

***Microstigmus comes* Wasps have a Method of Nest Construction Unique Among Social Insects¹**

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ABSTRACT

As many as six females of the Neotropical wasp, *Microstigmus comes*, cooperate to gather and silk a single ball of material derived from the underside of fronds of the host palm, *Chryseobipha guagara*. They mold this into a bag, then lower it on a silked petiole which is finally given a characteristic spiral. Construction averaged 36.8 hours of working time performed over four days. Orphaned wasps initiated new nests on their original host plant 75 percent of the time. Heavy rain and winds destroyed 28.6 percent of newly established units.

THE NEOTROPICAL WASP, *MICROSTIGMUS COMES* Krombein, is the most socially advanced member of the Sphecidae (Matthews 1968a), with as many as 18 adults of both sexes sharing a nest. Members of this species nest only on the undersides of fronds of the palm *Chryseobipha guagara* Allen, which occurs abundantly in the lowland rain forests of the Osa Peninsula of Costa Rica. Unique, pendent, bag-like nests, each suspended by a narrow petiole, are constructed from waxy vestiture scraped from the underside of the palm frond and bound together with silk that female wasps secrete from abdominal glands (Matthews 1968b). While the details of nest initiation are well established for most social vespid wasps, the manner of *M. comes* nest construction has been heretofore unobserved.

At Sirena, Corcovado National Park, Costa Rica, we observed various stages in the construction of 25 *M. comes* nests during October 1980, March 1981, and September 1981. These were discovered in the course of monitoring over 200 active nests as part of a long-term study of the social biology of this species. In August 1982, we observed and filmed the complete construction sequence for five nests, which wasps initiated after their original nests were destroyed. All behavioral observations were made in the natural setting, and details of some rapid behaviors were determined with motion or still photography.

RESULTS

OBSERVATIONS.—Although both sexes of *M. comes* often occur in active mature nests, we observed only females constructing nests. Incipient nest construction is indicated by the presence of one to six wasps walking about a small area beneath a palm frond. As they walk, the wasps repeatedly peck at the surface with their mandibles, loosening the whitish vestiture which coats the frond's un-

derside. Intermittently they touch the substrate with the tips of their abdomens, in a motion which applies silk to bind the loosened plant material. Gradually, an oval area about 10 × 15 cm becomes raised and roughened by their repeated pecking (Fig. 1A and B). Such rasped areas are very conspicuous on the underside of young fronds. After completely loosening the surface material from the entire oval, the foundresses roll it inward from the periphery, silking the material continually as they proceed (Fig. 1B). Facing outward, they tug at the loosened material, using their forelegs and jaws to pull and their jaws to cut away the last adhering fibers. In this way, they gradually gather a large, undifferentiated, fluffy mass in the approximate center of an area now scraped clear.

Once the mass has been gathered from the substrate and hangs from a single spot (Fig. 1C), the wasps begin the process of lowering it. Through repeated bouts of chewing and silking beginning at the point of connection, they form a rope-like stalk (Fig. 1D), from which the bulk of accumulated nest material hangs. Compacted material added from the nest ball to the stalk's base gradually increases its length until ultimately the fibrous ball hangs from a relatively straight petiole, 14–19 mm long.

Toward the end of this suspension phase, one or more wasps burrow into the nest ball. Within the undifferentiated mass, these females turn and somersault, silking as they go, until a small cavity is gradually created in its upper portion. Exiting from the newly formed space, these wasps form a small hole about two mm in diameter near the junction of the petiole and bag. With repeated enterings and exits, an entrance takes shape and its rim becomes extensively silked.

Next, a wasp moves a short way up onto the straight petiole, stops, and pulls part of the petiole into a loop with her middle and hind legs while pushing vigorously against it with her abdomen. After silking this area, she moves part way around and slightly up the petiole and repeats this behavior. By continuing this loop-forming process as she moves up and around the petiole, she

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