THE HABITS AND DISTRIBUTION OF *MACROMISCHA SUBDITIVA* WHEELER (HYMENOPTERA: FORMICIDAE)

By William S. Creighton[1]
Department of Biology, City College New York

Before discussing *Macromischa subditiva* I wish to review some older observations on the habits of this beautiful genus. The nests of Macromischa are seldom easy to find. The one exception to this rule appears to be *M. sallei* Guérin, whose abundant and conspicious carton nests, built around the twigs of bushes, are certain to attract attention. It thus happens that *M. sallei* is the only species in the genus for which adequate field data exist. In 1913 W. M. Mann studied hundreds of nests of *sallei* in Haiti (1). The uniformity of these nests was remarkable; they were invariably constructed of carton and invariably suspended from the branches of bushes or small trees. While Sallé's San Domingan nests had come from bushes growing on marshy plains (2) the Haitian nests occurred on rocky, well-drained ridges, hence there was no reason to suppose that the latter nests had been placed in bushes to avoid water-soaked soil. In short, the nesting habits of *M. sallei* appeared to be not only arboreal but also those of a non-adaptable arboreal.

This circumstance strongly influenced W. M. Wheeler in the nidification list which he published in his 1931 study of Macromischa (3). At that time Wheeler had nesting data for 28 species of Macromischa and he knew that there is a wide range of nesting response within the genus. His list carries eight nesting categories and, while some of these are rather similar, the range extends from strictly arboreal to strictly terrestrial species. This list is invaluable to anyone who is studying Macromischa in the field and, since Wheeler was trying to show no more than the variable nesting habits of different species of Macromischa, he amply accomplished his purpose. The objectionable feature of the nidification list is its failure to give the number of nests on which the inclusions are made. To secure this information it is necessary to consult the authorities whose names are carried after the names of the species whose nests they observed. When this is done it is clear that 17 of the 28 species listed were known from a single nest and hence could appear

[1]Emeritus Professor, Department of Biology, City College.

Manuscript received by the editor October 3, 1965

in only one nesting category. Nor was the situation much better with most of the 11 other species. Seven of these were known from two colonies each and two from three colonies each. Thus there were only three species (*flavitarsis* 5 colonies; *wheeleri* 8 colonies, *squamifera* 15 colonies) which might be said to furnish more than a suggestion of nest preferences. What Wheeler did with these last two species is astonishing. He knew that both *wheeleri* and *squamata* have flexible nesting habits. In 1920 W. M. Mann published observations that leave no doubt on this score and I had later amplified Mann's data in a personal communication to Dr. Wheeler (4). Yet both *wheeleri* and *squamata* each appeared in a single category in the nidification list. Thus, although Wheeler saw clearly that nesting responses vary widely within the genus Macromischa, he failed to appreciate that the nesting response of the individual species may also be variable. On the basis of present data it is impossible to say what percentage of species in the genus possess flexible nesting habits but, if further progress is to be made with the habits of Macromischa, it is imperative to recognize that some of the species, among them *subditiva,* behave in this fashion.

Remarkably few records of any kind have been published for *M. subditiva* since Wheeler described this species in 1903 (5). In 1912 Mitchell and Pierce provided a two-line habit note on specimens taken in Victoria County, Texas which repeated the observations carried in Wheeler's original description (6). When M. R. Smith monographed our species in 1939 he gave no new data on habits and added only one new locality record (7). Apparently there are no other published records for *subditiva,* although M. R. Smith stated in a paper published in 1947, that the species occurs in Louisiana (8). This reference is enigmatic, since no locality was cited and since repeated surveys in the area between Austin and the Louisiana border have failed to turn up *subtiva* in eastern Texas. The record is not included in the list presented in this paper.

From what has already been said it should be obvious that it is important to distinguish between records based on strays and records where the nest was found. I have, therefore, divided the records into two groups, the first based on strays (Table I), the second on nests taken (Table II).

In six of the above colonies a single female was present. It is impossible to say whether this was true of the seventh nest (Wimberley colony) for part of this colony was scattered when the crevice in which it was living was forced open. In addition to the female

Table I

Records for *M. subditiva* based upon strays

Station	*Collector*	*Where taken*
TEXAS:		
Austin (Travis Co.)	W. M. Wheeler	On leaves of bushes
New Braunsfels (Comal Co.)	W. M. Wheeler	Dead limbs on ground
Harlingen (Cameron Co.)	R. A. Vickery	Not stated
10 miles west of Boca Chica (Cameron Co.)	W. S. Creighton	Cavities in dead mesquite limb
Fowlerton (La Salle Co.)	W. S. Creighton	Cavities in dead mesquite limb
Delta Lake (Hidalgo Co.)	W. S. Creighton	On willow bark

Table II

Records for *M. subditiva* based upon nests

Station	*Collector*	*Nest site*
TEXAS:		
Austin (Travis Co.)	W. M. Wheeler	In willow bark (*Salix* sp.)
Victoria (Victoria Co.)	J. D. Mitchell	Under willow bark (*Salix* sp.)
30 miles NE of Raymondsville (Kenedy Co.)	W. S. Creighton	Burrows in live-oak limb (*Q. virginiana*)
2 miles west of Wimberley (Hays Co.)	W. S. Creighton	Crevice in limestone ledge.
Bentsen State Park (Hidalgo Co.)	W. S. Creighton	Under hackberry bark (*Celtis laevissima*)
La Feria (Cameron Co.)	W. S. Creighton	Abandoned termite burrows in partly buried plank
NUEVO LEON:		
Chipinque Mesa (Monterrey)	W. S. Creighton	Burrows in live-oak limb (*Q. fusiformis*)

the largest colony contained 145 workers, the smallest one only twelve workers. It appears, therefore, that the colonies of *subditiva* are always small and seldom, if ever, pleometrotic.

Two captive colonies were established in February 1965 and it was soon apparent that *subditiva* is a very easy ant to maintain in artificial nests. It appears to be omnivorous, since the captive colonies rarely refused anything edible, but it has a strong preference for insect food. The captive colonies ate termites, fruit flies, house flies, crane flies, mosquitos, dermestid beetles, crickets, caterpillars and various moths and butterflies. With the exception of adult sawflies and stoneflies, which they plainly disliked, although they ate them, they accepted this varied insect diet without hesitation. They are one of the few ants which the writer has studied that would eat cut-worms. Their favorite food appeared to be the larvae of buprestid bettles. The ant larvae were mostly fed by regurgitation but, on occasion, bits of insect tissue were placed in their jaws.

In the captive colonies the rate of egg-laying averaged out to slightly less than three eggs per day. The eggs hatched into larvae in about 30 days and these transformed into pupae in about 23 days. The pupal period was about 19 days. The pupae darken extensively after 14 days and at emergence are so deeply colored that there is no callow period in the strict sense of the term. These newly emerged adults can be told from their older nestmates but this is by no means easy for the color difference is slight and largely confined to the lower surface of the body. It is usually easier to tell a "callow" by its actions for, during the first two or three days after emergence they take little part in the nest activities. The pupal exuvium is pulled off in long strips by the workers. Two or three will often work together at stripping off the exuvium, which they apparently eat. During the stripping the emerging imago often assists the process by bending its body from side to side.

It appears that *subditiva* produces and matures brood throughout the year. The writer has taken nests of *subditiva* from the middle of October to the middle of March and these have invariably contained brood. With the exception of two male pupae this brood has been free of sexual forms, hence it seems likely that under ordinary conditions only worker brood is produced during the winter months. It may be added that *subditiva* has no trouble bringing brood through in artificial nests. During the time that the captive colonies were under observation the population of one of them more than tripled.

LITERATURE CITED

1. Wheeler. W. M. & Mann, W. M., Bull. Amer. Mus. Nat. Hist. 33: 35
2. Guérin-Meneville, F. E., Rev. Mag. Zool. Paris, 2nd Ser. 4: 73 (1852). (1914).
3. Wheeler, W. M., Bull. Mus. Comp. Zoöl. 72 (1): 5 (1931).
4. Mann, W. M., Bull. Amer. Mus. Nat. Hist. 42: 413, 423 (1920).
5. Wheeler, W. M., Psyche, 10: 99 (1903).
6. Mitchell, J. D. & Pierce, W. D., Proc. Ent. Soc. Wash. 14: 73 (1912).
7. Smith, M. R., Ann. Soc. Ent. Amer. 32, (3): 506 (1939).
8. Smith, M. R., Amer. Mid. Naturalist, 37, (3): 575 (1947).