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A New Ant from the Great Smoky Mountains, Tennessee

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Formica habrogyna sp. nov.

Holotype, worker. (Cole collection No. 2285).

Total length, 6.0 mm.

Head, excluding mandibles, a little longer than broad, slightly broader behind than in front, with convex posterior and lateral borders. Clypeus carinate its entire length, the anterior border entire and angularly projecting, its median lobe large, very convex, abrubtly set off from the lateral portions and projecting abruptly from them in front. Frontal area triangular, broader than long, markedly depressed, its apical angle not as well marked as the basal angles. Frontal carinae short and strongly divergent. Frontal furrow faint but visible for a distance as great as the length of the frontal carinae. Frontal lobes sharply angular. Mandibles stout, strongly convex, 8-toothed. Antennal scapes slightly curved, rather stout, evenly thickened from base to apex, extending about one-third their length beyond the posterior corners of the head; funicular joints longer than broad, basal joints longer and narrower than apical joints, basal joint the longest, terminal joint nearly as long as the two preceding joints taken together and tapering toward the apex.

Thorax in profile rather long, not particularly robust. Pronotum broadly convex; promesonotal constriction distinct and breaks the promesonotal outline in profile; mesonotum convex, somewhat more so than the pronotum; mesoepinotal suture narrowly and rather shallowly impressed, base of depression flat and ascending anteriorly; epinotum rather narrow, higher than long, dorsal face broadly convex, posterior declivity almost straight and the angle between them well marked. Thorax rather stout when seen from above; pronotum appearing broad and very convex; mesonotum narrow, about one-half the width of the pronotum; apex of epinotum decidedly narrower than that of the mesonotum or pronotum, giving the appearance of a distinct blunt crest. Petiole with a rather blunt anterioventral lobe; scale wide, a little higher than the angle made by the two dorsal faces of the epinotum, with a convex anterior surface and a rather straight posterior surface; border blunt, broadly rounded and feebly produced upward in the middle. Legs long, with rather stout femora and tibiae. Gaster large, elliptical and somewhat pointed at the apex.

Opaque; mandibles, clypeus, frontal area and frons slightly shining; frons, vertex, thorax and petiole finely and densely shagreened; genae and gula feebly shagreened and more shining. Mandibles finely and longitudinally striate; clypeus very faintly covered with fine striae.

Erect hairs sparse; short and rather blunt; very short and sparse on gula, vertex, occiput and posteriolateral angles of head; longer, denser and more pointed on mandibles, frons and clypeus; absent from antennae; short and sparse on thorax, very sparse on venter and on pronotum, absent laterally, longer and denser on coxae but other leg segments naked. Apex of each mandible with a tuft of fine pointed hairs. Venter of petiole with a single cluster of dense and rather long hairs; apical border of scale with a row of sparse short hairs. Hairs on gaster more numerous than elsewhere, but very sparse laterally, shorter and more blunt than those on clypeus and frons. Pubescence fine, short and yellowish; much more abundant on gaster than elsewhere, and concealing the surface; sparse on epinotum; very sparse on remainder of thorax and on the head; dense on antennal scapes and funiculi.

Head and thorax Sandford's brown; legs and antennal funiculi somewhat darker; eyes and mandibular teeth black; mandibles dark reddish brown; gaster blackish brown No. 1, except the base which is reddish. Occipital region of head and apex of epinotum lightly infuscated.

Paratype, nest queen. (Cole collection No. 2285).

Total length, 5.9 mm.

Head very much like that of holotype, but smaller. Eyes strongly convex, with their outline extending beyond the side of the head when viewed from in front. Thorax, when seen from above, suboctagonal, narrower than the head, widest point a little anterior to the stubs of the fore wings; scutum a little longer than broad, subpentangular in outline; median anterior angle broadly rounded; anterior edge of scutellum feebly arcuate, the lateral projections rather broad, long and sharp at their tips; mesonotum narrow and broadly U-shaped. In profile, the suture between pronotum and scutum is distinct, so that the sharply sloping face of pronotum is well differentiated from the abruptly ascending face of the broadly convex scutum; metaepinotal suture shallow and rather broad; long descending face of epinotum concave near the base, the angle between it and the short convex upper surface broad and indistinct. Petiole with a rather blunt anterioventral lobe; base of petiolar scale very thick, apex narrow; apical border rather blunt, rounded and produced upward in the middle; anterior face of scale convex, posterior face rather flat. Legs shorter and a little stouter than those of holotype. Gaster ovoid, slender and pointed distally.

Sculpture much like that of holotype, but clypeus more feebly and less uniformly striate, and the entire body more shining, especially the scutum and scutellum. Hairs long, slender, pointed and numerous except on femora, tibiae, tarsi, genae, antennae, petiolar scale and most of pronotum and posterior declivity of epinotum, where they are very sparse or altogether absent; present on posterior corners of head. Pubescence yellow, very fine and sparse; more dense on gaster but does not obscure the shining surface.

Head and thorax russet, except compound eyes, ocelli, mandibles, palpi, wing stubs and legs; ocelli, mandibles, palpi, antennae, legs and wing stubs darker; compound eyes and mandibular teeth black. Gaster uniformly ochraceous tawny.

The type series consists of the following specimens: 67 workers and one nest queen (Cole collection No. 2285), Gatlinburg, Tennessee, April 10, 1938; 84 workers and one nest queen (No. 2566), 162 workers and one nest queen (No. 2567) and 92 workers and one nest queen (No. 2568), all from Gatlinburg, April 31, 1939; and 58 workers and one nest queen (No. 2590), Gatlinburg, May 14, 1939. All were collected by the author.

Both the holotype and the paratype queen used for the description are a part of collection No. 2285. This colony was a populous one and had its nest beneath several small rocks obscurely banked with plant debris. All the nests mentioned above were near the top of a rather steep, dry, grassy north-facing hillslope. In each nest the queen was found with the brood in a chamber about three inches below the surface. The workers are aggressive and eject formic acid when disturbed. Worker larvae and pupae were in all of the nests examined. All colonies were beneath rocks which were not imbedded in the soil. None of the nests had more than a scant supply of plant debris around it, and this was usually not discernible until after the rock had been removed. The elevation of the hillslope where the nests were found is approximately 1700 feet.

The holotype and a long series of paratypes are in the author's collection. One paratype queen and a series of paratype workers are to be deposited in the U. S. National Museum.

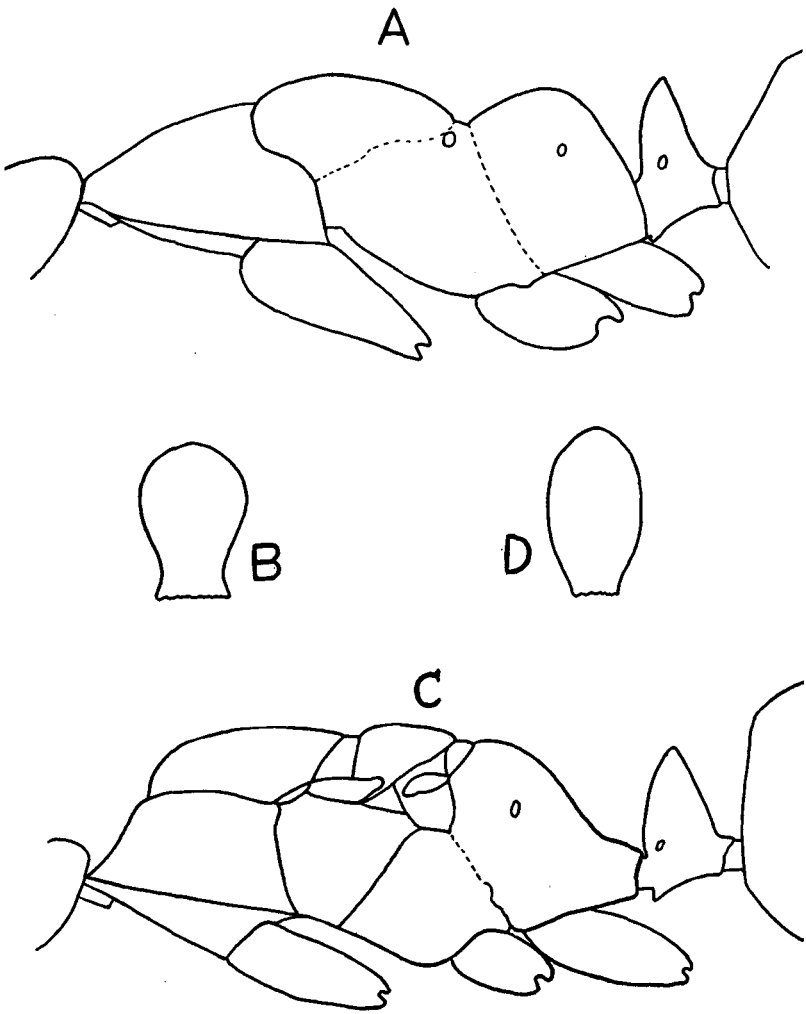
Variation in paratype material.—The paratype series of workers consists of 462 specimens. The total body length varies from 4.3 to 6.1 mm. A few of the workers have the apical border of the petiolar scale more rounded than that of the holotype. Many of the smaller workers have the head, pronotum and mesonotum infuscated, but in many other small workers the infuscation is absent. In some of the smaller workers the hairs on the gula are sparse or altogether absent. In other respects they are like the larger workers. Some of the larger workers have the occipital region and the epinotum lightly infuscated; others do not. On the average, the largest workers are of a somewhat brighter color than the small ones. The abundance and length of pilosity vary greatly among both the smaller and the larger workers.

The four paratype queens show little diversity from the paratype queen used as a basis for the description. Two of them have a little greater pilosity and in one the petiole is lightly infuscated.

Affinities.—The small size of the queen together with a lack of cephalic characters peculiar to the Sanguinea Group leave no doubt that this new species belongs in the Microgyna Group. In Wheeler's revision of the genus *Formica*, the workers and queens key out to *difficilis*, whose type locality is Virginia.[1] I have been able to compare workers of the new species with those of *difficilis* collected in Virginia by T. Pergande. The new species shows a

1 *F. difficilis* has also been collected in the Black Mountains of North Carolina and in various localities in New Jersey and New York.

close relationship to *difficilis* in many respects, chiefly in the cephalic characters and in most of the sculpture. The worker differs from that of *difficilis,* however, in the following respects: The median clypeal lobe is more convex and less markedly carinate, the mesoepinotal suture is deeper, the epinotum is not as sharply angular in profile, hairs are present on the apical border of the petiolar scale, the color of the head and thorax is darker and erect hairs are more numerous, longer and less blunt.



Formica habrogyna sp. nov. A, Holotype (worker), showing contours of the thorax; B, anterior face of petiolar scale of holotype; C, paratype (queen), showing contours of the thorax; D, anterior face of petiolar scale of paratype queen.

I have not been able to examine cotypes of the variety consocians Wheeler, which are supposed to differ from the typical *difficilis* in their greater pilosity. Because of the great variation in pilosity among the workers of my paratype series, I felt considerable doubt as to the validity of *consocians,* since *consocians* is based chiefly upon this character. As regards the matter, Dr. M. R. Smith wrote me the following opinion which I quote, "I have not seen cotypes of Wheeler's *consocians* nor have I any authentically determined specimens. Since the variety is based almost entirely on length and abundance of pilosity, and our specimens in the museum seem to vary considerably in this respect, I am not sure whether the variety has any validity or not."

Through the kindness of Dr. Smith and the U. S. National Museum, I have been privileged to examine two females of *difficilis.* As regards the status of these specimens, I quote from Dr. Smith's letter to me: "I cannot be sure whether these are types or not. Emery did not cite the specific type locality for the species, simply stating that he had received all three castes of the species from New Jersey and Virginia. In our collections there are specimens from Caldwell, N. J. marked 'collections of Theodore Pergande' and attached to these is a hand written label '*Formica difficilis* Emery; det. Emery; types'. Unfortunately there are only two queens in this series. There are also in the collection a number of series of specimens of *difficilis,* some bearing only the label 'Va.,' and others 'Rossyl, Va.' None of these from Va. have anything to indicate they are type specimens and only the Rossyln specimens are represented by queens, hence I am sending you two queens of the Rossyln series."

Upon comparing the paratype queens of the new species with the two females of *difficilis* loaned me I have found several distinct differences which I enumerate as follows: The length of the entire body is greater than that of *difficilis,* the thorax is decidedly narrower, the apical tooth of the mandibles is shorter and more blunt, the head is smaller, the thorax seen from above is narrower and hence decidedly more slender, the scutum is more uniformly convex, the petiolar scale is narrower and its apex is less broadly rounded, the pubescence on the body is much more sparse and does not obscure the surface, the gaster is much narrower and the entire body is darker and not concolorous.

Descriptions and comparisons are based upon dried alcoholic specimens. Colors of all major body regions are those determined by comparison with the plates in Ridgway's, "Color Standards and Color Nomenclature." Colors of small parts are those of the writer's conception and were determined at a magnification of 30 diameters.

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Pseudogynes of Formica neogagates Emery

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While collecting ants near Albuquerque, New Mexico, May 20, 1932, the writer took a series of 26 specimens of *Formica neogagates* Emery from a small nest in an area of grass and yucca. There was a small, earthen, grass-covered mound over the nest. The workers were not numerous and the queen was not found. In the series collected the writer discovered 6 distinct pseudogynes. These are so markedly different from the normal workers that it seems advisable to give them brief mention.

The late Dr. W. M. Wheeler interpreted the pseudogyne as a "workerlike form with enlarged mesonotum and sometimes traces of other sclerites of the female, but without wings or very rarely with wing vestages."[1] He believed that pseudogynes in nests of *Formica* were produced by Lomechusine beetles in the colony. They are supposedly formed from female larvae which have been neglected by the workers and "left unfed after they have passed the stage at which such treatment would lead to the formation of workers."[2] This is an expression of the trophogenic interpretation of caste formation. Although the matter of caste determination has as yet been unsolved and is still debatable, it is such studies as this one of pseudogynes which seem to indicate a trophogenic rather than a blastogenic determinant for the various female castes of ants.

One of these pseudogynes of *neogagates* (Fig. 1) differs from the normal worker as follows: The thorax is greatly enlarged. In profile, the anterior face of the pronotum is steep, and the mesonotum is large and convex. The anterior face of the long scutum is very convex and leads into the almost flat uppermost surface. The scutellum is well developed, being about one-third as long as the scutum. There is only a faint dorsal impression between the scutum and scutellum. The posterior declivity of the scutellum is very sharp, forming almost a right angle with the horizontal axis of the body, and there is a deep but rather narrow impression between it and the narrow but distinct metanotum. The epinotum is much lower than the mesonotum but only very slightly lower than the metanotum; its dorsal surface is faintly and broadly convex and its posterior declivity is rather steep, the two forming a broad obtuse angle at their juncture. There are no vestages of wings.

Seen from above, the pronotum is broadly convex and its sides are flattened. The mesonotum is ovoid and narrower than the pronotum, being

1 Wheeler, W. M., *Ants; their Structure, Development and Behavior.* Columbia Univ. Press, 1926, p. 96.

2 *Ibid.*, p. 408.

widest just a little anterior to its union with the lateral surfaces of the pronotum. The scutellum is subtriangular; its dorso-anterior angle is sharply acute and its posterior dorsal border is broadly convex. The metanotum is narrow. The epinotum is rather flat laterally, as broad as the scutum and as broad as high.

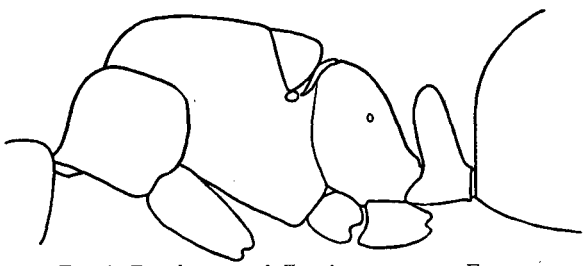

Fig. 1. Pseudogynes of *Formica neogagates* Emery.

Two specimens vary from this description as follows: The scutum is much more convex, so that the thorax in profile has a very decided arched appearance. There is no evidence of a suture dividing the mesonotum into a scutum and a scutellum, and there is no metanotum. The mesoepinotal suture is deep and rather broad, and the epinotum is much lower than the mesonotum. Among all the pseudogynes, the curvature of the lateral thoracic sutures varies considerably. Two specimens exhibit a narrower epinotum in profile than does the one described and figured. This results from a rather straight lateral mesoepinotal suture. In two specimens the lateral boundaries of the scutum are defined by faint sutures. In another specimen the scutum is more convex; hence the impression between the scutum and the scutellum is more pronounced. The thorax of each pseudogyne is reddish brown with doral infuscation. This condition of color also prevails among some of the normal major workers. Each pseudogyne has a body length comparable to that of a major worker.

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