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Notes on *Myrmecocystus lugubris* Wheeler and its Synonym, *Myrmecocystus yuma* Wheeler (Hymenoptera, Formicidae)

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In 1909 W. M. Wheeler published the description of *Myrmecocystus lugubris* (Jour. New York Ent. Soc., vol. 17, no. 3, p. 98) from a series of 15 specimens taken by J. C. Bradley at Otis, California. Although the above reference has repeatedly been cited, it appears that no one has since taken this insect. The reason for this became apparent to the present writer after specimens from 11 stations in California, Baja California, Arizona, and Sonora were compared with the types of *lugubris* and *yuma* in the collection of the American Museum of Natural History. The total number of specimens available for this study was 336 and, while this figure is not so great as could be wished, it was sufficient to demonstrate that Wheeler had been deceived in the differences that he utilized to separate *lugubris* from *yuma*, a species that he described in 1912 (Psyche, vol. 19, no. 6, p. 176). In the opinion of the present writer *yuma* is clearly a synonym of *lugubris*, and with adequate material for examination it is easy to understand why Wheeler failed to appreciate this fact.

In the first place, it is certain that Wheeler never realized that the worker caste of *lugubris* is distinctly polymorphic, even though the size differences between the workers are slight. It is true that Wheeler noted size differences in the type series of *lugubris*, but this was due to the fact that two of the specimens were semi-repletes, with distended gasters

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which increased their over-all size. Wheeler was not aware that the head shape of the worker of *lugubris* varies with its size. In the case of small workers (which seem to have made up the entire type series of *lugubris*) the head (mandibles excluded) is distinctly longer than broad, with the sides parallel and the occipital border feebly convex or, in some specimens, flat in the middle. The head length of such specimens is 0.73 mm. This is, of course, the head shape given by Wheeler as characteristic of *lugubris*. In the larger workers the cheeks are slightly convex, when the head is viewed in full face, and diverge from the insertion of the mandibles to the occipital angles. In such specimens the occipital border is much more strongly convex, and the width of the head is approximately equal to its length, which is 0.9 mm. This is the type of head that Wheeler regarded as characteristic of *yuma*. Unfortunately for such a view most nests contain both large workers with broad heads and small ones with narrow heads.

A second feature that Wheeler used to separate the two species is the character of the gula. This was said to be convex in *yuma* but flat or concave in *lugubris*. It is significant that this feature was not mentioned in the original description of *lugubris*, but added in 1912 when *yuma* was described. There is no doubt whatever that this situation is the result of drying. The integument of *lugubris* is extremely thin, and the head capsule, particularly in the smaller workers, is apt to be distorted on drying. In all fresh specimens the gula is slightly convex, but a certain percentage of each nest series shows the concave gula, supposedly characteristic of *lugubris*, as the specimens dry. It seems probable that in the three years between the description of *lugubris* and that of *yuma*, the drying out of the type series of *lugubris* had produced, in some of the specimens, the concave distortion of the gula which drying often causes.

Although Wheeler did not utilize the structure of the petiole as a means for separating *lugubris* and *yuma*, it is clear that he considered that the two had petioles of quite different structure. In the original description of *lugubris*, Wheeler twice pointed out that the petiole is compressed anteroposteriorly and has a sharp summit. This summit was said to be lightly impressed in the middle. This gave a very striking distinction between the compressed petiole of *lugubris* and the blunt, subcuneate petiole of *melliger* or *mexicanum*. But in the description of *yuma*, Wheeler noted that the petiole, while anteroposteriorly compressed, was subcuneate in profile and had a blunt, rounded summit which was flat in the middle. Thus from Wheeler's description it would be logical to infer that the petiole of *yuma* is always thicker and blunter at the summit than that of *lugubris*. Actually there seems to be little justification for

this distinction. In the specimens that the present writer has examined, including the types of *yuma*, there is considerable variation in the width and thickness of the petiole and the amount of incision at its crest. Indeed some of the types of *yuma* have a distinctly incised petiolar crest, perhaps again a result of distortion on drying. But it seems quite clear that it is hopeless to attempt to distinguish between *lugubris* and *yuma* on the basis of a difference in petiolar structure.

The same thing is true of the slight color differences cited by Wheeler. The color of *lugubris* was given as black, with the clypeus, antennae, legs, and palps fuscous and the mandibles sordid yellow. The color of *yuma* was said to be dark brown, with the anterior half of the head, antennae, palps, and legs paler and the mandibles, clypeus, cheeks, tibiae, and tarsi yellowish or pale brown. There is no possibility of utilizing such color differences, because any long nest series will contain individuals which fit either category. In the opinion of the present writer, the lighter-colored workers are those that have more recently emerged. As the present writer was unwise enough to employ three of the distinctions discussed above (curvature of the gula, shape of the petiole, and color) as the means for separating *yuma* and *lugubris* in the key presented in 1950 (Bull. Mus. Comp. Zool., vol. 104, p. 441), I wish to make it clear that further studies have shown the complete futility of these distinctions as separatory characters. There is only one course open—*yuma* must be treated as a synonym of *lugubris*.

It follows that an account of the habits of *lugubris* must include those previously attributed to *yuma*. Wheeler seems to have inclined to the view that *lugubris* is a honey-dew feeder, while *yuma* is entomophagous. He based his views on the fact that semi-repletes had been present in the type series of *lugubris* but none in that of *yuma*, and that in the case of *yuma* he had found insect remains scattered about the nest entrances. It is probable that *lugubris*, as do several other species of *Myrmecocystus*, feeds both on honey-dew and insects, but this is not certain. The presence of semi-repletes in the nests does not guarantee that the distension of the gaster is due to the imbibition of honey-dew. These semi-repletes are scarcely comparable to the enormously distended repletes of *mexicanum* and *melliger*. On the contrary they are much more like the semi-repletes of *Prenolepis imparis*. The gaster, while enlarged, is by no means spherical, and the insect seems to have no trouble moving about. As it is known that *Prenolepis imparis* often produces semi-repletes by imbibing the juices of dead earthworms, there is no reason why those of *lugubris* could not be produced by the imbibition of the juices of dead insects. We need additional observations before it can be stated with certainty that *lugu-*

bris feeds on honey-dew as well as insects. As far as the writer has been able to determine, the nests of *lugubris* are always small, seldom containing more than a hundred individuals. They are built in various types of soil, stony gravel, hard-packed sandy gravel, or loose sand. The elevational range of *lugubris* extends from sea level to the neighborhood of 3000 feet. It seems unable to occupy stations above the 3000-foot level and is thus absent over much of the Mojave Desert, although it occurs in the less elevated portions of that region and in areas of low elevation to the north of it. The presence of *lugubris* in the deserts around the head of the Gulf of California and on the floor of Death Valley is good evidence that *lugubris* is a highly adapted xerophile. The specimens on which the following records for *lugubris* are based were collected by the author and may be found in the collection of the American Museum of Natural History and in the personal collection of the author.

NEW RECORDS: *California*: Freeman, Kern County (3100 feet); Yermo, San Bernardino County (2000 feet); Fried Liver Wash, Joshua Tree National Monument (1700 feet); Ashford Mill, Death Valley National Monument (sea level); Mesquite Spring, Death Valley National Monument (1600 feet). *Baja California*: San Felipe and 5 miles north of San Felipe (sea level); 20 miles north of San Felipe (200 feet). *Arizona*: Desert 3 miles east of Yuma (500 feet). *Sonora*: Five and 10 miles east of San Luis (250–300 feet).