

**NEW STATE RECORDS OF MYRMOSINAE  
(HYMENOPTERA: MUTILLIDAE) FROM MISSISSIPPI,  
U.S.A. WITH NOTES ON INTERACTIONS BETWEEN  
*MYRMOSULA PARVULA* (HYMENOPTERA:  
MYRMOSINAE) AND *LASIOGLOSSUM IMITATUM*  
(HYMENOPTERA: HALICTIDAE)<sup>1</sup>**

Joe A. MacGown<sup>2</sup>

ABSTRACT: Three species of Mutillidae (Hymenoptera: Myrmosinae), *Myrmosa unicolor* Say, *Myrmosina nocturna* Krombein, and *Myrmosula parvula* (Fox), are reported from Mississippi for the first time. Notes on *M. parvula* and its interactions with a gregarious nesting bee species, *Lasioglossum (Dialictus) imitatum* (Smith) (Hymenoptera: Halictidae), are given.

KEYWORDS: Mississippi, Mutillidae, Myrmosinae, Halictidae, *Myrmosa unicolor*, *Myrmosina nocturna*, *Myrmosula parvula*, *Lasioglossum imitatum*, communal nest

Myrmosinae (Hymenoptera: Mutillidae) is represented in the Nearctic region by four genera and fifteen species including *Leiomyrmosa* Wasbauer (1 species), *Myrmosa* Latreille (4 species), *Myrmosina* Krombein (2 species), and *Myrmosula* Bradley (8 species). Only four of these species, *Myrmosa blakei* Bradley, *M. unicolor* Say, *Myrmosina nocturna* Krombein, and *Myrmosula parvula* (Fox), are known to occur east of the Mississippi River.

Species in the subfamily Myrmosinae are known to parasitize the larvae of various small ground-nesting bees and wasps (Krombein, 1979a). Brothers (1978), who wrote on the biology and life stages of *M. parvula* using *Lasioglossum zephyrum* (Smith) as a host, reported that females of *M. parvula* oviposited on the bee larvae without paralyzing the larvae. After the mutillid larvae emerged, they fed on their host by puncturing the cuticle and consuming the body fluids.

The subfamily Myrmosinae, as well as its included genera, has been in a constant state of taxonomic flux during the last century, with many nomenclatural changes occurring as more information on individual species has been discovered. Myrmosinae has been considered its own family, Myrmosidae; a subfamily of Mutillidae; a tribe of Mutillidae; and a subfamily of Tiphidae (Lelej and Nemkov, 1997). In 1979 the subfamily Kudakrumiinae was erected (Krombein, 1979b), and subsequently several genera previously thought to belong in Myrmosinae were transferred to Kudakrumiinae by Lelej (1981). Brothers and Finnamore (1993) regarded Kudakrumiini and Myrmosini as tribes of Myrmosinae. Lelej and Nemkov (1997) resurrected Kudakrumiinae and included the Nearctic *Leiomyrmosa* and *Myrmosula* in that subfamily. However, Brothers (1999), fol-

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<sup>2</sup> Mississippi Entomological Museum, Box 9775, Mississippi State, MS 39762, U.S.A. Email: jmacgown@entomology.msstate.edu.

lowing up on earlier research (Brothers, 1975), treated Kudakrumiinae as a tribe (Kudakrumiini) of Myrmosinae. Consequently, Brother's (1999) classification is followed in this manuscript.

*Myrmosa unicolor*, *Myrmosina nocturna*, and *Myrmosula parvula* are reported from Mississippi for the first time. Following the species accounts, notes on the interactions between *M. parvula* and *Lasioglossum (Dialictus) imitatum* (Smith) (Halictidae) are given. All specimens examined are housed in the Mississippi Entomological Museum (MEM).

### MYRMOSINAE

#### *Myrmosa unicolor* Say

The distribution of *Myrmosa unicolor* has been given as New Brunswick south to North Carolina, west to British Columbia and Arizona (Krombein, 1979a), but this species has not been reported for the southeastern United States. The only other eastern species of *Myrmosa* is *M. blakei*, a rarely collected species that has been reported only from New York and Virginia (Krombein, 1979a). *Myrmosa unicolor* has been reported using *Halictus* sp. (Halictidae) (Melander and Brues, 1903), *Tiphia* sp. (Tiphidae), *Lindenius columbianus errans* (Fox) (Sphecidae), *Lasioglossum pruinosis* (Robertson), and *L. imitatum* as hosts (Krombein, 1979a).

Two males of *Myrmosa unicolor* have been collected in Mississippi, one in May (no date on specimen) and the other on 14-15 June. Seven females have been collected in Mississippi from 2 to 16 July. The following specimens were examined from Mississippi (new state record): Oktibbeha Co.: Craig Springs (1 female); Starkville (1 female); State College (Mississippi State University) (1 male); Pontotoc Co.: 1 mi. SE of Ecu (5 females); and Smith Co.: 1 mi. N Raleigh (1 male).

#### *Myrmosina nocturna* Krombein

*Myrmosina nocturna* has been reported from California, Kansas, Louisiana, Maryland, and Texas (Krombein, 1979a). No host records are known for this species.

*Myrmosina nocturna*, known only from males, has been collected in Mississippi from 30 April through 1 September, and all specimens with collecting methods data were collected at blacklight traps. The following specimens were examined from Mississippi (new state record): Bolivar Co.: nr. Benoit (2 males); Mississippi River Levee, 33°36'29"N 91°07'34"W (1 male); Kemper Co.: 2 mi. N Scooba (1 male); Lowndes Co.: T17N, R16E, Sec. 34 (1 male); Oktibbeha Co.: Adaton; (3 males); Starkville (20 males); 6 mi. SW Starkville (1 male); T19N, R15E, Sec. 16 (1 male); Scott Co.: Pinkston Hill, 32°16'06"N 89°23'33"W (2 males); and Sharkey Co.: Delta National Forest, 32°52'39"N 90°45'36"W (1 male).

### *Myrmosula parvula* (Fox)

*Myrmosula parvula* occurs from Washington D.C. south to Alabama, and west to Montana and Texas (Krombein, 1940; Krombein, 1979a); however, this species has not been reported from Mississippi. It has been reported as using various species of Halictidae as hosts including *Lasioglossum imitatum*, *L. zephyrum* (Smith), *Augochlorella striata* (Provancher), and *A. persimilis* (Viebeck) (Michener and Wille, 1961; Batra, 1965; Brothers, 1978; and Krombein, 1979a).

Female *Myrmosula parvula* have been collected in Mississippi from 12 June through 22 August, and one male was collected on 14 August. The following specimens were examined from Mississippi (new state record): Oktibbeha Co.: Bradley (1 female); Craig Springs (1 female); and Sessums, 33°23'31"N 88°42'40"W (28 females, 1 male). Additional notes on *Myrmosula parvula* are given below.

**Behavioral Observations.** Female *Myrmosula parvula* were first seen on 14 August 2005 while observing a communal ground-nesting site of the sweat bee, *Lasioglossum imitatum*, in Sessums, Oktibbeha County, Mississippi. The Sessums community is located in the Black Belt Prairie, a floristically diverse habitat (Leidolf and McDaniel, 1998), which includes many of the recorded floral hosts of *L. imitatum* (Michener and Wille, 1961). This small halictid species nests gregariously in large nesting sites with many individual nest tunnels, and with colonies often persisting at the same site for many years (Michener and Wille, 1961). At the Sessums site, the entire nesting area was approximately 3 meters wide and 11.3 meters long and was between two rows of *Pinus taeda* L. (Pinaceae) in a regularly mowed lawn (of mixed species of grasses) that had bare patches of soil present. Upon examination of other similar bare areas at the same locality, three more communal nest sites were discovered, all of approximately the same dimensions. The soil in the nest area was a compact, sandy clay, and the entire area was on a slight slope, which probably aided in drainage. Nest entrances appeared to be random in their relative positions to one another, with some being separated by less than 2 cm and others being spaced more than 10 cm apart. The entrances to the nests were simple, circular openings that were approximately 1 mm wide, with the tunnel width immediately below the entrance wider than the opening. Tunnels were excavated with a small garden shovel and a sharp knife to depths of 12 cm to approximately 27 cm, but because the ground was very compact and hard with numerous tree roots running through it, full comprehension of nest sizes and tunnel directions was not learned. However, the portions of the tunnels that were excavated were found to be perpendicular to slightly angled from the ground surface with several wider lateral cells present.

At noon, a swarm of low-flying bees was observed between the ground and approximately 16 cm above the soil level. Weather conditions were typical for the time of year with a temperature of approximately 35°C, high humidity, and sparse cloud cover. Hundreds of bees were present and were observed for two

hours with no obvious cessation of activity. Many bees were visible within the entrance holes. These bees were oriented either head up, with the face flush with the surface of the ground, and with antennae straight up and moving back and forth slightly, or head down with the rear of the abdomen placed upward in such a way as to effectively block the entrance. Occasionally, one of the flying bees would fly toward one of the bees in the holes and then enter the hole with the occupant. In other instances bees flew into holes that were unguarded. Collections were made of the flying bees to determine their identity and sex. A total of 35 flying bees was collected, and they proved to be a mix of both females (24 specimens) and males (11 specimens). Ten bees from nest holes with faces turned upward were collected with an aspirator, and all were female.

While observing the bees, approximately 30 small, reddish-yellow, ant-like mutillid females were seen crawling on the ground at the communal bee nest site. Ten specimens were captured and subsequently determined to be *Myrmosula parvula*. A black, alate male of this species was also captured as it was hovering over a female. While observing the female mutillids, it became apparent that they were attempting to enter the nests of the *Lasioglossum*, a known host of *Myrmosula* (Krombein, 1979a). Female *Myrmosula* individuals crawled on the ground in a somewhat erratic manner going from one halictid nest entrance to another in an effort to enter one of the holes. The bees prevented the mutillids from entering their domain by plugging many of the holes with their bodies. Typically, each bee was oriented in the face-up position with antennae waving, but when a mutillid came within close proximity, the bee immediately turned around inside the tunnel and positioned the dorsal side of its convex metasoma at such an angle as to fill the hole entirely, thus preventing access into the nest. It is not known whether or not the bees plugging the holes were all one sex or a mix of sexes, but of those collected that performed the defensive switching of the body orientation maneuver, all were females. Bees were not observed in any instance with exposed stingers above the entrance holes, nor were any bees engaged in defensive behavior with the *Myrmosula* outside of the nest itself. In only one case did a low-flying bee briefly attack a mutillid, but it quickly broke off the encounter. On a few occasions a mutillid managed to reach a bee in a hole before the defending bee had time to turn around, in which case there was a momentary scuffle between the two species until the bee finally got turned around. Eventually, a mutillid would find an unguarded hole and enter the nest, where it stayed for between one and three minutes. Upon leaving the nest, the mutillid continued searching for other holes. If a mutillid entered a hole already occupied by another mutillid, then one of them, presumably the latter intruder, left rapidly. This behavior of quickly blocking the entrance with the abdomen to deter entrance was also reported by Batra (1965) who observed *L. zephyrum* using this tactic against both *M. parvula* and *Pseudomethoca frigida* (Smith) (Mutillidae). Melander and Brues (1903) reported similar behavior with the halictid bee *Halictus pruinosus* Robertson (= *Lasioglossum pruinosus*) defending its

nest from the mutillid wasp *Mutilla canadensis* Blake. However, in addition to blocking the entrance holes when defending their nests from *P. frigida* and *M. canadensis*, both *L. zephyrum* and *H. pruinosus* were also quick to leave the nest to attack the intruders.

On the following two days, 15 and 16 August, from 5:00 to 7:00 P.M. observations were again made at the same nest site. Temperatures were only slightly cooler than at midday on the 14th, but the area was more shaded by trees at this time of day. There appeared to be fewer bees flying at the nest site than on 14 August. On both days there were still large numbers of *M. parvula* crawling around confronting the bees, and ten more females were collected and many more females seen. Although individuals were not counted, it is estimated that there were at least 30-50 individuals present on each day. Additional observations were made on 22 August 2005 from noon until 1:30 P.M. when bee activity and climatic conditions were very similar to those on 14 August. At least 20 mutillids were crawling around the nest area, and eight more females were collected.

It should be noted that there have been *L. imitatum* nests at this site for at least four years, with the nesting site first seen on 17 August 2001. Additionally, this site has proved to be ideal habitat for two other species of communal nesting bees, *Halictus rubicundus* Christ (Halictidae) and *Panurginus polytrichus* Cockerell (Andrenidae), both of which have been collected in April of previous years in a large area of gregarious nests. The fact that these bee species have been nesting at the same site for several years is not unusual, as nesting aggregations of bees are known to persist for many years at the same site, sometimes with hundreds of colonies present (Michener and Wille, 1961; Wcislo, 2000). However, there are several factors that can limit communal nest site longevity including suitability of the habitat, lack of nearby floral hosts due to changes in floral composition, and the buildup of increasingly larger parasite populations over time (Wcislo, 2000). This site will be monitored in following years, and future observations will determine whether or not this particular *Lasioglossum* aggregation survives.

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