

# American Museum Novitates

PUBLISHED BY THE AMERICAN MUSEUM OF NATURAL HISTORY  
CENTRAL PARK WEST AT 79TH STREET, NEW YORK 24, N.Y.

NUMBER 2239

DECEMBER 17, 1965

## Studies on Southwestern Ants Belonging to *Camponotus*, Subgenus *Myrmobrachys* (Hymenoptera, Formicidae)

BY WILLIAM S. CREIGHTON<sup>1</sup>

It is hoped that the data presented in this study will clarify the status of *Camponotus (Myrmobrachys) mina* Forel, show that Wheeler's subspecies *zuni* is a synonym of *mina*, and provide a distinction between *mina* and a new species described herein as *trepidulus*.

The history of *mina* is depressing, for none of the myrmecologists who have worked with this ant has furnished a satisfactory account of it. Much of this difficulty is due to the inadequate material with which the earlier investigators dealt. This material was scanty and secured under conditions which made accurate analysis impossible.

In 1879 Forel described *mina* from a single specimen which Sassaure had taken at Cabo San Lucas at the southern tip of Baja California. It is now clear that this specimen is a media, but Forel regarded it as a major, which led him to select a highly unsuitable name, for in *mina* both the size of the individual and the size of the colony are large for a member of the subgenus *Myrmobrachys*.

In 1893 Pergande, who was unaware of Forel's description of *mina*, redescribed the insect as *erythropus*. Pergande had a small number of specimens which Eisen and Haines had taken at San José del Cabo and a few others which these collectors had secured at six stations in the Cabo

<sup>1</sup>Research Associate, Department of Entomology, the American Museum of Natural History; Emeritus Professor of Biology, the City College of New York.

San Lucas area. Pergande shared this material, hence its original extent is problematical, but everything indicates that there were fewer than 25 specimens all told. Those from the Cabo San Lucas area were obviously strays, but, while Pergande restricted the type material of *erythropus* to the specimens taken at San José del Cabo, he made no claim that these represented a nest series, for he did not know whether the type material of *erythropus* came from one nest or from several.

In 1896 Emery synonymized *erythropus* with *mina*. There is no reason to question Emery's synonymy, but it is unfortunate that he failed to explain how he arrived at it. Pergande sent much material to Emery, and it is likely that Emery had types of *erythropus* to send to Forel for comparison with the type of *mina*. Emery's synonymy made *mina* much more understandable if specimens of *erythropus* were available for study.

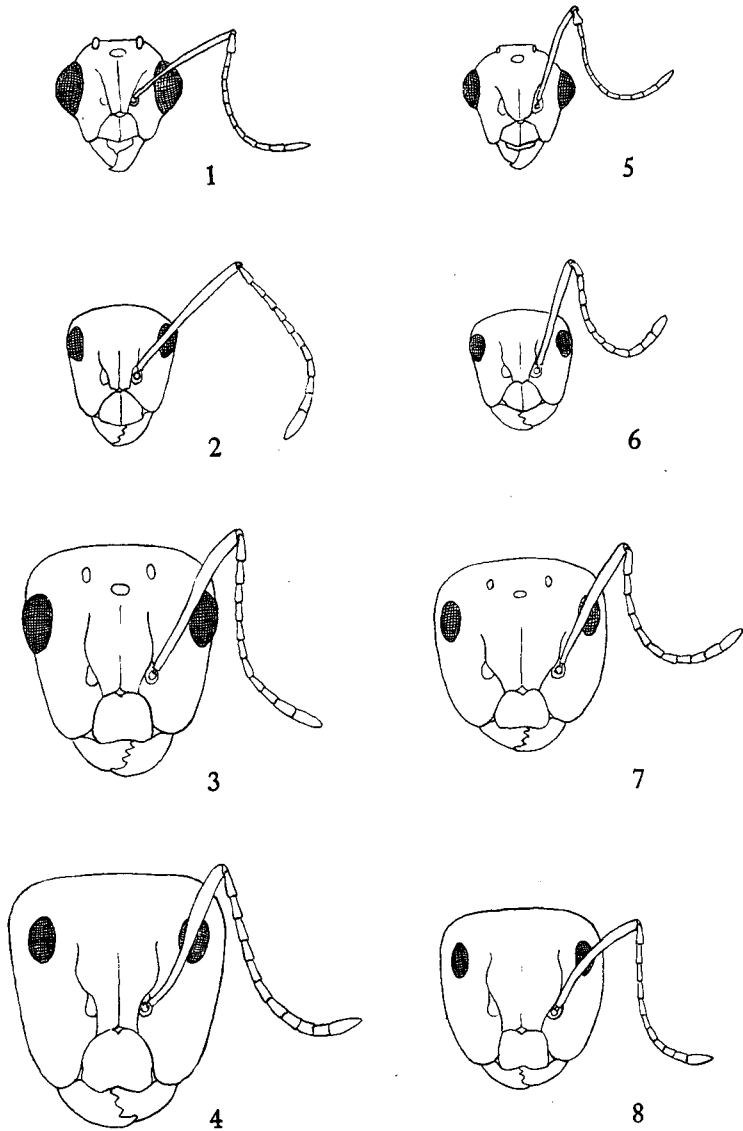
This led Wheeler, who had two cotypes of *erythropus*, to describe the subspecies *zuni* in 1910. In the description of *zuni* Wheeler stated that he had collected "numerous" specimens which were running on the bark of old mesquite trees near Tucson, Arizona, but this statement must be taken with a grain of salt. There are six cotypes of *zuni* in the collection of the American Museum of Natural History and seven in the collection of the Museum of Comparative Zoölogy at Harvard. There is also a single media in the collection of the United States National Museum of the Smithsonian Institution which came from the type series of *zuni*. But these 14 specimens appear to be all that Wheeler had when he described *zuni*. Nor are these a nest series for, since they came from more than one tree, more than one nest must have contributed to the series. If Wheeler had been cautious in dealing with these specimens the problem of *zuni* might not have arisen, but Wheeler's treatment of *zuni* was remarkably incautious. He not only limited his comparison to the two cotypes of *erythropus* in his possession but also made such a superficial examination of the type series of *zuni* that several of the characteristics on which he based this subspecies are negated by the types themselves. The worst of this unfortunate business is not that the synonymic subspecies *zuni* was set up but that it was done in such a way as to make both *mina* and *zuni* unrecognizable without an extensive study of type material.

This view is based on 11 colonies of *Myrmobrachys* taken by the present writer in the southwest from 1951 to 1963. The total number of specimens secured was in excess of 500, of which about 250 were mounted for study. More important is the fact that sexual castes were secured in several of the nests. Even in the field it was obvious that two species were represented, a large species taken in northern Sonora and southern Arizona and a small one taken in southern Arizona only, but it was not clear

which of the two was *zuni*. This material was compared with the types of *zuni* and *erythropus* in the collection of the American Museum. In addition, Dr. M. R. Smith and Dr. Karl V. Krombein arranged a loan of the type material of *zuni* and *erythropus* in the collection of the United States National Museum, and Dr. Howard Evans that of *zuni* in the collection of the Museum of Comparative Zoölogy. This type material was of great importance to this study, and I wish to express my thanks for help without which this paper could not have been written.

A study of this type material showed that the large species taken by the writer is the same as Wheeler's *zuni*, but it also showed that this large species is the same as Pergande's *erythropus*. The types of *zuni* were then compared with Wheeler's description of that subspecies, and it was disconcerting to discover that most of Wheeler's treatment of *zuni* is undependable. It is distasteful to have to deal with the many errors that Wheeler made, but no accurate idea of *zuni* is possible until these mistakes are corrected. From the writer's standpoint Wheeler's most unfortunate error is his statement that the scapes of the major of *zuni* do not surpass the occipital corners. I used this character as a distinguishing one of *zuni* in my 1950 monograph on North American ants. Since the statement is untrue, the key for *zuni* presented in that study is both worthless and misleading. It is interesting that there is only one major in the type series of *zuni* in the Museum of Comparative Zoölogy. Excluding the mandibles, the head length of this specimen is 2.15 mm., hence it is noticeably larger than the other members of the type series, the largest of which has a head length of 1.7 mm. It seems certain, therefore, that Wheeler drew his description of the major of *zuni* from this large specimen. In this major the right antennal scape not only crosses the occipital corner but is in contact with the upper surface of the head throughout most of its length. It would be impossible to arrange the scape to better advantage as far as the relation of its length to the occipital corner is concerned. When the head is viewed in full face the tip of the scape projects beyond the occipital corner by an amount approximately equal to its greatest diameter. Moreover, if the head is rotated until the scape does not appear to project beyond the occipital corner, the entire top of the occiput is in view and the mandibles are for the most part hidden. It is hard to believe that Wheeler could have positioned the head so poorly when he described the major of *zuni*, yet there is no other explanation for his error. The truth of the matter is that the scape of *zuni*, like that of *mina*, projects beyond the occipital corner by an amount about equal to its greatest thickness.

Two other errors in Wheeler's description of *zuni* are due to his failure



FIGS. 1-4. *Camponotus (Myrmobrachys) mina*. 1. Head of male. 2. Head of minor. 3. Head of female. 4. Head of major.

FIGS. 5-8. *Camponotus (Myrmobrachys) trepidulus*. 5. Head of male. 6. Head of minor. 7. Head of female. 8. Head of major.

All figures are at the same scale. Drawn by the author.

to realize that certain features of this insect vary with the size of the worker. The clypeal carina is best developed in the minor, where it forms a conspicuous ridge that extends entirely across the clypeus. It is less developed in the media and feeble in or absent from the major. The reverse of this condition applies to the development of piligerous foveolae on the cheeks and clypeus. These are prominent, coarse, and close-set in the major, sparse and shallow in the media, and absent from the minor. Since these differences due to size are identical in the type series of *erythropus* and that of *zuni*, Wheeler's attempt to employ them as taxonomic criteria is of no significance. Moreover, it is obvious that he reached his erroneous conclusions by comparing a media of *zuni* with a major of *erythropus*, for such a comparison would bear out Wheeler's contention that *zuni* differs from *mina* in having a major with a distinctly carinate clypeus and with smaller and sparser piligerous foveolae on the cheeks and clypeus. No such explanation will apply to Wheeler's view that *zuni* differs from *mina* in lacking erect hairs on the sides of the head and the occipital corners and also in the absence of erect hairs and long pubescence from the antennal scapes. An examination of the entire type series of *erythropus* might have convinced Wheeler of his error, for there are rubbed specimens in that series as well as in the type series of *zuni*. Even without such an examination Wheeler should have known that he was dealing with depilated specimens, for five of the 14 types of *zuni* have erect hairs on the sides and the occipital corners of the head and long pubescence on the antennal scapes.

There are other errors in Wheeler's treatment of *zuni* but it is pointless to prolong the list when those already cited give proof that the subspecies *zuni* is indefensible and that it must be treated as a synonym of *mina*. In view of the many confusing statements that have been made about *mina* it is advisable to redescribe the species here. The descriptions that follow deal with features not shown in the figures.

*Camponotus (Myrmobrachys) mina* Forel

MAJOR (FIG. 4): Head length (distance from the anterior level of the clypeus to the middle of the occipital border), 2.15 mm. Greatest width of the head, 2.0 mm. Eyes feebly convex, oval in outline and with about 25 facets in greatest diameter. Mandibles with five stout, conical teeth on the masticatory margin and a flattened, triangular tooth where this margin meets the inner margin. Thorax slightly more than two-thirds as wide as head. Prothorax not margined but with a blunt angle where dorsum meets sides. Promesonotal and mesoepinotal sutures prominent but only slightly impressed. In profile basal face of epinotum much longer

than declivous face, with angle between them poorly marked. Node of petiole thick, its crest blunt. Seen from behind crest is evenly convex in most specimens but occasionally middle of crest slightly flattened. Femora of forelegs flattened and dorsoventrally expanded, those of middle and hind legs less flattened and not dorsoventrally expanded.

Thorax, petiole, and gaster with numerous long, white, pointed, erect hairs. Erect hairs on front, occiput, and gula usually shorter than those on thorax, but otherwise the same. Cheeks and clypeus with numerous short, blunt, erect hairs, some of which are feebly clavate. Erect hairs on mandibles moderately abundant, short, and slender. Usually a row of slender erect hairs on and near flexor surface of each femur and a few on antennal scapes. Tibiae with numerous semi-erect, short, blunt, golden hairs. Pubescence short, dilute and appressed on the mandibles, femora, and gastric dorsum; more abundant and often semi-erect on antennal scapes; very fine and dense on funiculi.

Head and thorax evenly and densely covered with tiny punctures, so close-set that areas between them form narrow rims around punctures, punctate areas dull or very feebly shining. In addition, rounded foveolae on front and clypeus and more numerous oval ones on cheeks. Petiole and gaster moderately shining, surface shagreened and with numerous prominent piligerous punctures.

Color black, mandibles, clypeus, and cheeks dull brownish red. Antennae and legs yellowish brown. Gaster usually with strong bluish reflections.

MINOR (FIG. 2): Length of head, 1.5 mm. Greatest width of head, 1.25 mm. Eyes more convex than those of major. Fore femora laterally compressed but with less dorsoventral expansion than those of major. Clypeus and cheeks without foveolae; sides of head and gula shining, less heavily punctured than in major. Sculpture elsewhere and pilosity like those of major.

FEMALE (FIG. 3): Length of head, 1.9 mm. Greatest width of head, 1.7 mm. Thorax slender, slightly narrower than head. Scutum a little more than twice as long as scutellum. Epinotum in profile higher than long, its convex basal face depressed below level of scutellum, angle between basal and declivous face much rounded. Petiole similar to that of major but with a sharper crest, in some cases notched in middle. Fore, middle, and hind femora laterally compressed but only fore femora strongly expanded dorsoventrally. Gaster voluminous, longer than thorax. Cephalic sculpture and pilosity like those of major. Thorax and petiole delicately shagreened, feebly shining, and with widely scattered piligerous punctures. Gaster more heavily shagreened, distinctly less shining than that

of major, with fewer and less conspicuous piligerous punctures. Erect hairs on thorax, petiole, and gaster sparser and shorter than those of the major. Pubescence on thorax and gaster short and very dilute. Pilosity of appendages like that of major. Color like that of major, except gaster lacks bluish reflections. Wings hyaline, slightly iridescent, their veins yellow.

MALE (FIG. 1): Length of head, 0.93 mm. Width of head through eyes, 1.15 mm. Thorax bulky, slightly wider than head. Basal face of epinotum depressed well below level of scutellum and without a sharp transition to declivous face, the two forming a single convex curve. Scale of petiole low and thick, blunt, evenly rounded crest no thinner than base. Gaster slender, posterior segments narrowing sharply to rear. Fore femora laterally flattened but not dorsoventrally expanded. Cephalic punctuation feebler than that of female or major, clypeus and cheeks slightly shining, foveolae sparse and poorly developed. Thorax, petiole, and gaster delicately shagreened, moderately to strongly shining. Piligerous punctures small and sparse on thorax and petiole, more numerous on gaster. Occiput, front, clypeus, and gula with numerous long, brownish, pointed, erect hairs. Erect hairs on dorsum of thorax much shorter and sparser except on epinotum where they are as long as those of head. Petiole with a few long erect hairs, those of gaster much more numerous. Hairs on appendages very fine and grading into pubescence. For the most part these hairs are appressed or suberect but there are a few fully erect hairs on fore femora. Color blackish brown, mandibles, genitalia, and tarsal joints dirty yellow. Wings like those of female.

The writer has taken colonies of *mina* at the following stations: Arizona: Baboquivari Canyon, Baboquivari Mountains, at 3500 feet; Sonora: 8 miles south of Sasabe at 3100 feet, 5 miles south of Santa Ana at 2500 feet, and 12 miles west of Santa Ana at 2300 feet.

All four of the above colonies were nesting in mesquite (*Prosopis juliflora*). The colonies of *mina*, when mature, consist of several hundred individuals. It seems probable that the colony is begun in a beetle-larva burrow but, as it grows, the colony occupies areas of decay which may extend through much of the tree. The workers of *mina* are very active and forage during the day. The marriage flight occurs in late July in southern Arizona.

### **Camponotus (Myrmobrachys) trepidulus, new species**

Figures 5-8

There is nothing to be gained by presenting a full description of *trep-*

*dulus* here, for in pilosity, sculpture, and color *trepidulus* is virtually identical with *mina*. The differences that separate *trepidulus* from *mina* are those of size and proportion, particularly the proportions of the head. These differences, which are shown in the accompanying figures, are summarized here:

The length of the head in *trepidulus* is less than that of *mina* in all castes except the male. In the female and major of *trepidulus* the head is not only shorter than that of *mina* but it is also proportionally wider. Thus in the female and major of *trepidulus* the head is more quadrate than that of *mina*. In the female of *trepidulus* the length of the head is 1.66 mm., the width of the head is 1.66 mm., and the cephalic index is 100. In the major of *trepidulus* the length of the head is 1.70 mm., the width of the head is 1.75 mm., and the cephalic index is 103. In the female of *mina* the length of the head is 1.90 mm., the width of the head is 1.70 mm., and the cephalic index is 90. In the major of *mina* the length of the head is 2.15 mm., the width of the head is 2.00 mm., and the cephalic index is 73. Another distinction which applies in all castes is the smaller size of the eye in *trepidulus*. This difference is very striking in the male, female, and major, but not so obvious in the minor in which the difference in the size of the eye is not great. The distinction holds, nevertheless, for the eye of the minor of *trepidulus* has a length of 0.27 mm., while in the minor of *mina* the length of the eye is 0.35 mm.

The type material of *trepidulus* consists of two nest series taken near the Forestry Cabin (elevation 3500 feet) in Baboquivari Canyon in the Baboquivari Mountains of Arizona on July 21, 1951. Both colonies were nesting in dead limbs of *Quercus oblongifolia*. The holotype major and five males were in one nest; the female was in the other.

Five more colonies were taken in Brown Canyon on the eastern slopes of the Baboquivaris at elevations between 4200 and 4400 feet. These colonies were also nesting in the dead branches of live oaks, two in *Q. oblongifolia* and three in *Q. emoryi*. The colonies of *trepidulus* are small. The two largest consisted of 52 and 53 individuals, respectively, and the other colonies were much smaller. It appears that there are seldom more than 25 individuals in a nest. This species lives in abandoned beetle-larva burrows, and a single burrow will usually accommodate a mature colony. It was not possible to determine when the marriage flight of *trepidulus* occurs, although there is evidence that the marriage flight of *trepidulus* is not coincidental with that of *mina*. In 1951 the marriage flights of *mina* in Baboquivari Canyon occurred from July 18 to July 28. During that period many females of *mina* were taken at light. While the sexual forms of *trepidulus* were present in nests in Baboquivari Canyon during the



above period none ever came to light. Colonies of *trepidulus* taken in early September in Brown Canyon in the Baboquivari Mountains contained no sexual forms; hence it seems probable that the marriage flight of *trepidulus* occurs in August. The live oaks in which *trepidulus* nests are also preferred as nest sites by *C. (Colobopsis) papago* Creighton, and the two species sometimes nest in the same tree. No animosity develops when this occurs, as both species are very inoffensive and timid ants.

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