DESCRIPTION OF THE ERGATOID QUEEN OF *POGONOMYRMEX MAYRI* WITH NOTES ON THE WORKER AND MALE (HYM., FORMICIDAE)*

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INTRODUCTION

During a recent stay in Santa Marta on the north coast of Colombia, I had the opportunity to study *Pogonomyrmex mayri,* the sole member of the subgenus *Forelomyrmex,* whose entire range is the desert and dry deciduous forest below 200 m. on the northwestern, western, and possibly southern skirts of the Sierra Nevada de Santa Marta.

This ant was described by Forel (1899: 61–62, footnote) from worker(s) and male(s) he collected. Neither he nor subsequent entomologists, including P. J. Darlington, found females. The reason females were unknown became clear as I worked in the area and later began to look at the biology of *P. mayri* more closely. Though I collected males from vegetation nearly year around (3 Sept. to 30 June), no winged females were seen in two years. Furthermore, only after thoroughly excavating 10 nests were any females found at all, one in each of 2 nests dug by my coworker, María del Carmen Hincapié, and her assistant. Both were ergatoid nest queens.

This paper presents a formal description of those queens, notes on the worker and male supplementing Forel's original description, and a discussion of the taxonomic status of *Pogonomyrmex mayri.* Notes on the biology of *P. mayri* will be reported later.

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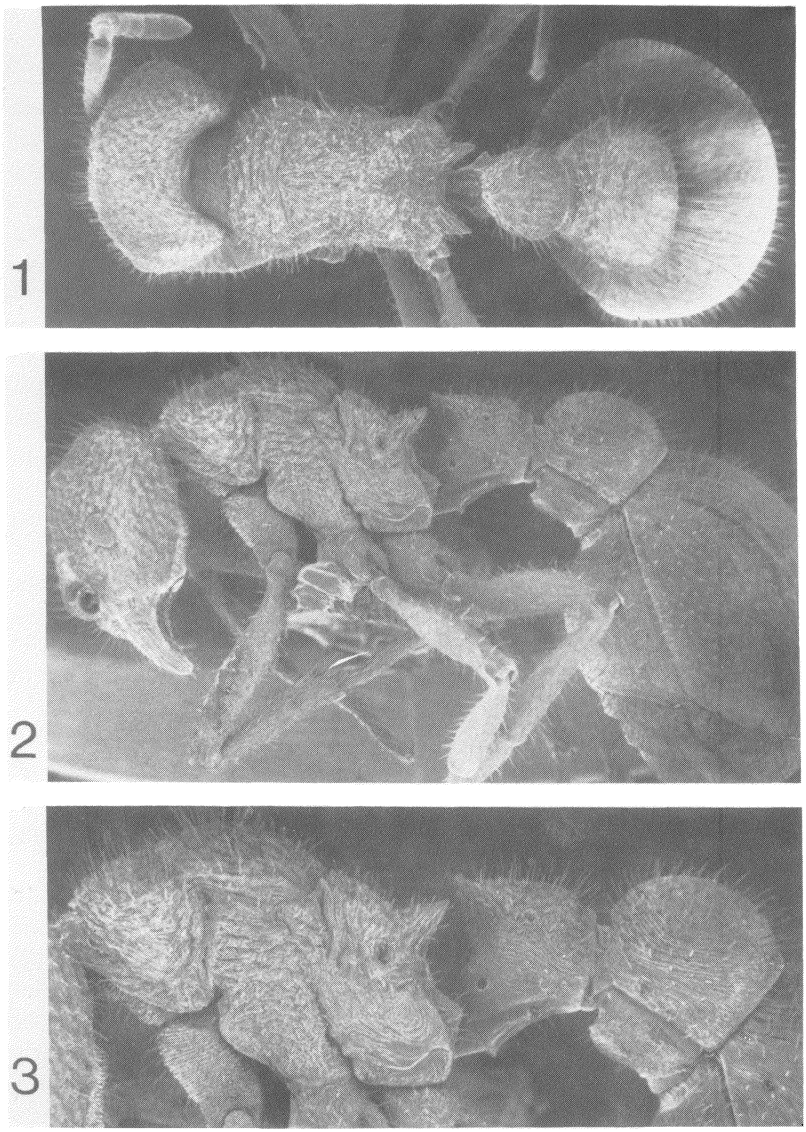
QUEEN
(Figs. 1–4, Table 1)

Two specimens (Museum of Comparative Zoology at Harvard University) taken by María del Carmen Hincapié from nests in soil behind the beach at Bahía Gairaca, about 20 km. by road east of Santa Marta, Colombia, in Parque Nacional Tayrona, on 2 different days, April 22, 1978 (#780422–6) and April 26, 1978 (#780426–9). The following description is based primarily on the first specimen, with occasional remarks on the second if they differ in some way. For each measurement, that of the first specimen is followed by that of the second.

Mandibles subtriangular; basal and masticatory borders meet at obtuse angle; outer border gently convex, slightly flattened mid-length; masticatory border with 5 teeth increasing in size apically, the second tooth with a denticle on its distal edge (second specimen with denticle reduced on one mandible, absent on the other). Palpal formula 3,3 as determined from undissected specimens; neither palp reaching posterior margin of buccal cavity. Labrum with rounded lobes on either side of a sharp median emargination. Head (fig. 4) about as wide as long; in full face dorsal view occiput broadly V-shaped, with distinct occipital lobes; sides of head gently convex on temples to small bulge behind the eye, then indented to flat cheeks. Middle of clypeus weakly convex overall, both transversely and longitudinally; sculpture stops a weak median carina short of reaching apron; apron narrow, leading edge convex with median tooth bracketed by low rounded lobes; lateral arms form low narrowly rounded ridges in front of antennal fossae. Frontal triangle reduced to a narrow, deep Y-shaped sulcus separating clypeus from posterior ¾ of frontal lobes. Frontal lobes short, well separated; carinae convex. Eyes small, convex, ringed by a round-bottom sculptured groove.

Antennae 12-merous. Scape short and rather thick, not reaching vertex of head; bent at a nearly right angle within basal ¼ of length and largely flat beyond (extensor surface viewed from side). First 2 segments of flagellum longer than wide, L 0.21, 0.20; 0.18, 0.18; segments 3–7 wider than long; segments 8–11 about as long as wide. Apical segment much longer than any other, L 0.34, 0.37; apex narrowly rounded. Last 4 segments constitute a weakly defined



Figs. 1–3. Queen of *Pogonomyrmex mayri*. Fig. 1, dorsal view. Fig. 2, lateral view. Fig. 3, lateral view of trunk and waist (waviness of some hairs is an artifact of charging).

antennal club. Width of flagellar segments increases uniformly from first (0.13, 0.12) to last (0.18, 0.20).

Trunk in full dorsal view (fig. 1) with complete, fine, immobile, promesonotal suture; mesonotum bisected at about 2/3 of length by a faint shallow sulcus (probable remnant of scutoscutellar suture) which drops out at lateral margins; metanotum reduced to a sharp groove between mesonotum and propodeum. Propodeal spines robust, acute, their bases widely separated by a broad concavity. Propodeal spiracles prominent; their orifices circular, facing posterolaterad.

From the side (figs. 2, 3) dorsal profile convex; mesonotum set off by grooves, its outline higher and more convex than pronotum and propodeum. Distinct sutures separate pronotum and mesonotum from mesopleura; metapleura delimited by weak sulci scarcely distinguishable from the sculpture, expecially in areas anterior to the spiracle. Metapleural gland bulla well developed. Inferior propodeal plates broad, blunt. Dorsal face of propodeum curves broadly into declivous face.

Petiole robust (figs. 1–3), with broadly conical anterior peduncle and weakly differentiated posterior peduncle. Venter seen from below with 3 longitudinal ridges running from short acute tooth to posterior peduncle. Node in side view with flat anterior face (except for 2 low undulations) joining anterior peduncle at about a 135° angle, meeting dorsal face of node at an acute angle; dorsal face flat, broadly curving into short posterior face. Outline of node from above ovoid, slightly wider than long, widest just caudad of midlength. Anterior edge sharp (with low upturned burr in second specimen), gradually softening to broadly rounded along sides.

Postpetiole large, inflated; connection with gaster broad. In lateral view, dorsum strongly and evenly convex; venter much shorter than dorsum, profile undulate, anterior lip broadly rounded. From directly above (not as in fig. 1) node subtrapezoidal; posterior edge a broad convex arc somewhat flattened mesad, posterior corners broadly rounded, sides flat, tapered to corners of weakly concave anterior edge.

Gaster greatly enlarged, subglobose, heavily sclerotized, slightly longer than wide and slightly wider than deep; widest at midlength. Sclerites not fused, but rigidly articulated. Measured from side along axis, first tergum covers 90% of length of gaster; first sternum 53%.

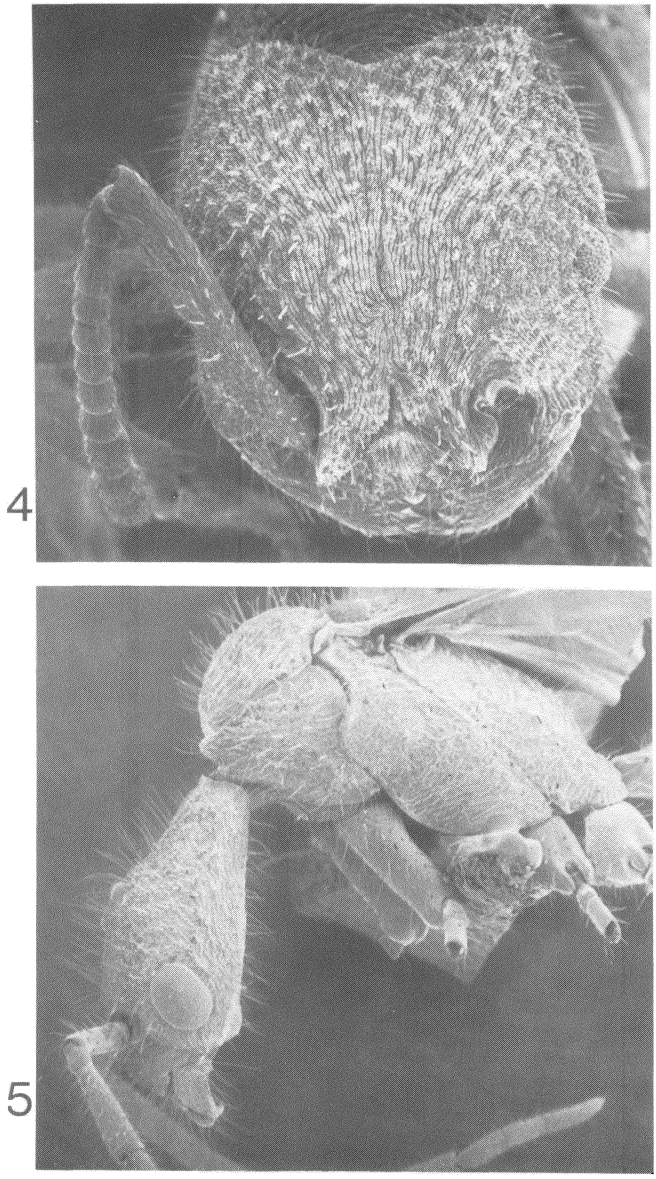
Legs neither long and slender nor very robust. Femur lengths front to back 1.48, 1.50; 1.45, 1.45; 1.64, 1.65 mm., not incrassate (W/L 18, 18; 17, 18; 16, 16%). Hind tibia length 1.33, 1.48 mm. Middle and hind tarsi each with one short simple apical spur. Hind metatarsus 1.16, 1.29 mm.; tarsal claws simple.

Most of body with fine dense punctulate striae overlain by a coarse broken wavy sculpture (figs. 1–4): clypeus, top, sides and back of head, trunk (except those areas listed below), petiolar node and postpetiole. In other places the overlying sculpture is much reduced or absent, leaving largely flat surfaces of fine, punctulate striae: gula (some weakly undulate sculpture present), anterior face of pronotum, prosternum, forecoxae, dorsomedial surfaces of metapleural gland bullae, declivous face of propodeum (striae coarser, less dense), most of first gastric segment (striae weaken caudad). Striation much reduced, leaving predominately fine, densely punctate surfaces on: antennae (striae present but finer than elsewhere and not predominate), legs except first coxae, and end of first and most of succeeding segments of gaster (narrow coriaceous margins on each). Mandibles finely longtitudinally striate, without punctures. Inner surface of mandibles, peduncle and venter of petiole smooth and shining; the latter with scattered punctures. Striation more or less longitudinal on mandibles, antennae, clypeus, dorsum and sides of head, mesonotum, sides of trunk (though much confused in parts), coxae, anterior face and sides of petiolar node, sides and venter of postpetiole, and gaster. Striation essentially transverse on gula (bisected by median longitudinal ridge), pronotum, basal and declivous faces of propodeum (striae converge on apices of spines from all sides), dorsal surface of petiolar node, anterior and dorsal faces of postpetiole (transversely arcuate).

Whole body, except peduncle of petiole, covered with short, stiff, erect, acute golden hairs, interspersed with shorter, more flexuous recurved hairs. Apron of clypeus with longer flexuous hairs; hair on mandibles more decumbent. No psammophore of any sort. Color uniformly dark ferruginous brown, except for brown to yellow apical antennomere.

WORKER
(Figs. 6–8)

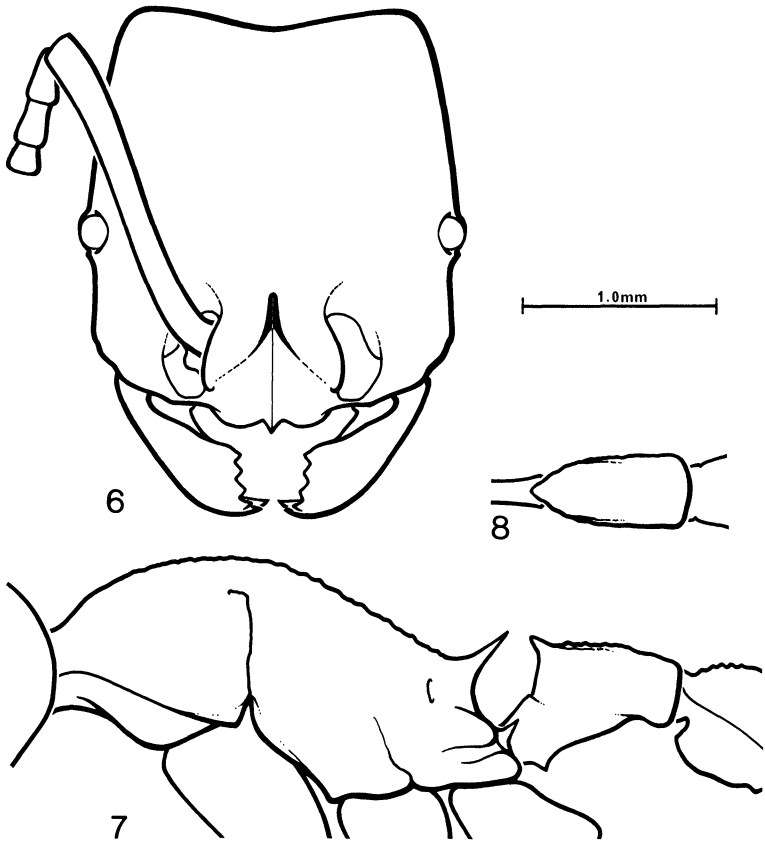
The worker is most strikingly different from the queen in its jet black color, its larger head, and smaller waist and gaster. It appears



Figs. 4–5. Fig. 4, Head of queen of *P. mayri,* nearly full dorsal view. Fig. 5, side of head and trunk of *P. mayri* male.

as if there is a longitudinal gradient of allometric growth in the queen such that the anterior half grows slower than, and the posterior half faster than in the worker. A detailed description of how the worker differs from the queen follows (see also table 1).

Head much larger, more elongate (fig. 6). Mandibles longer, with 6 distinct teeth and a low basal angle. Papal formula 4, 3. Median carina complete to marginal tooth, but low; seen best from postero-dorsal view. Eye smaller relative to size of head. Trunk more completely fused; profile evenly convex, with poorly differentiated



Figs. 6–8. Worker of *P. mayri*. Fig. 6, head in full dorsal view. Fig. 7, trunk and petiole in lateral view. Fig. 8, dorsal view of petiole.

neck and declivous propodeal face (fig. 7). Propodeal spiracle not prominent; orifice oval, facing caudad. Superior propodeal spines longer, spiniform; their bases narrowly separated. Inferior propodeal plates short, spiniform. Petiole (figs. 7, 8) low, narrow; anterior peduncle very slender in dorsal view, dorsoventrally cuneiform; no posterior peduncle; venter with 2 longitudinal ridges. Anterior ridge of petiolar node drawn out into an acute, dorsoventrally flattened, somewhat upturned tooth; sides of node seen from above parallel, flat in anterior half, weakly convex in posterior half. Postpetiole smaller than in female, especially in width and height; more conical in dorsal view. Gaster much smaller in all dimensions. Legs longer, more slender; middle and hind tibial spurs finely pectinate. Sculpture on dorsum of trunk not broken by sutures; transverse striae on anterior pronotum become longitudinal on mesonotum, then transverse again on propodeum. Striation on first tergum of gaster fades at about midlength; much of caudal half smooth and shining. Color uniformly dull black in mature workers; callows dark ferruginous brown. Petiole, postpetiole and gaster less densely hairy than in female; color of erect hairs can vary from black to golden on any one individual.

The sting apparatus of the worker is most like those of *P.* (*Ephebomyrmex*) *naegeli* and *P.* (*E.*) *imberbiculus* (Kugler, 1978): anterior apodeme of spiracular plate wide and of uniform width along entire length of plate; lancets with 2 distinct barbs and no dorsal ridge; triangular plate without dorsal and medial tubercles; other parts as shown in Kugler (1978) figs. 18, 19, 21, 22, and 26.

MALE
(Fig. 5)

Measurements (ranges from 5 individuals, including the largest and smallest available from 7 collections) TL 7.29–8.10; HL 1.56–1.74; HW just behind eyes 1.10–1.25 (CI 70–73); eye L 0.31–0.34; scape L 0.34–0.42; combined L of 2nd and 3rd flagellar segments 0.81–0.90; ML 0.12–0.19; WL 2.17–2.40; front wing L 4.00–4.10; hind femur L 1.86–2.00; petiole L 0.80–0.94; postpetiole L 0.72–0.93; gaster L 1.74–2.10.

Head remarkably elongate and flattened behind (fig. 5). Clypeus rather long, broadly convex in both dimensions, middle subsiding evenly to sides; free margin broadly arcuate except for slight median

flattening or emargination, which possesses in some specimens a very small acute or rounded tooth that is a continuation of a weak median carina running the length of the clypeus. Frontal triangle triangular, with a broad, shallow, V-shaped impression. Frontal carinae reduced to rims encircling the sockets of the antennae. Palpal formula 4, 3. Scape much shorter than combined length of

Table 1. Measurements and indices of *Pogonomyrmex mayri* females and workers. Data for the first female specimen are listed first, followed by those of the second. Worker data are ranges from 6 individuals selected to include the largest and smallest available from 7 collections. Measurements are expressed in millimeters; indices in percentages, and both follow the standard definitions (see Brown, 1953: 11–14; 1975: 3–4). Head width was measured just behind the eyes. Postpetiolar and gaster measurements were taken separately, and from dorsal view.

TABLE 1

Measurements	*Queens*	*Workers*
TL	8.21, 8.49	7.85–9.04
HL	1.57, 1.58	2.00–2.24
HW	1.45, 1.52	1.73–1.96
ML	0.25, 0.27	0.26–0.35
Eye L	0.25, 0.25	0.26–0.30
Scape L	1.12, 1.20	1.67–1.82
WL	2.02, 2.00	2.20–2.54
Petiole L	0.90, 0.90	0.90–1.00
Petiole W	0.72, 0.68	0.36–0.43
Postpetiole L	0.94, 0.94	0.68–0.80
Postpetiole W	1.25, 1.20	0.59–0.70
Gaster L	2.53, 2.80	1.80–2.24
Gaster W	2.18, 2.14	1.38–1.67
Fore femur L	1.48, 1.50	2.00–2.20
Fore femur W	0.27, 0.27	0.30–0.35
Hind femur L	1.64, 1.65	2.32–2.62
Hind femur W	0.27, 0.26	0.30–0.34
Indices		
CI	92, 96	85–88
MI	16, 17	13–16
SI	73, 77	90–96
Scape W/L	15, 13	11–12
Fore femur W/L	18, 18	15–16
Hind femur W/L	16, 16	12–13
Petiole W/L	80, 75	39–54
Postpetiole W/L	133, 128	79–88
Gaster W/L	108, 107	70–78

second and third flagellar segments. Scape and flagellum fairly densely covered with short erect hairs; segments 2–12 of flagellum also very densely endowed with fine appressed pilosity.

Trunk uniquely shaped and proportioned, as if the propodeum has grown forward, compressing the mesoscutum and pronotum, and rotating the neck and head to a more ventral position (fig. 5). Pronotum very constricted mesad. Mesonotum very short (mesoscutal L/WL 20–23%);[1] seen from the side evenly and rather strongly convex, from above nearly equilaterally triangular; with 2 short black lines that indicate underlying apophyses of the notauli. Middle of scutellum and metanotum raised into a prominent subcircular bulge. Propodeum elongate (propodeal L/WL 49–52%),[1] dorsal face curving insensibly into declivous face; unarmed. Petiole long, cylindrical, nodeless. Legs long and slender (hind femur L/WL 83–86%); front coxae long, compressed front to back (fig. 5).

Wings evenly covered with fine hairs. Venation of fore wing variable. Of 154 wings (77 individuals) from 7 collections, the most common venation had a small closed discoidal cell with subequal sides, a hexagonal cubital cell with a narrow opening to the costal cell and sinuate lower edge (Rs), radial cell open distad, and veins Rs and M unjoined by a cross vein beyond the discoidal cell (121 wings). In 11 wings the discoidal cell was open distad, but otherwise the same. In 20 wings the discoidal cell was closed, but a cross vein (r-m) connected the Rs and M veins, creating a second cubital cell. That cross vein joined the Rs well proximad of the end of the first cubital cell, except in one wing where it was almost even with the end of the cell. Two wings had both open discoidal cells and the r-m cross vein. Wings of different venation commonly appear on the same individual.

Hypopygium in ventral view subtriangular; apex broadly rounded, proximal corners square with slender truncate lateral projections, middle of base with a long slender truncate anterior process. Gonostyli (=parameres) of genital capsule tapered in side view, but with apices broadly rounded; setae occur only around apices. Digitus long, slender, blunt, strongly down-curved; not reaching to apex of gonostylus. Cuspis short, pollicate when seen from the side.

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[1]Mesoscutal and propodeal lengths measured from lateral view by taking their maximum length along lines parallel with Weber's length.

Aedeagus fairly slender, with serrate ventral margin; serrations decrease in size to apex. Apex narrow, blunt; half smooth, half finely serrate. Inner dorsal margins of gonocoxites form a long narrow, gently convex V.

Sculpture like that of worker and female, with the following exceptions: Striation on head largely transversely arcuate caudad of antennae, clypeus without coarse undulations. Trunk and petiole without overlying broken wavy sculpture; all but pronotum longitudinally striate. Striation on postpetiole gives way to purely punctate sculpture in caudal half. Gaster, first and second antennomeres, and legs smooth and shining, except for weakly striate fore coxae.

Discussion

Pogonomyrmex mayri clearly belongs to the genus *Pogonomyrmex* as presently constituted; and is most closely related to members of the subgenus *Ephebomyrmex.* It is most like *Ephebomyrmex* in 15 of the 22 characteristics used by Cole (1968) to distinguish males and workers of the subgenera *Ephebomyrmex* and *Pogonomyrmex,* the sting apparatus most resembles that of the *Ephebomyrmex* species I have examined (Kugler, 1978), and some of its most unusual characters, such as the elongate head of the male, the Y-shaped frontal triangle of the queen and worker, and the circumocular groove, may be seen as the extreme development of characteristics of *Ephebomyrmex* species. Nevertheless, it *is* remarkably different from any known *Pogonomyrmex,* with a number of novel characters, and consequently has been placed in its own subgenus (*Forelomyrmex* Wheeler) since its description. The following shows how other *Pogonomyrmex* species compare with *mayri*'s most distinctive features.[2]

The clypeus in most *Pogonomyrmex* has a concave leading edge except in *angustus, darlingtoni, odoratus, schmitti* and *townsendi* (all *Ephebomyrmex*), none of which has a median tooth. The frontal triangle is usually broadly triangulate, but is somewhat elongate, laterally compressed, and except for a median carina, depressed

[2]Except where indicated, based on the MCZ collection containing 51 of the estimated 67 presently standing species, subspecies and varieties of the subgenera *Ephebomyrmex* and *Pogonomyrmex.*

below the level of the clypeus only in *darlingtoni, saucius* and *schmitti.* In none of these, however, is the front so narrow as in *mayri,* nor is it at all Y-shaped. The back of the head in full dorsal view is broadly and shallowly concave in most *Ephebomyrmex* species, but is only excavated to such a degree that it has definite occipital lobes in the majors of some subgenus *Pogonomyrmex* species, *e.g., badius.* The cephalic index approaches that of *mayri* only in *cunicularius* (84), an undetermined species near *cunicularius*[3] (84, 87), *odoratus* (85–87), and *angustus* (86–89). Only in the latter is the occiput at all concave. In some species the sculpture is flattened at the edge of the eye, but only in *darlingtoni* does it become at all impressed, and then it is shallow, only weakly defined, and limited to the dorsal half of the eye. All species examined have much larger eyes, relative to the size of the head, than *mayri.* The petiolar node in most *Pogonomyrmex* species is well rounded on top, sides and apex, and has a distinct posterior peduncle. A few species have a broad subacute to acute apex, but only in the sp. near *cunicularius* does the node even superficially resemble that of *mayri.* On closer examination, it also is quite distinct. Sculpture in the subgenus *Ephebomyrmex* tends to be "coarsely rugo-reticulate" (Cole 1968: 35), but no species examined has the overlying broken, undulate pattern of *mayri.*

Ergatogyny has occasionally been reported in *Pogonomyrmex,* but most specimens are only occasional aberrations in species with normal queens, *e.g., comanche, maricopa, subnitidus, californicus* (Cole 1968: 175), and *pima* (MCZ). Only one female has been reported for *cunicularius,* and it is ergatoid (Santschi, 1931), but the description indicates nothing more remarkable about it than a more or less distinct scutellum. Ergatogyny seems to be the rule in *laticeps.* Kusnezov (1951: 273–275) describes the range of ergatoid forms, but makes no mention of enlarged waists or gasters, or of reduced heads. Those characters are evidently unique to *mayri.*

The bizarre form of the *P. mayri* male is also apparently unequalled in this genus (Cole, 1968; Creighton, 1952; Gallardo, 1932; Kusnezov, 1949, 1951). Some males of *Aphaenogaster* species have elongate heads constricted behind. In the other *Pogonomyrmex*

[3]Two specimens collected by W. L. Brown in Argentina: Catamarca, Cat. (airport), 4 Feb. 1967; Prov. Tucuman, Km 1333, Rte. 9, N. of Tapia, 25 Jan. 1967, bosque chaqueño.

species I was able to examine directly, the head is at best only slightly longer than wide in some species (CI range of 4 *Ephebomyrmex* species 89–97). The mesoscutum is long (mesoscutal L/WL 33–50%), propodeum short (propodeal L/WL 26–37%) and the petiole has a distinct node. The legs are shorter than in *mayri* (hind femur L/WL 61–76%), and the front wing usually has a r-m crossvein that joins the Rs at or distal to the end of the first cubital cell (see Cole, 1968: 25–26, plate 1 fig. 1). If the r-m vein is absent, the first cuboidal cell is open.

Pogonomyrmex mayri may in fact deserve full generic status, but for the present it seems prudent not to create a monotypic genus before *Pogonomyrmex* is completely revised. The most recent revisions (Kusnezov, 1951; Cole, 1968) have been regional in scope and thus inadequate to address the question of whether the subgenera *Pogonomyrmex* and *Ephebomyrmex* are really two distinct genera. Should such a split occur, *mayri* would no doubt be placed in the separate genus *Forelomyrmex*.

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