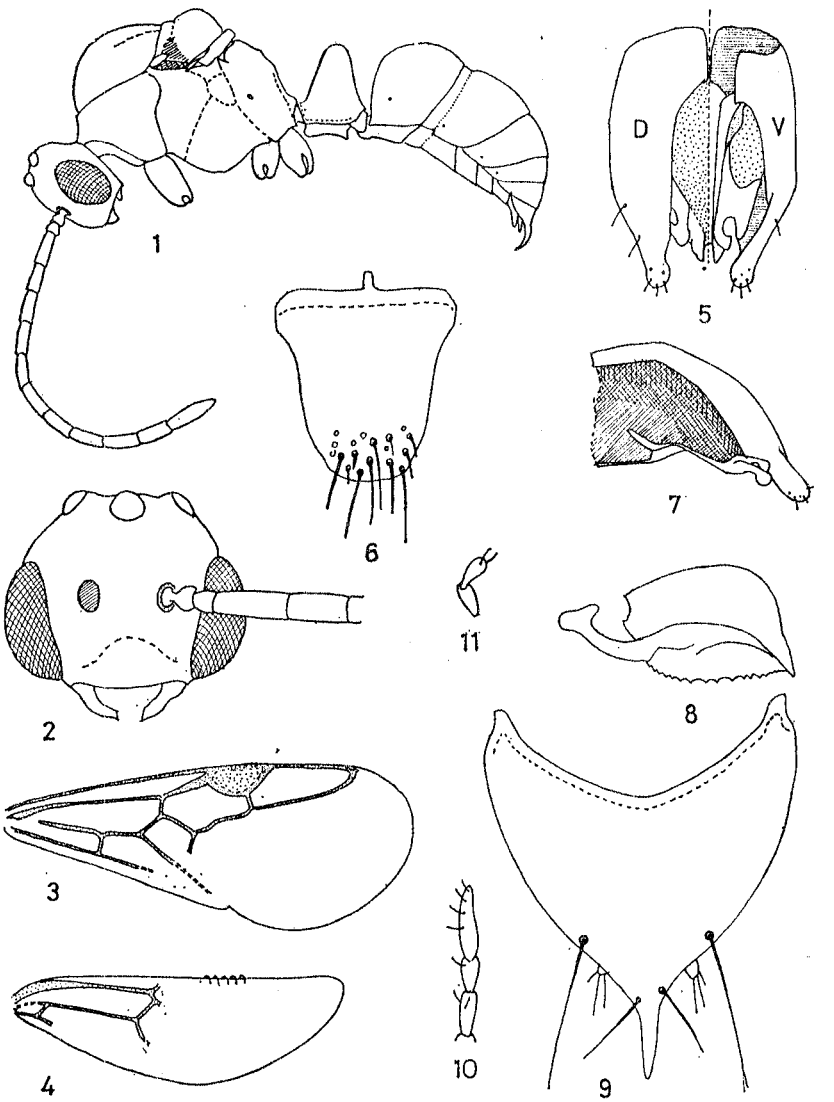
Cephalic index (CI) = HW / HL x 100
Mandibular index (MI) = ML / HL x 100
Interfrontal index (IfI) = IfW / HW x 100
Scape index (SI) = SL / HL x 100
Hind femur index (HfI) = HfL / HW x 100

Genus **Thaumatomyrmex** Mayr

Thaumatomyrmex Mayr, 1887: 530-531 (type of the genus: *T. mutilatus*, Mayr, 1887, monobasic). Emery, 1901: 36 (tribal assignation). Ashmead, 1905: 382 (tribal assignation). Emery, 1906: 717-718 (critique of Ashmead, 1905). Wheeler, 1910: 135 (tribal assignation). Emery, 1911: 48-49 (tribal assignation and generic characters). Wheeler, 1922: 644 (in key to the tribes and genera). Weber, 1939: 98 (key to the species). Weber, 1942: 65-68 (generic characters and key to the species). M. R. Smith, 1944: 97-98 (synopsis and key to the species). Kempf, 1954: 42-52 (male; larvae; tribal assignation). Wheeler & Wheeler, 1964: 450-451, fig. 13 a-d, 459, fig. 18 f, 460 (diagnosis and generic characters of larvae).

Generic characters

Worker. Medium-sized, total length between 3.3-5.0 mm; black with usually lighter appendages. Mandibles (Figs. 29-36) elongate, arcuate, narrow, with three long spiniform teeth of which the apical tooth is by far the longest; several long sensory (?) hairs arising from around the base of proximal spine. Labrum basket-shaped, bipartite, the proximal portion attached to the clypeal margin, forming distally an arcuate border from which the distal portion of labrum drops down at an angle of 90°, having its apex bilobed. Palpi (of *paludis*) 3, 2. Median apron of clypeus flat, broader than long, its anterior border straight, its posterior border arcuate; the lateral portions of clypeus extremely narrowed due to the advanced position of the frontal carinae. The latter widely separated from one another, their lateral border much closer to sides of head than to midline; each with a lobelike expansion above the antennal socket, posteriorly not prolonged beyond the middle of eyes. Anterior corner of head, formed by the lateral extension of the clypeus and the genae, and containing the mandibular acetabulum, slightly to conspicuously protruding. Antennae 12-segmented; scape always longer than distance between outer borders of frontal carinae (interfrontal width); funiculus gradually dilated toward apex, segments II-VI never longer than broad, apical segment (XI) as long as VIII+IX+X combined. Eyes large, conspicuously convex, placed in front of middle of head length, close to the often stalklike mandibular insertion. Thorax short, compact. Pronotum convex in both directions without any trace of marked shoulders. Mesonotum, if differentiated, very short. Metanotal groove present or absent. Hind femora always longer than antennal scapes. All tibiae with a single apical spur; spurs of tibiae I and III large, broad and pectinate, of tibia II small, spinelike. Tarsal claws simple. Petiolar node robust, high, from scalelike to cuboid in shape; subpetiolar process developed, elongate. Gaster scarcely constricted between somite I and II, the first



Thaumatomyrmex mutilatus Mayr, male. Fig. 1. Body in side-view. Fig. 2. Head in full-face view. Figs. 3 and 4. Fore and hind wing. Fig. 5. Copulatory organ in dorsal (D) and ventral (V) aspect. Fig. 6. Hypopygium. Fig. 7. Parameres and volsellae, seen from inside. Fig. 8. Aedeagus in side-view. Fig. 9. Pygidium and apices of cerci in dorsal view. Figs. 10 and 11. Labial and maxillary palpus. (Redrawn from Kempf, 1954: 52).

segment much larger than the following. Sting well-developed. Hairs curved, widely spaced, arranged according to a standard pattern, especially on head; present on head, thoracic dorsum, petiolar summit and on gaster; appressed and much shorter on

scapes and on legs. Fine pubescence confined to antennal funiculus and tarsomeres.

Female. There is no description of this caste. But Dr. D. R. Smith informs me that there is a female of *zeteki* in the collection of the U. S. National Museum. I have not seen this specimen.

Male. Black; appendages lighter. Total length about 4.5 mm. Mandibles weak, short, not functional, not or scarcely touching each other when closed. Maximum diameter of eyes over one half of head length. Ocelli relatively large, placed on top of rounded vertex in full-face view. Palpi 3,2. Antennae 13-segmented; scape very short, subequal to short first funicular segment which is scarcely longer than broad. Mesonotal scutum lacking Mayrian furrows (notaulices), but with well-developed parapsidal sutures. Mesonotal scutellum bulging, strongly convex in both directions. Propodeum unarmed, rounded or subangulate in profile. All tibiae with a single apical spur; spurs of tibiae I and III well-developed and pectinate, of tibiae II simple and small. Wings hyaline to slightly infuscated, veins feebly pigmented, pale; fore wing with a well-developed stigma but with the venation reduced in the apical field (Fig. 3): radial cell closed (*Rs* attaining the anterior wing margin), a single cubital cell present, terminal abscissa of *M* absent or at best vestigial; discoidal cell present, closed or open at postero-distal corner *(mutilatus),* in the latter case *m-cu* does not attain *Cu.* Subpetiolar process well-developed, posteriorly pointed or dentate. Pygidium with a strong apical spine. Hypopygium apically broadly or narrowly rounded, not excised. Constriction of gaster between somites I and II normal. Genitalia shown in Figs. 5-8.

Larvae. Thee of the larvae found in Agudos *(mutilatus)* were studied and diagnosed by Wheeler (1954: 450-460, passim). The material was badly preserved and the larvae did not show adequate body profiles, a character considered of basic importance in larval taxonomy, and which correlates most closely with adult taxonomy. For this reason the genus *Thaumatomyrmex* was omitted from the key and continues generically unclassified. On the highly probable assumption that the natural body shape of the larvae is of the crookneck squash type, their generic placement would roughly coincide with that suggested by the adult male. The Wheelers annotate the presence of numerous (about 146) spirelike tubercles of the subcone type, and the stout mandibles

presenting a large, sharp-point apical tooth, a medial flange which is narrowed at base, a rounded medial tooth and a distinct blade. Whereas the tubercles are of the most generalized type, the mandibles, belonging to group I, are of a peculiar shape which they call «thaumatomyrmeciform».

Discussion. The worker, on account of its mainly adaptive configuration, gives only a few hints as regards its suprageneric affinities. Emery (1901: 36; 1911: 48-49) gave the group tribal status of its own and placed it into the supratribal section of Proponerinae near the groups which presently form the tribe Ectatommini. Ashmead (1905: 382), for no reasons given or at least intelligible, ranked *Thaumatomyrmex* under the tribe Cylindromyrmecini, an unacceptable assignation because the latter is presently considered a doubtful member of subfamily Cerapachyinae. Wheeler (1910: 135) classified them under Ectatommini, a point of view he gave up later (1922: 644) by following Emery's suggestion.

The discovery of the male sex helped to solve at once the puzzle offered by the worker (Kempf, 1954: 47-52, figs. 1-11) and placed the genus within tribe Ponerini (section of Euponerinae of Emery, 1911), where *Thaumatomyrmex* shows some affinities with *Ponera* and *Hypoponera,* but diffeering in the male sex conspicuously by the reduced wing venation (absence of a second cubital cell and of terminal abscissa of *M*) and the bulging mesonotal scutellum (Figs. 1 and 3).

Distribution. The genus, confined to the Neotropics, covers a wide territory on continental Central and South America from British Honduras to southeastern Brazil, that is between Lat. N 18° and S 32°; in the Antilles it occurs at least on the Island of Cuba. The countries of the continent in which specimens and species of *Thaumatomyrmex* have been found are the following: British Honduras, Honduras, Panama (Canal Zone), Colombia, Venezuela, Trinidad, Bolivia and Brazil (States of Amazonas, Pernambuco, Goiás, Espírito Santo, São Paulo, Santa Catarina and Rio Grande do Sul). So far, all the recognized species, with the exception of *paludis* (Venezuela, Brazil: Manaus) and *atrox* (Guianas and Trinidad), are seemingly allopatric, there being no overlap in their territories of dispersal. This situation, most probably, does not represent the reality but is only an impression caused by the extremely meager collecting record. Only of *mutilatus* do we have now an appreciable number of specimens from widely scattered localities.

Habitat and habits. Only a summary of the little that is known of the mode of life of these ants is given here. More detailed information will be found further below, under each species.

Nearly all hitherto collected specimens were strays, either accidentally discovered during their forays or obtained from sifted leaf mold. The localities of capture suggest that they are preferably denizens of forests. But there also are records of their occurrence in open parkland *(mutilatus)* and even in the dry «caatingas» of northeastern Brazil *(contumax)*. Twice workers with larvae, pupae (and males) were detected in preformed vegetal cavities (under the bark of a root and in a half-rotten log; *mutilatus* and *ferox*). The small size of these cavities and the few adult ants observed in each case arouse the suspicion that the nests might have been more extentive, consisting of several such interconnected cavities, but this is already guessing.

The peculiar mandibles mark these ants as predators, but we have no positive knowledge of their prey and preferences. The closest indication, yet no explicit proof, lies in the fact that *mutilatus* was found on two occasions in intimate association with termites. However their feeding on termites, which seems highly probable, was not observed. A previous hypothesis of their being snail eaters, based on the fact that the holotype of *cochlearis* was accidentally discovered in a collection of empty shells of land snails with which the ground was literally carpeted, seems flimsy and far-fetched.

Males of *mutilatus* were found in the nest in January (São Paulo State), taken in a light trap in March (Santa Catarina State). Unidentified males, from Espírito Santo State and Pernambuco State in Brazil, were taken respectively in September and May.

Species level classification and characters

The heretofore collected worker specimens of *Thaumatomyrmex* are easily split into three apparently natural groups:

I. Group of *mutilatus:* Integument of body, including gular surface of head, finely shagreened, subopaque, with a silky sheen. Mesonotum and propodeum continuous, not divided by a metanotal suture or groove. Petiolar node scalelike, its anterior and posterior surfaces meeting dorsally and laterally forming a subacute margin, showing in dorsal view as a distinct transverse carina. Setae number normal, i. e. no more than 35 setae dorsally on head. Disc of clypeus with a pair of close-set setae, and the lateral border of declivous face of propodeum with three erect setae, the lower two arising from the top and the bottom of the inferior propodeal carina. Highest value for interfrontal index 72-78. Two presumedly allopatric species, *mutilatus* and *contumax* from extra-Amazonian Brazil, separable from each other by proportional measurements (indices).

II. Group of *cochlearis:* Clypeus longitudinally striolate; frons and vertex of head with posteriorly diverging dense rugulae and coarse punctures; gular surface of head smooth and shining; thorax and petiole also with coarse punctures, the former also with patches of rugulae on sides. Mesonotum and propodeum dorsally continuous, a metanotal suture is at best vestigial and does not form a transverse notch. Basal face of propodeum longitudinally nearly straight, meeting with the declivous face at an obtuse and marked angle. Petiole cuboid, seen in side-view nearly as broad at apex as at base, the former broadly rounded. Hairy species with more than 50 setae on dorsum of head, including oblique projecting setae on sides of head. Disc of clypeus without a pair of close-set setae. Sides of declivous face of propodeum with three projecting setae. Interfrontal index 62-63. One species, *cochlearis* from Cuba.

III. Group of *ferox:* Integument of body smooth, shining and highly polished; sculpture restricted to frontal lobes, antennal sockets, collar of propodeum and base of mandibles (under high magnification the smooth integument, especially on dorsum of head, presents minute, slightly vermiculate, scattered scratches that look like extremely fine appressed pubescence). Metanotal suture and transverse groove nearly always present (exception: *paludis*). Petiole never quite scalelike, the anterior and posterior surfaces of node meeting dorsally and laterally at a more rounded margin. Hairs as in group I, but disc of clypeus lacks the pair of close-set setae and the sides of declivous face of propodeum bear

only two projecting setae, the lowermost from the top of the inferior carina, if present. Interfrontal index 60-72. Five named species, from the Amazon basin, northern South America and Central America, divisible into two subgroups:

1. Head subquadrate, cephalic index 94-100. Mandibular apex in closed position not noticeably projecting laterad beyond genae, mandibular index 87-94. Interfrontal index 67-72. Two species, *paludis* from Venezuela and Amazonas State, Brazil, and *zeteki* from Panama and northern Colombia, quite distinct from each other.

2. Head broader than long, more or less expanded in front of eyes, receding toward occiput behind eyes; cephalic index 108-130. Mandibular apex in closed-position noticeably projecting laterad beyond genae, mandibular index 122-139. Interfrontal index 60-61. Three species, *ferox* from Honduras, *atrox* from Guiana and Trinidad, *manni* from Bolivia, and an unnamed form (see under *ferox*) from British Honduras. The distinction between these forms is rather scanty and subtle. All of them are known only from type specimens. Their status has to be reevaluated when more material is available.

Thaumatomyrmex mutilatus Mayr

(Figs. 1-12, 21, 31, 35)

Thaumatomyrmex mutilatus Mayr, 1887: 531-532 (☿; Brazil, Santa Catarina State). Emery, 1887: 353 (Brazil, Rio Grande do Sul State). Emery *in* von Jhering, 1894: 380, fig. (☿; Brazil, Rio Grande do Sul State). Emery, 1911: 118, pl 2, figs. 5, 5b (☿). Weber, 1939: 98 (key). Weber, 1942: 67, 68 (key). M R. Smith, 1944: 97, 98 (key). Kempf, 1954: 48-52, figs. 1-11 (♂; Brazil, São Paulo State: Agudos). Kempf, 1972: 250 (catalog).

Type. One (?) worker, Mayr collection, Naturhistorisches Museum, Vienna, Austria. Not seen.

Worker. TL 3.6-4.2 mm; HL 0.76-0.91 mm; HW 0.77-0.91 mm; CI 95-105; ML 0.72-0.89 mm; MI 86-102; IfW 0.56-0.69 mm; IfI 72-78; SL 0.63-0.76 mm; SI 81-89; WL 1.12-1.27 mm; PnW 0.55-0.64 mm; HfL 0.80-0.92 mm; HfI 99-110; PW 0.64-0.76 mm. Black, mandibles, frontal lobes, antennae and legs (except fore coxae) ferruginous. Integument of body minutely shagreened, i. e. densely and microscopically striolate-punctulate, subopaque, with a silky sheen. Mandibles finely striate on basal third, remainder smooth and shining. Frontal lobes striato-rugose. Exposed portions of terga III and IV of gaster superficially reticulate to reticulate-punctate, quite shining. Antennal scapes and legs rugulose-punctate, the latter somewhat shining. Hairs on body stiff, curved, with blunt tips, pale yellowish, their distribution shown in Figs. 12 and 21; note the pair of close-set standing hairs on center of clypeal disc, spreading out in the fashion of an inverted V, and the three hairs bordering the propodeal declivity, two of which arise from the top and the bottom of the inferior carina. Long (sensory?) hairs on mandibles

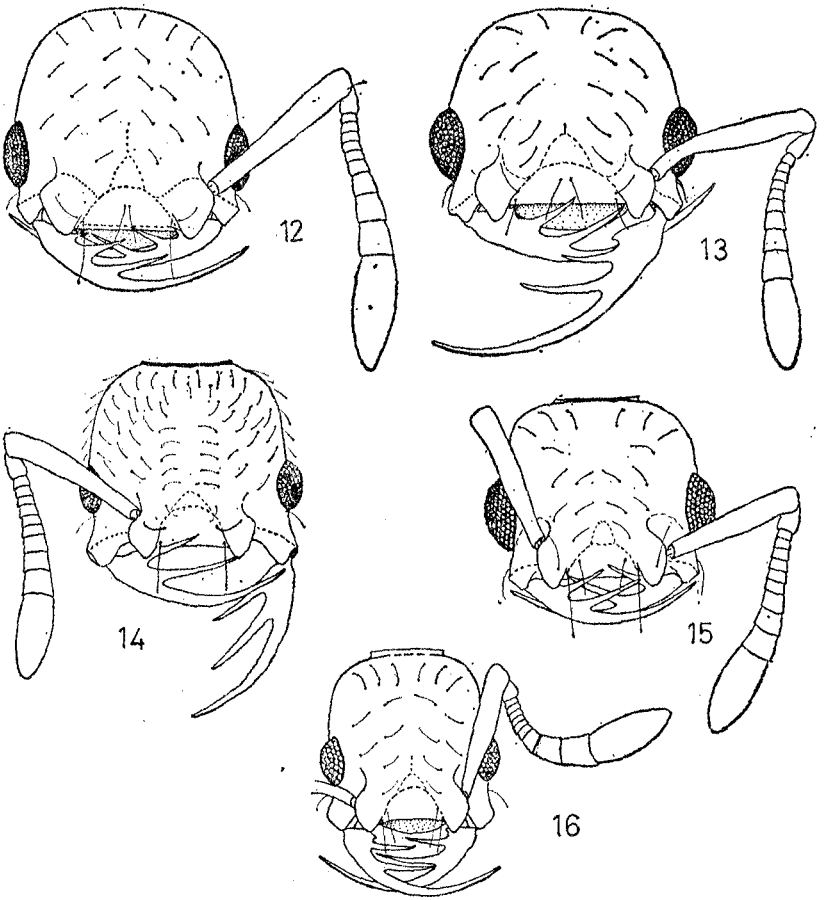
shown in Figs. 31 and 35. Antennae and legs with short, appressed hairs. Fine pubescence confined to funiculi and tarsomeres.

Head (Fig. 12) about as long as broad, its greatest width between the eyes (the latter included) and its greatest length between anterior tip of frontal lobes and posteriormost part of occiput in full-face view, not broadened in front of eyes, the mandibular acetabula not projecting in a stalk-like fashion, the sides of head not strikingly receding behind eyes, but posteriorly curved forming a semicircle with the occiput. Mandibles (Figs. 31, 35) with a well-developed tooth on dilated base of proximal spine, their chord lenght subequal to head width, their apex not noticeably protruding beyond genae when closed (Fig. 12), the apical spine distinctly shorter than twice the distance between its origin and the mandibular base, length of intermediate spine shorter than half the length of apical spine. Frontal lobes narrowly rounded in front but not pointed. Frontal area and frontal suture at least vestigial. Eyes with about 14 facets in a row across the greatest diameter which is subequal to one third of head length. Maximum width between frontal lobes about three-fourth of head width. Antennal funicular segments II-VI distinctly broader than long. Carinulate border of occipital foramen not visible from above in full-face view. Thorax (Fig. 21) lacking a metanotal groove, suture or ridge. Propodeum in profile more or less evenly rounded, inferior half of lateral border of declivous face strongly carinate. Petiole seen from above much broader than long, seen from the side with more strongly convex (in both directions) and inclined anterior surface, and steeper and less convex posterior surface, both forming a point at apex, and meeting at a transverse, very distinct, subacute carina.

Male (Fig. 1). I give in translation the original description of this sex (Kempf, 1954: 48-50):

«Total length 4.2. mm. Median head length, excluding mandibles, 0.61 mm; Weber's length of thorax 1.41 mm. Black; funiculi, trochanters, femora and tibiae chestnut brown; mandibles, tarsomeres and genitalia testaceous.

Head (Fig. 2) subopaque, broader than long (30:25); interocular width less than median head length (20:25). Mandibles small, finely punctate, with very short chewing border lacking teeth, scarcely distinct from basal border, forming an acute angle with lateral border. Maxillary palps (Fig. 10) with



Thaumatomyrmex, workers: Head in full-face view. Fig. 12. *T. mutilatus* Mayr (N. Teutónia, nº 3373). Fig. 13. *T. contumax* sp. n. (holotype). Fig. 14. *T. cochlearis* Creighton (Limones Saboruco). Fig. 15. *T. paludis* Weber (holotype). Fig. 16. *T. zeteki* M. R. Smith (paratype). (All drawn to the same scale, W. W. Kempf *del.*).

three, labial palps (Fig. 11) with two segments. Clypeus discally rather convex, with the anterior border gently arcuate and the postero-lateral borders vestigial to nearly obsolete. Frontal carinae absent. Eyes large, elliptical, their diameter surpassing one half of median head length. Ocelli conspicuous and salient. Occipital border, between posterior ocelli, slightly concave. Antennae filiform. Scape short, as long as broad. First funicular segment subequal to scape. Second funicular segment thrice as long as broad. Apical segment longer than first and second

funicular segments combined. Integument of head uniformly and finely reticulate-punctate.

Thorax subopaque and moderately shining, its general outline shown, in Fig. 1. Pronotum vertical on disc, on sides uniformly curved downward and backward without forming an angle at shoulders; finely reticulate-punctate. Scutum greatly convex, elevated above level of pronotum, without Mayrian furrows (notaulices) but with distinct parapsidal sutures and a weak sagittal furrow, distinct in front and behind but obsolete on disc. Integument of scutum finely reticulate-punctate with delicate and dense striae which are more or less longitudinal but form concentric arcs on the posterior portion between the parapsidal sutures. A deep transverse sulcus between the scutum and the body of the scutellum, the latter strongly convex in both directions and covered with dense, longitudinal rugae. Metanotum with a sagittal keel. Basal face of propodeum finely reticulate, with an abrupt depression in front, posteriorly separated from the plane and distinctly reticulate declivous face by a fine, transverse, somewhat undulate carinule. Sides of thorax finely reticulate-punctate and somewhat rugose on upper half, smoother on lower half.

Legs subopaque. Claws simple. Apex of anterior and posterior tibiae with a big pectinate spur, of mid tibiae with a simple and delicate spur on internal face.

Petiole with a high scale, conical in profile, rounded at apex, smooth and shining. Anterior surface gently convex, posterior surface slightly concave. Subpetiolar process in the form of a longitudinal keel which is subdentate in front and behind.

Gaster smooth and shining, with the sculpture nearly obsolete. Pygidium with a robust apical spine, curved downwards (Fig. 9). Cerci visible. Hypopygium (Fig. 6) with the apical border convex and entire. When the genitalia are retracted, only the apices of the parameres are visible at each side of pygidial spine. Anatomical details of genitalia shown in Figs. 5, 7 and 8.

Wings hyaline (Figs. 3 and 4). Fore wing with the radial cell closed and appendiculate, with one closed cubital cell and a discoidal cell which is open. The basal vein is removed from the transverse median vein by a distance which exceeds the length of the latter. Veins of both wings as well as the stigma faintly infuscated.

Mandibles, head, dorsum of thorax, sides of declivous face, petiole and gaster with sparse hairs, somewhat bristly and

curved, suberect on thorax, more inclined on head and on gaster. Hairs of legs denser, smaller and rather decumbent».

Specimens examined: 18 workers and 3 males, as follows: BRAZIL, *Rio Grande do Sul State:* Morro Reuter, December 1964, F. Plaumann leg. 1 ☿ (WWK 4107); Sinimbu, alt. 200 m, November 1960, F. Plaumann leg. 1 ☿ (WWK 3585); *Santa Catarina State:* Ibicaré, July and August 1959, F. Plaumann leg. 2 ☿☿ (WWK); Nova Teutônia. June 1961 (three collections), March 1971 (male, WWK 7857), April 1972, F. Plaumann leg. 4 ☿☿, 1 ♂ (WWK 3372, 3373, 3475, 7980, 7857); *São Paulo State:* Agudos, Fazenda Santo Antônio, in xerophilous forest, January 25, 1953, nest in a small cavity beneath bark of an exposed root of a tree, W. W. Kempf leg. 4 ☿☿, 2 ♂♂, 4 larvae, 6 pupae of males (WWK 739; USNM); same locality and collector under a rotten log within a nest of termites of genus *Diversitermes* (R. L. Araujo det. 1974), December 4, 1955, 2 ☿☿ (WWK 1484; MCZ); same locality and collector, parkland in front of seminary, under dry leaves on soil, October 28, 1954, 1 ☿ (WWK); same locatity, collector, Fazenda Glória, margin of xerophilous forest under decaying log with unidentified termites, March 25, 1955, 1 ☿ (WWK 1934); same locality, Fazenda Santo Antônio, October 1958, R. Mueller, O.F.M. leg. 1 ☿ (WWK 2749); *Goiás State:* Highway 153, 48 km south of Goiânia, rocky forest, May 9, 1971, W. L. & Doris E. Brown legg. 3 ☿☿ (1 ☿ received as a gift for WWK examined, remaining specimens in MCZ).

Distribution. Known from southeastern and central Brazil, this species inhabits the humid and more xerophilous latifoliate forests of these regions.

Discussion. The present species and the following, *contumax* sp. n., differ from all other known species by the microscopically shagreened and subopaque integument of body which has a silky sheen; the presence of two close-set setae on center of clypeal disc spreading out in a V-shaped fashion (Figs. 12, 13); the pale, thick, apically truncate hairs; the presence of three hairs on lateral border of propodeal declivity (Figs. 21, 22), the lowermost hair arising from the bottom end of the inferior ridge or carina (among all other species, only *cochlearis* has three setae in this region, but the lowermost seta arises from the top of the ridge); the deep and broad excision between the basal tooth and the proximal spine of mandibles (Figs. 31, 33, 35); the relatively shorter proximal and intermediate mandibular spines, the latter distinctly shorter than one half the chord length of the apical spine; the marked and almost sharp transverse margin between the anterior and posterior surface of petiolar node, a condition approximated only in *paludis,* in

which, however, it does not attain the same degree of sharpness; the antero-posteriorly more compressed and scale-like node of petiole, a character which was not explored statistically but may eventually be significant when more material is at hand.

The differences between *mutilatus* and *contumax* consist mainly in proportional measurements and will be given under the latter species.

Variation. The specimens from Agudos, São Paulo State, Brazil, coming from 5 different, in part widely separate collecting stations, disagree collectively from the other specimens mentioned above, taken in the States of Rio Grande do Sul, Santa Catarina and Goiás, Brazil, in the following features: Coxae, femora, tibiae and first tarsomere of all legs more fuscous brown; mandibular lenght a little but persistently shorter as compared with head length (MI 86-92 in these specimens as compared with MI 98-102 in the rest); when closed the tip of the apical spine of mandibles never surpasses the outermost point of genae or mandibular acetabalum; head also a trifle but persistently longer (CI 95-98, as compared with 99-102 in the remaining specimens); hind femora slightly but constantly longer as compared with head width (HfI 108-110, as compared with 99-103 in the other specimens); mandibles with the basal portion shorter and the basal tooth less protruding (Fig. 35 as compared with Fig. 31); pronotum in profile less bulging above, its antero-inferior corner angulate to subdentate (bulging above and antero-inferior corner rounded in the rest of the workers). The differences, although numerous, are deemed too light for rendering a judgment as regards their significance. The number of specimens and collections is much too little. Consequently I leave the Agudos epecimens under *mutilatus*.

The lone Goiás specimen seen is the smallest in absolute measurements but agrees well in proportional measurements with the Rio Grande do Sul e Santa Catarina specimens, considered typical. The former has the antennae and legs even more infuscated than the Agudos specimens, with the exception of the light yellowish brown central portion of extensor face of tibiae.

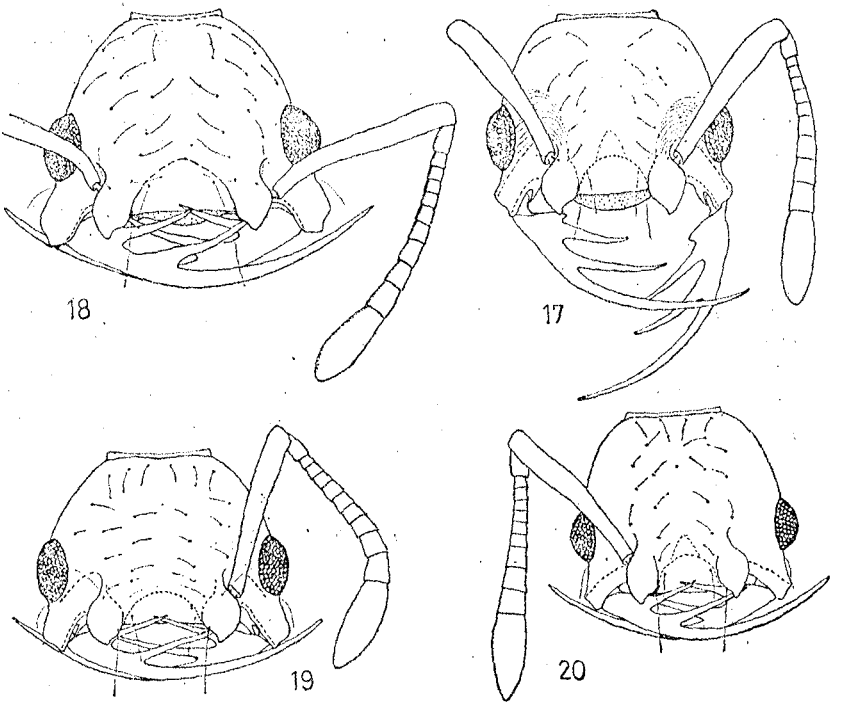
Biology. This species, i. e. the Agudos morph, has twice been found associated with termites, suggesting that the latter might be the favorite if not exclusive food of these ants, whose three-tined mandibles are ideally adapted for piercing soft-bodied insects. However, as already stated above in the introduction, an actual feeding on termites has not been observed so far.

Note. Several isolated males, probably collected in light traps, were taken by M. Alvarenga, September 1972, at Linhares, Espírito Santo State, Brazil (WWK 9178: 9 ♂♂), and by J. Lima, May 1972, at Caruaru, Pernambuco State, Brazil (WWK 10580: 6 ♂♂). They could belong to this or the following species. Inasmuch as we know only the male of *mutilatus* as definitely associated with the repective worker, I have not tried to work out the specific distinctions between the males.

Thaumatomyrmex contumax sp. n.

(Figs. 13, 22, 33)

Worker (holotype). TL 4.1 mm; HL 0.81 mm; HW 0.95 mm; CI 116; ML 1.04 mm; MI 127; IfW 0.68 mm; IfI 72;



Thaumatomyrmex, workers: head in full-face view. Fig. 17. *T. atrox* Weber (paratype). Fig. 18. *T. manni* Weber (holotype). Fig. 19. *T. ferox* Mann (lectotype). Fig. 20. *T.* sp. (British Honduras). (All drawn to the same scale, W. W. Kempf *det.*).

SL 0.72 mm; SI 89; WL 1.24 mm; PnW 0.60 mm; HfL 0.91 mm; Hfl 96; PW 0.72 mm. Extremely close to *mutilatus* from which it differs in the following significant characters: head (Fig. 13) absolutely and relatively (as compared with head lenght) broader, cephalic index 116 (95-105 in *mutilatus*). Mandibles (Fig. 33) absolutely and relatively (as compared with head length) longer, mandibular index 127 (86-102 in *mutilatus*), the apical spine proportionately and absolutely longer, the tip projecting beyond the maximum width of head across eyes (included) when mandibles are closed, and the proximal spines distinctly cross each other on clypeus. Hind femur distinctly shorter than head width (Hfl 96). Mid-coxae (fore and hind coxae black), all trochanters and basal third of femora ferruginous, apical two thirds of femora brownish black; tibiae pale testaceous; antennae dark brown.

The thorax and the petiole, which do not present any noticeable difference from those of *mutilatus*, are shown in Fig. 22.

Type. BRAZIL, *Pernambuco State:* Araripina, January 4, 1973, Raúl Montenegro leg. (n. 407) 1 ♀ (holotype; WWK 8443).

Discussion. Whether or not the present form is only a member of a geographical race or the end of a continuous morphocline, may not be decided upon the available specimens of both *mutilatus* and *contumax*. These are possibilites one has to reckon with, but remain at the present in the domain of sheer theory. On hand of the given evidence, the striking morphological gap as regards the critical measurements seems best expressed by giving it specific status. The occurrence of a *Thaumatomyrmex* in the «caatingas» of the Araripe mountains was a real surprise. For differences between *contumax* and the remaining species of *Thaumatomyrmex* see under *mutilatus*.

Thaumatomyrmex cochlearis Creighton

(Figs. 14, 23, 29)

Thaumatomyrmex cochlearis Creighton, 1928: 163-165, figs. 1 A & B (♀; Cuba, Las Villas: Mina Carlota nr. Cumanayagua). Wheeler, 1937: 445 (Cuba, Las Villas: Limones Saboruco, Soledad). Weber, 1939: 98 (key). Weber, 1942: 67, 68 (key). M. R. Smith, 1944: (key).

Type. A lone worker (holotype) taken by W. J. Clench and W. S. Creighton at Mina Carlota (Cumanayagua) on November 2, 1927, in the Creighton collection (LACM), not seen. Dr. R. R. Snelling kindly sent me the requested information on the specimen, including the following measurements: HL 0.82 mm; median head length (from anterior clypeal border to occiput along sagittal line) 0.70 mm; HW 0.88 mm; ML 0.79 mm; IfW 0.54 mm; SL 0.59 mm.

Worker. TL 4.0 mm; HL 0.77 mm; HW 0.83 mm; CI 107; ML 0.73 mm; MI 95; IfW 0.52 mm; IfI 63; SL 0.57 mm; SI 74; WL 1.16 mm; PnW 0.56 mm; HfL 0.75 mm; HfI 90; PW 0.61 mm. Black; mandibles, frontal lobes, antennae and legs, except the black fore coxae, yellowish brown to ferruginous; exposed portion of terga III-V of gaster likewise brown. Head dorsally sculptured, the gular face smooth and shining; the dorsal sculpture is as follows: clypeus and frontal area finely longitudinally striate; remainder of cephalic dorsum striato-rugose, the rugae and striae diverging caudad, with coarse interspersed punctures, the median stripe on frons and vertex with the sculpture obsolescent and somewhat smooth and quite shining. Mandibles finely striate dorsally on base until origin of apical

spine, the rest smooth and shining. Antennal scape and tibiae, also the tarsomeres, finely reticulate-punctate, not quite smooth nor noticeably shining. Thorax basically smooth and shining but with the same coarse punctures as on head, which here are somewhat sparser, especially on dorsum of promesonotum, denser on propodeum and sides, the latter also with patches of horizontal rugulae on posterior half; declivous face of propodeum with vestigial transverse rugae on upper half; mesopleura nearly entirely smooth and shining, except for a row of punctures along posterior border. Coxae and femora indistinctly sculptured, nearly smooth and quite shining. Petiole densely but more, finely punctured, the punctures sparser on anterior surface and dorsal face of node, the interstices smooth and shining. Gaster with the punctures still sparser and less conspicuous, especially on dorsum of tergum I and II which are quite smooth and shining. Remaining terga and sterna superficially punctulate to reticulate, quite shining. Hairs brownish yellow, pointed at apex, curved to suberect, much more abundant than in the other species, their distribution indicated in Figs. 14 and 23; note the presence of oblique projecting hairs on sides of head behind eyes and the three hairs on each side of declivous face of propodeum. Hairs on scapes and legs appressed.

Head (Fig. 14) in full-face view similar to that of *mutilatus*, i. e. nearly as long as broad, but somewhat more broadened in front, and its greatest length is between two parallels drawn through the anteriormost point of the somewhat stalked mandibular acetabula of head and the posteriormost point of occipital carinule which is visible in full-face view. Mandibles (Fig. 29) lacking a tooth at base of proximal spine; this and the intermediate spines relatively longer, the intermediate spine longer than half the chord length of apical spine; the latter measures twice the distance between the mandibular insertion and the point of its own origin and is relatively longer than in *mutilatus* but does not project beyond the sides of head in front of eyes when the mandibles are closed. Frontal area vestigially delimited. Eyes comparatively smaller, their maximum diameter little longer than one fourth of head length, and bearing only 9-10 facets in a row across the same diameter. Also the interfrontal width is a bit narrower (cf. IFI which is 63 in this species as compared with 72-78 in *mutilatus*). Scapes likewise shorter, the scape index being only 74 (as compared with 81-89 in

mutilatus). Clypeus without the pair of close-set setae on disc. Funicular segments II-VI distinctly broader than long.

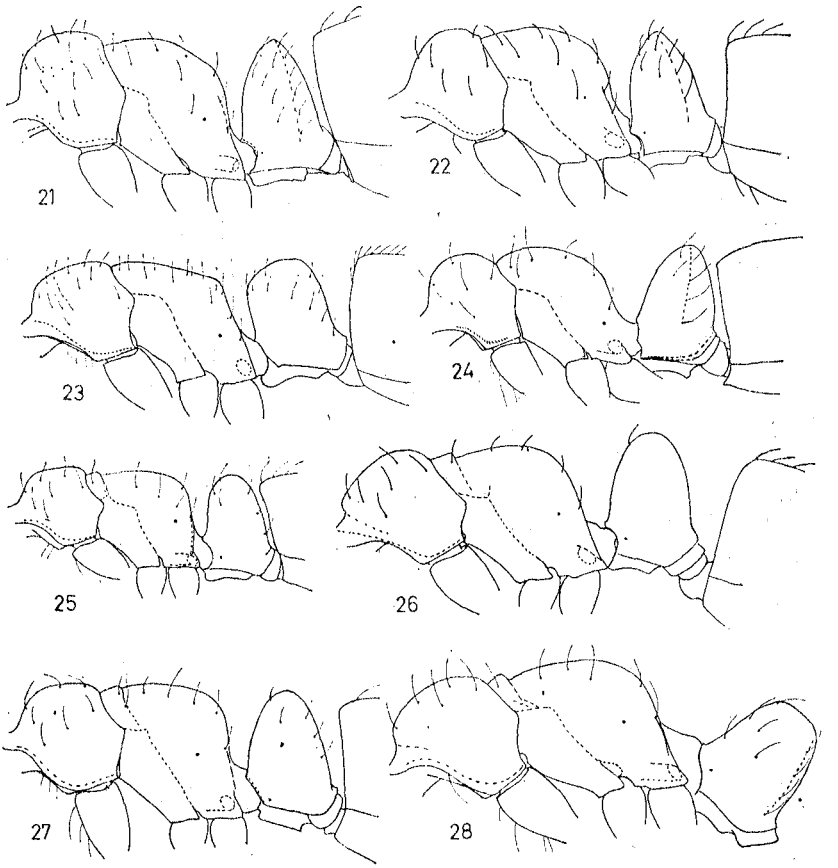
Thorax (Fig. 23) without forming a bulge at pronotum, the dorsal outline of the latter continuous with the following mesonotum and basal face of propodeum; antero-inferior corner rounded. Metanotal suture vestigially discernible in dorsal view (very close to the promesonotal junction but does not break the dorsal profile. Propodeum with rather straight basal and declivous faces, both forming a distinct but narrowly rounded and obtuse angle at their junction; the latter marginate to vestigially carinulate on inferior half; the lowermost of the three setae projecting from lateral border arising from the top of this carinule. Petiole subtrapezoidal in dorsal view, broadest behind, yet not scalelike; as seen in profile, the little slanting anterior face is almost subparallel to posterior face, with the apex very broadly rounded; subpetiolar process well-developed anteriorly, posteriorly low and inconspicuous.

Specimen examined: CUBA, *Las Villas:* Limones Saboruco, Soledad, VII, M. Bates & G. Fairchild legg. 1 ☿ (WWK, received as gift from the MCZ; this is the specimen mentioned by Wheeler, 1937: 445). Dr. W. L. Brown, Jr. (in litt. May 22, 1974) informs me that the MCZ collection contains two additional workers of this species from the following localities: CUBA, *Las Villas:* Blanco's Woods, Soledad, E. O. Wilson leg., and *Camaguey:* Baragua, M. Bates and G. B. Fairchild legg. With the type, these would be a total of four known specimens.

Distribution. Island of Cuba.

Discussion. The above diagnosed specimen fully agrees with the type according to the original description and figures by Creighton, and the additional information and figures especially made for me through the courtesy of Dr. R. R. Snelling (LACM). The description above already differentiates the present species from *mutilatus* and *contumax*. The differences from the remaining species in the genus consist in the peculiar sculpture of the integument of the body, especially of head, the more abundant pilosity, the bulky petiolar node which presents in side-view the anterior surfaces subparallel and the apex very broadly rounded, a condition approximately obtained only in *manni*. This is a very distinctive species in its own right, with no peculiarly close affinities to any other of the known forms.

Biology. The trivial name of the species suggests and records the fact that the holotype, was found among empty shells of land snails from an area in which the ground was literally carpeted with these



Thaumatomyrmex, workers: thorax and petiole in profile. Fig. 21. *T. mutilatus* Mayr (Ibicaré, SC). Fig. 22. *T. contumax* sp. n. (holotype). Fig. 23. *T. cochlearis* Creighton (Limones Saboruco). Fig. 24. *T. paludis* Weber (Venezuela: S. Carlos). Fig. 25. *T. zeteki* M. R. Smith (paratype). Fig. 26. *T. atrox* Weber (paratype). Fig. 27. *T.* sp. (British Honduras). Fig. 28. *T. manni* Weber (holotype). (All drawn to the the same scale, W. W. Kempf *del.*).

shells. Creighton admits that the occurrence of the single worker among the shells was entirely fortuitous, but leaves the suggestion that the species might be a snail eater, finding similarity between the mandibles of *Thaumatomyrmex* workers and those of the snail-eating Carabid beetle *Cychrus*. Actually we know nothing about its habits.

N o t e. My specimen disagrees with Creighton's description and figure in the following detail: «... the lower surface (of the petiole) with a serrate lamina which ends posteriorly in a blunt tooth» (p. 165). This feature is also shown in Creighton's figure 1 B. I believe that this must be an artefact, caused perhaps by glue, inasmuch as such a condition appears too improbable and the contrary is true in the specimen examined by myself.

Thaumatomyrmex paludis Weber

(Figs. 15, 24, 30)

Thaumatomyrmex paludis Weber, 1942: 68-70, figs. 1-2 (☿; Venezuela, Orinoco Delta: on a small island near Isla Tórtola). M. R. Smith, 1944: 98 (key). Kempf, 1969: 275 (Brazil, Amazonas: Manaus).

Type. VENEZUELA, *Delta Amacuro:* on a small, nameless island, submersed at high tide, east of Isla Tórtola, February 2, 1935, N. A. Weber leg. 1 ☿ (holotype), in an abandoned birds nest (Weber collection: MCZ type 32304); examinel.

Worker (holotype). TL 3.8 (3.7-4.1) mm; HL 0.75 (0.73-0.81) mm; HW 0.77 (0.73-0.80) mm; CI 103 (98-103); ML 0.60 (0.60-0.72) mm; MI 89 (89-94); IfW 0.53 (0.52-0.57) mm; IfI 69 (69-72); SL 0.58 (0.58-0.71) mm; SI 78 (78-87); WL 1.12 (1.12-1.27) mm; PnW 0.53 (0.53-0.56) mm; HfL 0.77 (0.77-0.91) mm; Hfl 100 (100-113); PW 0.58 (0.58-0.68) mm. Black; mandibles, frontal lobes, antennae, trochanters and basal third of femora, apical four tarsomeres of all legs yellowish brown; remainder of femora, tibiae and tarsomere I, and three apical segments of gaster somewhat darker brown. Integument smooth, shining and highly polished except for the following: Dorsum of base of mandible to origin of apical spine finely striolate; frontal lobes finely rugulose; semicircular rugulae around antennal socket; antennal scape finely and superficially rugulose-punctate; neck of thorax transversely rugulose; femora and tibiae with stronger and sparse piligerous punctures, otherwise smooth and shining; tarsomeres densely reticulate-punctate, opaque. Hairs in general as in *mutilatus* (their distribution shown in Figs. 15 and 24), but honey-yellow in color, slightly finer, and less distinctly truncate at apex; lacking a pair of close-set setae on disc of clypeus, and the lateral submarginate border of propodeum bears only two setae, the lowermost arising from the top of the nearly obsolete inferior carinule.

Head (Fig. 15) about as long as broad, occipital corners more narrowly rounded than in *mutilatus*, its greatest length between two parallels drawn through the anteriormost tip of frontal lobes and the posteriormost point of the occipital carinule which is visible in full-face view; the mandibular acetabula scarcely stalked and hardly projecting. Mandibles (Fig. 30), when closed, not at all (or just a little) projecting beyond maximum width of head in front of eyes, the base of the proximal spines without a tooth, the tips of the same spines not crossing

when appressed against the clypeus; intermediate spine half as long as chord length of apical spine. Frontal lobes narrower than in *mutilatus,* narrowly rounded in front, without a somewhat constricted and pointed apex. Frontal area and suture vestigial. Maximum length of genae in full-face view in front of eyes not much longer than one half of the diameter of the latter. Eyes relatively large, their greatest diameter slightly over one third of head length, with about 13-14 facets in a row across the same diameter. Funicular segments II-VI of antennae conspicously broader than long. Thorax (Fig. 24) with the pronotum evenly vaulted in both directions, the antero-inferior corner subangulate. Mesonotum and propodeum continuous, lacking a metanotal suture or groove; basal and declivous face of propondeum very evenly and continuously rounded in profile, the lateral carinule on inferior part of alteral border of declivous face short and indistinct. Spiracle of propodeum, when seen from above, not drawn out in the fashion of a broad and low cone (i. e. the area surrounding the aperture not raised). Petiole somehow similar to that of *mutilatus,* its apex almost pointed when seen in profile, and with a more or less distinct yet not sharply marked transverse margination between the anterior and posterior face of node, both dorsally and on sides. Subpetiolar process posteriorly dentate. Dorsum of tergum I of gaster not overhanging the vertical anterior surface, both not forming an acute angle in profile.

Specimens examined: Aside from the holotype already cited above, I have seen the following specimens referable to the species: VENEZUELA, *Cojedes State:* 20 km west of San Carlos, from forest patch, June 30, 1971, W. L. Brown leg. 1 ♀ (WWK; the MCZ collection has another worker which I have not seen). BRAZIL, *Amazonas State:* Manaus, September 3, 1962, on the trunk of a live «Ingá» tree, K. Lenko leg. 1 ♀ (MZUSP 4272).

Discussion. This species belongs to the *ferox*-group, characterized by the entirely smooth and highly polished integument of the body, the lack of a pair of close-set setae on center of clypeus, and the presence of only two setae on each side of declivous face of propodeum. The closest relation is *zeteki,* with which it shares the subquadrate head and short mandibles, but from which it differs in the following features: mandibles lacking the small tooth on base of proximal spines which do not cross each other when mandibles are closed and pressed against the clypeus; intermediate mandibular spines only half as long as apical ones; the larger eyes with their greatest diameter equaling or even

surpassing one third of head length; the lack of a metanotal suture and groove, the mesonotum and propodeum being continuous and forming in profile an evenly and very broadly rounded curvature; inferior part of sides of declivous face only indistinctly carinate; petiolar node in side-view biconvex, subconical, with an acutely rounded apex and with a distinct though not sharp transverse margination separating dorsally and laterally the anterior face from the posterior face of the node. Also the interfrontal, scape and hind femur indices have constantly higher values in *paludis* (3 specimens seen) than in *zeteki* (3 specimens seen), but the respective ranges are contiguous, so that in individual cases they might not give much help.

The other species of the *ferox*-group, *ferox, atrox* and *manni*, have all a distinct metanotal groove and suture, much broader heads and longer mandibles.

Variation. The specimen from San Carlos, Cojedes State, Venezuela, is completely identical with the type with the exception of the more fuscous antennal scapes, femora and tibiae. The specimen from Manaus, Amazonas State, Brazil, to the contrary, is more aberrant, being of noticeably larger size (the highest value for each measurement given above in the description applies to this specimen); the totally light brown appendages except the coxae; the somewhat longer mandibles (when closed, the tip of the apical spines somewhat surpasses the sides of head in front of eyes); the lack of semicircular rugulae around the antennal socket; the less evenly curved propodeum when seen in profile; the thicker petiolar node, the apex of which is not acutely rounded when seen from the side; the transverse margination between anterior and posterior face of petiolar node is indistinct. Notwithstanding these differences, this specimen is best left with *paludis*.

Biology. The holotype was found in an abandoned birds nest on a tree, on a small island periodically subjected to submersion, and the Manaus specimen was taken while climbing the trunk of a tree. The presence of strays in such situations appears to be characteristic of a great many ant species of the Amazon and Orinoco fauna and by no means constitutes a peculiarity of the present species.

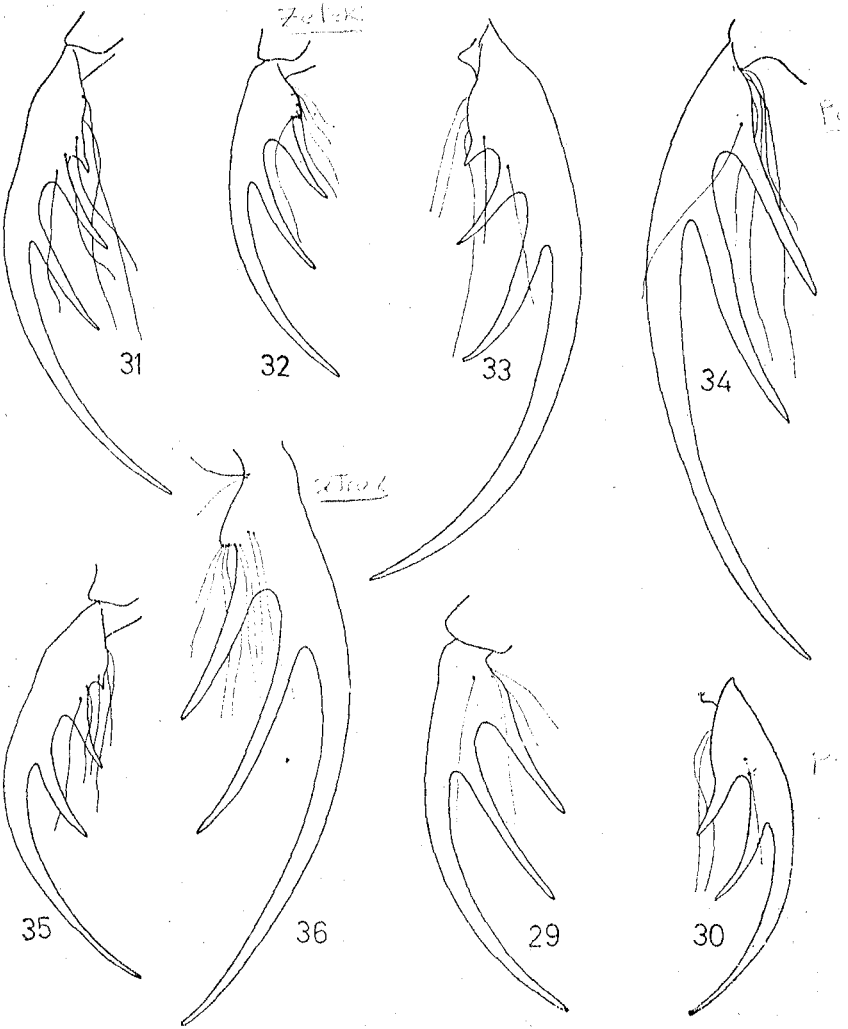
Thaumatomyrmex zeteki M. R. Smith

(Figs. 16, 25, 32, 37, 38)

Thaumatomyrmex zeteki M. R. Smith, 1944: 98-99 (☿; Panama Canal Zone: Barro Colorado Island). Sisson, 1974: 74, fig. (☿; SEM photograph of head).

Types. PANAMA, *Canal. Zone:* Barro Colorado Island, July-August 1942, James Zetek leg. 2 ☿☿ (holotype and paratype, Coll. Zetek nº 4975, Lot Nº 42-11986, USNM type nº 56483); paratype worker examined.

Worker (paratype). TL 3.3 mm; HL 0.69 (0.76) mm; HW 0.65 (0.76) mm; CI 94 (100); ML 0.60 (0.72) mm; MI 87 (94); IfW 0.44 (0.51); Ifl 67 (68); SL 0.52 (0.60) mm; SI 75 (78); WL 1.05 (1.15) mm; PnW 0.45 (0.52) mm; HfL



Thaumatomyrmex, workers: mandible. Fig. 29. *T. cochlearis* Creighton (Limones Saboruco). Fig. 30. *T. paludis* Weber (Venezuela: S. Carlos). Fig. 31. *T. mutilatus* Mayr (N. Teutônia SC). Fig. 32. *T. zeteki* M. R. (Barro Colorado I.). Fig. 33. *T. contumax* sp. n. (holotype). Fig. 34. *T. ferox* Mann (lectotype). Fig. 35. *T. mutilatus* Mayr (Agudos, SP). Fig. 36. *T. atrox* Weber (partype). (All drawn to the same scale, W. W. Kempf *del.*).

0.63 (0.72); Hfl 96 (95-100); PW 0.57 (0.64) mm. Black; mandibles, frontal lobes, antennae, legs except coxae, and tip of gaster light yellowish brown to ferruginous. Closest to *paludis*, exhibiting the following significant differences:

Mandibles with a minute but distinct basal denticle (Figs. 32, 38), the second spine longer than one half the length of the apical spine; distance between anteriormost point of genae respectively of the mandibular acetabulum) and anterior orbit of eye nearly as long as the maximum diameter of the latter which shows about 8-9 facets in a row across the eyes that are decidedly smaller than in *paludis;* antennal scape and funiculus stouter (Figs. 16, 37), the funicular segments II-VI strikingly transverse; antennal socket punctate-rugulose but not surrounded by semicircular rugae; metanotal groove and suture present, separating in profile the mesonotum from the propodeum (Fig. 25), the latter, likewise seen in profile, not continuously and evenly rounded, but nearly forming a blunt angle at their point of junction, yet not quite as marked as in *cochlearis;* inferior portion of lateral border of declivous face of propodeum with a distinct and sharp carinule, the lowermost seta of the pair flanking both sides arising from the top of this carinule; propodeal spiracle placed higher up on sides of thorax (Fig. 25), somewhat prominent on a low but distinctly raised cone, quite visible in dorsal view; fore femora with a row of oblique hairs on flexor face, a unique feature in the genus; anterior and dorsal surface of tergum I of gaster forming a subacute angle when seen in profile; values for interfrontal, scape and hind femur indices lower than in *paludis,* under, which further differences are cited.

Specimens examined: Aside from the paratype, already mentioned above, I have seen the following specimens: PANAMA, *Canal Zone:* Barro Colorado Island, April-May 1942, James Zetek leg. 1 ☿ (Coll. Zetek nº 4953, USNM Lot Nº 42-15209, WWK, received from Dr. M. R. Smith on exchange many years ago). COLOMBIA, *Cundinamarca Province:* Finca Bella Vista near Sasaima, June 1965, P. R. & D. L. Craig legg. 1 ☿ (MCZ). The USNM, according to information received from Dr. David R. Smith, possesses three additional specimens from Barro Colorado Island, two workers and one female (USNM 43-16534 and 44-2167). Likewise Dr. R. W. Taylor, CSIRO, Canberra, Australia, has one worker specimen collected on Barro Colorado Island, Panama Canal Zone, July 5, 1961, by his wife, Mrs. Wendy Taylor, from Berlese funnel sample of litter from rain forest (Australian National Insect Collection, ANIC, Canberra, Australia); a scanning electronic microscope photograph of the head of this worker specimen was recently published in the

National Geographic Magazine (Sisson, 1974: 74); two additional SEM-micrographs of the same specimen, Figs. 37 and 38, were especially made for the present publication, as acknowledged in the introduction. The Miguel Lillo collection at Tucumán, Argentina, has a worker from the same locality, which I cursorily examined in December 1974.

Discussion. M. R. Smith, in the original description, compares *zeteki* with *cochlearis* on account of the scarcely rounded and subangulate propodeal profile. But the closest species are in the *ferox*-group, where it has already been differentiated from *paludis*. It differs from the remaining species in the same group by much smaller size, stouter antennae, short mandibles, scarcely broadened head, greater frontal width, shorter antennal scapes with segments II-VI of funiculi strikingly transverse, and relatively longer hind femora, the length of which is subequal to head width.

Thaumatomyrmex ferox Mann

(Figs. 19, 34)

Thaumatomyrmex ferox Mann, 1922: 3-4, fig. 1 (☿; Honduras: San Juan Pueblo). Weber, 1939: 98 (key). Weber, 1942: 67, 68 (key). M. R. Smith, 1944: 98 (key).

Types. HONDURAS: San Juan Pueblo, February-March 1920. W. M. Mann leg. 2 ☿☿ (syntypes; lectotype: USNM, paralectotype: MCZ); lectotype examined.

Worker (lectotype). TL 4.7 mm; HL 0.89 mm; HW 1.13 mm; CI 127; ML 1.20 mm; MI 134; IfW 0.68 mm; IfI 60; SL 0.77 mm; SI 87; WL 1.36 mm; PnW 0.64 mm; HfL 0.97 mm; HfI 86; PW 0.73 mm. Resembling *zeteki* in color, sculpture and pilosity, but presenting the following differences:

Head (Fig. 19) trapezoidal, much broader than long with anteriorly strongly diverging and stalked genae and mandibular acetabula; sides of head strongly receding toward occiput behind eyes; greatest head length between two parallels drawn through the anteriormost point of mandibular acetabula and the posteriormost point of dorsally visible occipital carina; greatest width of head still at level of eyes, the latter included. Mandibles (Fig. 34) without a small tooth at base of proximal spines which cross each other slightly when mandibles are closed and pressed against the clypeus; intermediate spines somewhat sinuous, half as long as apical spines; the latter in closed position of mandibles projecting laterad much beyond genae and even beyond the outermost point of eyes. Frontal lobes with an

anterior slightly set off pointed projection. Eyes larger, their maximum diameter much longer than genae, subequal to one third of head length, with about 12 facets in a row across the greatest diameter. Antennal scapes relatively longer and more delicate, funicular segments II-VI nearly as long as broad. Thorax in general similar to that of *zeteki,* larger, and with propodeum more broadly rounded at junction of basal face with declivous face. Sides of the latter with only one seta (the other, the lower of the pair, perhaps rubbed off?). Petiolar node similar yet proportionately narrower. Gaster, as seen in profile, not forming a subacute angle between anterior and dorsal face of tergum I.

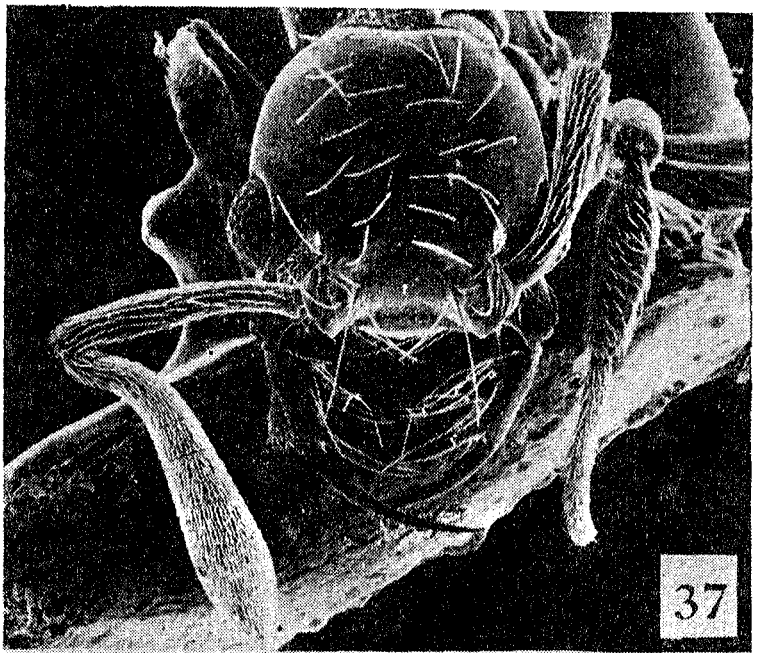
As *zeteki,* this species has a distinct and impressed metanotal groove, and the inferior propodeal ridges, flanking the declivous face, are well-developed. Propodeal spiracle in the same position and equally raised as in *zeteki.*

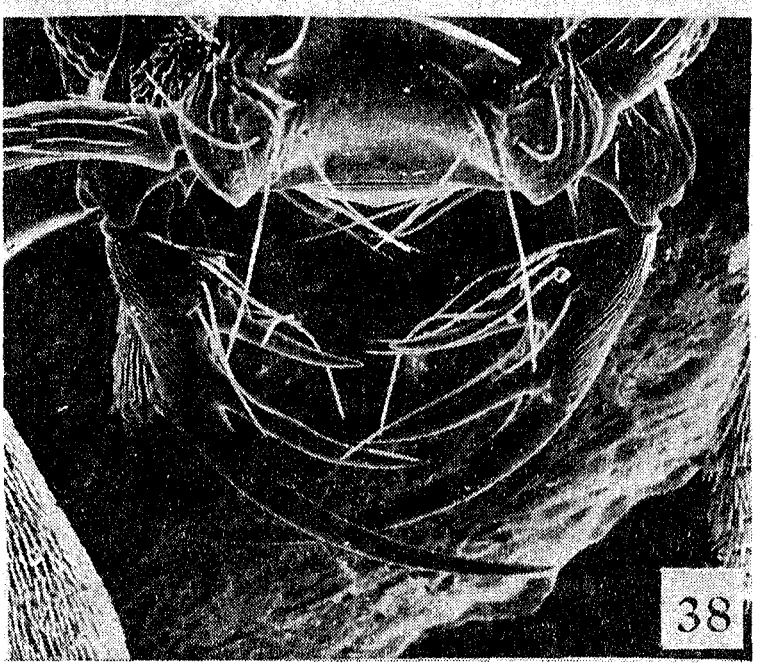
Biology. The two specimens, still the only ones known, were taken with one larva and one pupa in a depression in a half rotten log near a stream in the forest.

Discussion. This is the oldest species of the group, and is characterized by the anteriorly broadened and posteriorly receding, trapezoidal head. In the existing keys, *ferox* keyes out in the same couplet with *atrox* and is separated from the latter by a wrong character: ... proximal mandibular spines barely reaching the center of clypeus when mandibles are closed = *ferox;* ... proximal mandibular spines distinctly exceeding center of clypeus when mandibles are closed and crossing each other = *atrox.* At least in the lectotype specimen of *ferox* the proximal spines do cross each other on clypeus (Fig. 19) and consequently surpass the center of clypeus. I do not know about the condition in the paralectotype of *ferox,* but, at any rate, not too much trust should be placed in this character. As a matter of fact, *atrox* is dangerously close to *ferox;* the differences will be given further below under *atrox.*

Note. A strange specimen, from British Honduras, Caves Branch, taken in berlesate of forest floor cover in August 1972 by S. & J. Peck (MCZ), a worker, is at the same time close to *ferox* but also quite different in several details, so much that I first intended to describe it as a new species. On account of the doubts which already beset the described and named species in the *ferox*-subgroup, I leave it unnamed for the time being, but give the differential characters and the measurements:

Worker. TL 4.1 mm; HL 0.85 mm; HW 0.92 mm; CI 108; ML 1.04 mm; MI 122; IfW 0.56 mm; Ifl 61; SL 0.69 mm; SI 81; WL 1.25 mm; PnW 0.62 mm; HfL 0.88 mm; Hfl 96; PW 0.71 mm. Color, sculpture and pilosity as in *ferox,* but has two setae on each side of declivous face of propodeum (Fig. 27). Mandibles similarly elongate, projecting much beyond genae and even eyes when closed, and lacking a tooth at





Thaumotomyrmex zeteki M. R. Smith, SEM-micrographs of worker: Fig. 37. Head in full-face view. Fig. 38. Mandibles and clypeus (Courtesy of Dr. R. W. Taylor and C. D. Beaton).

base of proximal spines which cross each other on clypeus when mandibles are closed; intermediate spines gently and evenly curved and distinctly longer than half the length of apical spines. Genae less expanded laterad (Fig. 20), their length, including mandibular acetabula, subequal to length of relatively small eyes which have about 10-11 facets in a row across the greatest diameter. Head shape more of the subquadrote type, resulting in a great difference in cephalic index (108) as compared with that of *ferox* (127). The hind femora are also relatively longer, nearly as long as the standard head width (HfI 96).

Thaumatomyrmex atrox Weber

(Figs. 17, 26, 36)

Thaumatomyrmex atrox Weber, 1939: 98-99, fig. 3 (☿; Guiana: Mazaruni and Cuyuni Rivers junction; ☿; Trinidad: foothills N of Tunapuna). Weber, 1942: 67, 68 (key). M. R. Smith, 1944: 98 (key).

Types. GUIANA: junction of the Mazaruni and Cuyuni Rivers, August 20, 1935, among leaves, N. A. Weber leg. 1 ☿ (holotype, Weber collection: MCZ). Trinidad: foothills north of Tunapuna, July 29, 1935, among leaves, N. A. Weber leg. 1 ☿ (paratype: WWK, received from MCZ); paratype examined.

Worker (paratype). TL 4.4 mm; HL 0.91 mm; HW 1.09 mm; CI 120; ML 1.15 mm; MI 126; IfW 0.65 mm; IfI 60; SL 0.80 mm; SI 88; WL 1.33 mm; PnW 0.64 mm; HfL 0.97 mm; HfI 89; PW 0.73 mm. Extremely close to *ferox* from which it differs in the following characters:

Head (Fig. 17) slightly narrower (CI!) and mandibles (Fig. 36) somewhat sharter (MI!). The mandibles with a small tooth at base of proximal spine, the intermediate spine not sinuous, almost as long as one half the chord length of apical spine. Rugulae on frontal lobes prolonged caudad by curving laterad towards upper (inner) border of eyes and circumscribing the antennal socket. Greatest length of head both between anteriormost point of frontal lobes and of mandibular acetabula and the posteriormost point of occipital carina. Petiole with the anterior surface of node transversely convex, in profile almost straight (Fig. 26), apex medium rounded, posterior surface as seen from above concave, as seen from the side somewhat convex, showing on its disc a large, shallow circular depression.

Facet count across greatest diameter of eyes: 12 facets in a row. Metanotal groove present. Thorax (Fig. 26) as in *ferox*.

Discussion. The presence of a basal denticle on mandibles, the semicircular rugulae between frontal carinae and eyes, and the shallow, circular depression on posterior surface of petiolar node still

allow for a clear-cut separation of *atrox* from *ferox*. We ignore, however, whether these characteres possess constancy and aptness for the distinction of species.

Thaumatomyrmex manni Weber

(Figs. 18, 28)

Thaumatomyrmex manni Weber, 1939: 99 (☿; Bolivia: Huachi Beni). Weber, 1942: 67, 68 (key). M. R. Smith, 1944: 98 (key).

Type. BOLIVIA: Huachi, Beni, September 1921, W. M. Mann leg. 1 ☿ (holotype, USNM type nº 56821); another worker in the USNM collection bears the same locality, date and collector indications but no type label, this being probably a nidotype inasmuch as Weber had seen only the holotype which I have examined.

Worker (holotype). TL 5.0 mm; HL 1.03 mm; HW 1.33 mm; CI 130; ML 1.43 mm: MI 139; IfW 0.81 mm; IfI 61; SL 0.97 mm; SI 95; WL 1.56 mm; PnW 0.68 mm; HfL 1.14 mm; HfI 86; PW 0.78 mm. Resembling very closely *ferox* and *atrox*, but exhibiting the following differences from both species:

Of larger size (cf. absolute measurements). Head (Fig. 18) enormously expanded in front and strongly receding behing; greatest head width across the outermost point of genae (mandibular acetabula), which clearly surpasses the head width across the eyes (the latter included). Antennal scape longer, i. e. nearly as long as head length (SI!). Petiolar node (Fig. 28) much thicker in side-view, cuboid, with the apex very broadly rounded; in dorsal view the posterior surface of node appears flat yet not excavate.

Additional differences from *ferox* are as follows: Base of proximal mandibular spine with a small tooth; eyes slightly smaller, their maximum diameter distinctly less than one third of head length.

Additional differences from *atrox:* head length as measured between anteriormost point of stalked mandibular acetabula and occipital carina exceeding head length as measured between anteriormost point of frontal lobes and occipital carina; significantly greater cephalic and mandibular indices; semicircular rugulae between posterior end of frontal carinae and inner border of eyes at best vertigial.

Discussion. Although the comparison between the types of *ferox, atrox* and *manni* still allows for a clear-cut separation between

the three forms, it remains to be seen if the distinction may be upheld when further material belonging to this subgroup becomes available.

Key to the species for workers

1. Integument of body, including the gular face of head, finely and sharply shagreened with silky sheen; center of clypeus with a pair of close-set setae spreading in a V-shaped fashion (Figs. 12, 13) 2
— Integument of body either completely polished and shining, or dorsum of head with striae and dense rugulae, and thorax smooth and polished between coarse punctures; gular surface of head always smooth and shining; center of clypeus lacking a pair of close-set setae 3
2. Head scarcely broader than long, cephalic index less than 110 (Fig. 12); mandible length scarcely or not at all exceeding head width in front of eyes, the tips of the former not noticeably surpassing the genae when mandibles are closed; hind femora as long as, or longer than, the mandibles ..... *mutilatus* Mayr
— Head distinctly broader than long, cephalic index over 110 (Fig. 13); mandible length conspicuously surpassing head width in front of eyes, the tips of the former noticeably surpassing the genae when mandibles are closed; hind femora shorter than mandibles .... *contumax* Kempf
3. Integument of body partly sculptured: clypeus finely longitudinally striate, interspaces on frons above eye level and between eyes and median line striato-rugose; thorax and gaster with coarser punctures; basal and declivous face of propodeum forming a distinct angle when seen in profile (Fig. 23), with three erect setae on lateral border of declivous face ..... *cochlearis* Creighton
— Integument of body completely smooth and highly polished lacking any kind of sculpture; basal face of propodeum grading into declivous face by a more or less even curvature when seen in profile, lateral border of declivous face with two erect setae only 4
4. Mandibles shorter than head width, when closed their tips do not conspicuously surpass the genae (Figs. 15, 16); hind femora as long as, or longer than, mandible length 5
— Mandibles longer than head width, when closed their tips noticeably surpass the genae (Figs. 18-20); hind femora always shorter than mandible length 6
5. Metanotal groove and suture absent (Fig. 24); sides of propodeal declivity practically ecarinate; base of proximal mandibular spine not noticeably dilated and lacking a basal tooth (Fig. 30) .... *paludis* Weber
— Metanotal groove and suture present (Fig. 25); inferior half of sides of propodeal declivity sharply carinate; base of proximal mandibular spine dilated and with a small tooth (Fig. 32) .... *zeteki* M. R. Smith
6. Head capsule less strikingly dilated in front, cephalic index not over 110 (Fig. 20); hind femur length subequal to head width (hind femur index over 95) ..... sp. (Brit. Honduras)
— Head capsule strikingly dilated in front and receding behind eyes (Figs. 17-19), cephalic index over 115; hind femora distinctly shorter than head width (hind femur index under 90) 7

7. Interfrontal width much greater than pronotal width; antennal scape nearly as long as head length (scape index 95); petiole in profile broadly rounded above (Fig. 28) ..... *manni* Weber
— Interfrontal width subequal to pronotal width; antennal scape distinctly shorter than head length, scape index below 90; petiole in profile more narrowly rounded at apex (Fig. 26) 8
9. Mandibles with the base of proximal spine not unusually dilated, lacking a basal tooth (Fig. 34); no semicircular rugulae around antennal socket between frontal carinae and eyes (Fig. 19) .... *ferox* Mann
— Mandibles with the base of proximal spine noticeably dilated, with a prominent basal tooth (Fig. 36); semicircular rugulae around antennal socket between frontal carinae and eyes present (Fig. 17) ..... *atrox* Weber

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