

STUDIES OF NEW MEXICO ANTS. XI. THE GENUS FORMICA WITH A DESCRIPTION OF A NEW SPECIES (HYMENOPTERA: FORMICIDAE)¹

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The genus *Formica* Linné is one of the most interesting of the ant genera in New Mexico which has been considered by various investigators to be a region of hybridization as well as a center of distribution. I collected a total of 27 species and subspecies in the state which would indicate that *Formica* is one of the best represented genera. The mountains of New Mexico proved to be excellent spots for the study of speciation.

SUBGENUS PROFORMICA RUZSKY

Formica lasioides Emery. Nests were found beneath stones at the following localities: Cimarron Canyon, 7,100 ft.; Sapello Canyon, near Beulah, 7,500 ft.; Ute Park, 7,400 ft.; 2 mi. S. of Raton Pass, 7,700 ft.; 14 mi. S. of Mescalero, 7,925 ft.; Bandelier Natl. Mon., 6,350 ft. The colonies inhabited moist soil in open grassy areas with pine, spruce, and aspen.

Formica neogagates Emery. This very common species was taken from soil beneath stones and around tree trunks, from soil with only an entrance marking the nest, from both earthen crater and domed mound nests, from beneath bark of rotting logs, and from soil under logs and stumps. Several nests contained multiple queens. Habitats consisted of both open and shaded moist areas with grass, pine, cedar, aspen, and spruce, or no vegetation, and dry semidesert areas with rabbitbrush, yucca, and cacti. The species was collected from the following places: Cimarron Canyon, 7,100 ft.; Ute Park, 7,300 ft.; 12 mi. E. of Taos, 7,250 ft.; 18 mi. S. of Taos, 6,000 ft.; 8 mi. W. of Eagle Nest, 8,500 ft.; Tesuque Canyon, near Santa Fe, 10,000 ft.; 14 mi. W. of Horse Springs, 7,350 ft.; Sapello Canyon, Beulah area, 8,000 ft.; Mogollon Mt., 7,350-8,300 ft.; 2 mi. S. of Raton Pass, 7,700 ft.; 16 mi. E. of Raton, 6,650 ft.; Capulin Mt. Natl. Mon., 7,200 ft.

SUBGENUS RAPTIFORMICA FOREL

Formica obtusopilosa Emery. Colonies were found 10 mi. NE. of Cimarron, 6,500 ft. and at Ute Park, 7,300 ft. in earthen domed mound nests in level, moist, grassy, open areas with adjoining cedar and pine on the slopes. One crater nest was observed 40 mi. E. of Gallup in dry semidesert.

Formica perpilosa Wheeler. A single colony was found nesting beneath a sand crater at the White Sands Natl. Mon. picnic grounds, 3,800 ft.

Formica puberula Emery. Two nests were discovered beneath stones in moist grassy meadows at Tesuque Canyon, 8,400 ft.

Formica rubicunda Emery. Nests were found for the most part beneath stones, but a few colonies had constructed earthen or detritus domes. The habitat varied from dry, level, grassy mountain meadows to moist, steep slopes with pine, aspen, fir, and juniper. Colonies were found at the following places: Tesuque Canyon, 8,000-8,700 ft.; 12 mi. E. of Taos, 7,250 ft.; 12 mi. S. of Santa Fe.

Formica sanguinea subnuda Emery. Colonies were observed beneath leaves,

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stones, logs, and stumps in moist mountain meadows, on grassy slopes, and in forests of pine, aspen, oak, and spruce. They were in the following localities: 13 mi. N. of Eagle Nest, 9,500 ft.; 12 mi. E. of Taos, 7,250 ft.; 18 mi. E. of Taos, 8,400 ft.; Tesuque Canyon, 8,000-10,000 ft.; Dailey Canyon, Beulah area, 8,000 ft.

Formica wheeleri Creighton. This interesting species constructed domed earthen or detritus mounds or nested under stones in rather dry, sunny, level areas and slopes with grass, pine, and juniper at the following places: 11 mi. E. Eagle Nest, 9,000 ft.; 13 mi. N. Eagle Nest, 9,300 ft.; Cimarron Canyon, 8,100-7,500 ft.; Sapello Canyon, 8,000 ft.; Dailey Canyon, 8,000 ft.; Capulin Mt. Natl. Mon., 7,750 ft.; 2 mi. S. of Raton Pass, 7,700 ft.

SUBGENUS FORMICA LINNÉ

RUFA GROUP

Formica calviceps n. sp.

Holotype. Worker major (Cole Coll. No. J-70). Length, 8.0 mm.

Anterior margin of mesonotum distinctly elevated above the adjoining portion of pronotum; mesoepinotal impression broad and deep; basal surface of epinotum broadly convex and forming a sharply rounded obtuse angle with the declivious face, the two surfaces being of about equal length.

Erect hairs yellow; long and very sparse on vertex of head; a little shorter and more numerous on clypeus; sparse and uneven in length on gula; absent from genae and occiput; numerous robust and blunt on pronotum; short, numerous, and pointed on prothoracic sternum; absent from mesonotum except for a small patch of long and short hairs anterior to mesoepinotal declivity; a patch of rather long hairs just anterior to the juncture of the basal and declivious surfaces of epinotum and a few forming an uneven row along each lateral margin of epinotal declivity; on fore coxae rather long, sharp, and numerous, absent elsewhere on legs, except for the row on flexor surface of each tibia; petiolar scale bordered by numerous, short, pointed hairs; on gaster abundant, as long as or longer than those on thorax, pointed, rather evenly spaced, longer and more pointed at tip of gaster. Pubescence fine, grayish white, very sparse on head, shorter and more abundant on thorax, dense on gaster. Sculpture of body feeble.

Entire head rather shining, the gula, genae, clypeus, and mandibles especially so; thorax and gaster opaque. Head, thorax, and petiole rich ferrugineous red; mandibles brown; antennal funiculi and legs lightly infuscated; gaster deep blackish brown.

Type locality. Capulin Mountain National Monument, New Mexico, elevation 7,750 ft., A. C. Cole, collector. The holotype and a series of several hundred paratype majors, medians, and minors were collected from a large colony beneath three large stones banked with detritus in a level, dry, grassy area with a parklike stand of scrub oak.

Disposition of types. The holotype and a large series of paratypes are in the writer's collection. Paratypes have been deposited in the U. S. National Museum, the Museum of Comparative Zoology, and in the collection of W. S. Creighton.

Variation in the paratype series. The overall length of the majors is 7.5-8.2 mm., of the medians 6.2-7.4 mm., and of the minors 5.2-6.1 mm. Variation among the majors is relatively slight and aside from length consists of pilosity differences which do not depart significantly from the general pattern of the holotype. The medians tend to have somewhat of a reduction of both number and length of body hairs, those on the vertex being virtually absent. There is also a tendency toward faint thoracic infuscation. The minors are infuscated on the occiput, pronotum, mesonotum, epinotum, and petiolar scale and the body pilosity, especially that of head and thorax, is even more greatly reduced than in the medians.

Affinities. The new species appears to be most closely related to *F. laeviceps*

Creighton from which it differs (in the major) in the following respects: the mesonotum is distinctly elevated above the adjoining portion of the pronotum; the basal face of the epinotum is less convex and at the junction with the declivity forms a distinct rounded obtuse angle, the declivity being less steep than in *laeviceps* and the length of base and declivity subequal. The occipital corners are without erect hairs; the erect hairs on the head are sparser, those on the pronotum are shorter, they are absent from the mesonotum except for a small patch near the mesoepinotal suture, they are very sparse on the metanotal sternum, on the epinotum they occur chiefly at the junction of the basal and declivious surfaces, they are shorter, more blunt, and more abundant on the gaster, and those on the posterior gastric segments are not appreciably longer than elsewhere on the gaster. In color the new species and *laeviceps* are very close, but the major of *laeviceps* is of a somewhat richer red than that of the new species.

Formica integroides coloradensis Wheeler. I found three colonies of this form nesting beneath stones, which were not banked with detritus, in a grassy, sunny mountain meadow on a slope with bordering spruce and oak at Dailey Canyon, 8,000 ft.

Formica integroides subnitens Creighton. This form nested beneath stones banked with detritus or soil and detritus and in large detritus domes with earthen bases in shaded and open areas with willow, cedar, and grass. It was taken 5 mi. E. of Taos, 7,350 ft. and 12 mi. E. of Taos, 7,250 ft.

Formica obscuripes Forel. A huge colony inhabited the base of a large rotted stump (4 feet tall) heavily banked at the base with detritus and the hollow center filled with detritus, at Dailey Canyon, 7,600 ft., on a dry grassy pine slope. Nests were also observed under stones with a bank of detritus at Raton Pass, 7,100 ft.

Formica obscuriventris clivia Creighton. This form was rather common in the places where it was collected. The nests were beneath stones banked with detritus in dry and moist flat areas and slopes with grass, pine, spruce, and oak. The localities are as follows: Sapello Canyon, 8,000 ft.; Dailey Canyon, 8,000 ft.; 13 mi. N. of Eagle Nest, 9,500 ft.; Bandelier Natl. Mon. campground, 6,050 ft.

Formica oreas Wheeler. Colonies inhabited the soil beneath stones not banked with detritus or constructed large domed detritus mounds. Nests were in both dry and moist places and on level areas and slopes. They were found at the following localities: Cimarron Canyon, 7,100-7,250 ft.; Eagle Nest, 8,400 ft.; 12 mi. E. of Taos, 7,250 ft.; Ute Park, 7,600 ft.; Otawi entrance, Bandelier Natl. Mon., 6,100 ft.

MICROGYNA GROUP

Formica densiventris Viereck. This species was rediscovered at its type locality, Sapello Canyon, near Beulah, 8,000 ft. Nests were beneath stones and logs banked with detritus on a moist, rocky slope with scattered yellow pine and dense pine duff. Numerous nests of intergrades of this form and *F. rasilis* Wheeler (and/or *F. rasilis spicata* Wheeler) were found at Tesuque Canyon, 7,400-7,700 ft. and Sandia Mts., 7,500 ft. Before these apparent hybrid populations were discovered I had come to the conclusion that *rasilis* should be a synonym of *densiventris* which it still might well be and would certainly be indicated by a comparison of types of *rasilis* with those of *densiventris*. Considerably more study will have to be accomplished, however, before it can be shown whether the two forms are separate species, whether one is a subspecies of the other, or whether they are synonymous. Because of this, at present I prefer to consider the two as independent species. Nowhere in New Mexico did I collect series which could be clearly assigned to the typical *rasilis*.

Formica rasilis spicata Wheeler. I collected what I consider to represent this subspecies at only one locality, namely 13 mi. N. of Eagle Nest, 9,500 ft. The colony was under a stone not banked with detritus on a sunny, grassy, stony, moist, treeless slope.

Formica whymeri alpina Wheeler. Colonies were found in rotting logs,

under logs and stones, with and without detritus, and several had constructed large domed mounds of pebbles and twigs. The majority of nests was in rotting logs. All nests were in open grassy meadows with moist soil. Collections were made at the following places: Tesuque Canyon, 10,000 ft. (where colonies were numerous); Ute Park, 7,300 ft.

EXSECTA GROUP

Formica exsectoides Forel. The supposition had been that *exsectoides* does not occur in the Rocky Mountain region. Wheeler (1913, p. 484) described *F. exsectoides* var. *hesperia* from specimens taken at Colorado Springs. Creighton (1950, p. 513) synonymized this variety with the typical *exsectoides*. It was Creighton's opinion that Wheeler's specimens had actually come from the east but had been mislabelled, and this opinion was supported by evidence that the station was far to the west of the known range of *exsectoides*, that no one else had reported *exsectoides* (a conspicuous ant) from well collected Colorado before Creighton's ant book (1950) had been published, and that Wheeler's specimens were taken from beneath a stone—a most unusual nesting place for *exsectoides*. Creighton further noted that if it were supposed that Wheeler's series represented an incipient colony why was not the host species present in the nest? It is easy to follow this logic. Gregg (1952, p. 18) states that he has in his collection specimens of *exsectoides* from the vicinity of Boulder, Colorado, and that "we have to revise westward our conception of the range of *exsectoides*". Now that *exsectoides* has finally been found in New Mexico and retaken in Colorado it would appear that Wheeler's data are validated. The variety *hesperia* is however only a synonym of *exsectoides*.

The single colony from which I collected was beneath a stone not banked with detritus in Cimarron Canyon, 7,400 ft. The habitat was a dry, flat, grassy area with scattered juniper and pine.

Creighton (*in litt.*) has arrived at the conclusion that the representatives of *exsectoides* which are at present marooned in the Rocky Mountain region do not construct large nests like the typical eastern domed detritus mounds. The colonies appear to be living under ecological conditions which do not suit *exsectoides*. Both *ulkei* and *opaciventris* construct mounds in the west. With Creighton's view I concur.

Formica opaciventris Emery. I found a single colony of this species in Dailey Canyon, 8,000 ft., on a dry, open roadside. The ants had constructed a detritus domed mound 9 in. high, 14 in. wide, and 31 in. long. Two stones were buried in one end of the mound and the subterranean portion of the nest was in very stony soil.

FUSCA GROUP

Formica altipetens Wheeler. Colonies were beneath stones and logs and some in domed mounds of soil and detritus in rather moist areas with grass, pine, and spruce at the following localities: Cimarron Canyon, 6,700 ft.; 8 mi. W. of Eagle Nest, 8,900 ft.; 18 mi. E. of Taos, 8,400 ft.; Tesuque Canyon, Aspen Basin, 10,000 ft.

Formica cinerea lepida Wheeler. Nests were under stones in moist grassy meadows and shaded slopes with juniper and pine and with fir, pine, and aspen at the following places: Cimarron Canyon, 7,450 ft.; 5 mi. E. of Taos, 7,350 ft.; Sapello Canyon, 8,000 ft.; Tesuque Canyon, 8,000-8,700 ft.; 2 mi. S. of Raton Pass, 7,700 ft.; Capulin Mt. Natl. Mon., 7,100 ft.; Little Willow Creek Canyon, Mogollon Mt.; Bandelier Natl. Mon., 6,200 ft.

Formica fusca Linné. This very common species was found at the higher elevations (6,000-10,000 ft.) in nearly all parts of the state. The ants nested under stones which in some cases were banked with detritus. Occasionally a domed earthen mound was observed.

Formica marcida Wheeler. I am skeptical about the validity of this species but I have one collection (Bandelier Natl. Mon., 6,200 ft.) which may be tentatively assigned to it. The nest was beneath a stone in a moist, level area with a few scattered pines and hardwoods.

Formica montana Wheeler. One colony inhabited a nest in the soil without any cover over the entrance. It was at the base of Capulin Mt. Natl. Mon., 7,200 ft. in an open, moist, grassy area with scrub oak, pine, and cedar. I collected what I believe to be intergrades of this species and *altipetens* 20 mi. W. of Raton, 6,950 ft., near Capulin Mt. Natl. Mon., but not enough is known about this possible hybridization to venture a change in taxonomic status.

Formica neorufibarbis Emery. A single colony assignable to this species was found under a stone at Tesuque Canyon, 8,000 ft.

Formica neorufibarbis gelida Wheeler. This form occurred in considerable numbers at the localities from which it was collected and nested under stones and in rotting logs on moist slopes with pinyon-juniper, pine, aspen, fir, and spruce. The localities from which it was taken are as follows: 15 mi. E. of Eagle Nest, 9,500 ft.; 2 mi. W. of Cimarron, 6,490 ft.; 12 mi. E. of Taos, 7,250 ft.; 18 mi. E. of Taos, 8,400 ft.; Tesuque Canyon 8,700-10,000 ft.; Water Canyon, 16 mi. W. of Socorro, 6,550 ft.; 12 mi. S. of Santa Fe (as slave of *F. rubicunda*); Cloudcroft, 8,500 ft.; Sapello Canyon, 8,000 ft.

SUBGENUS NEOFORMICA WHEELER

Formica pallidefulva nitidiventris Wheeler. Nests were under stones in dry grassy areas with pine 2 mi. S. of Raton Pass, 7,700 ft. and 2 mi. W. of Datil, 7,500 ft. One colony was found nesting in the open soil with a small pile of sand at the nest entrance on a dry, sunny, grassy slope at Cimarron Canyon, 6,700 ft.

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