

Bembicini of Baja California Sur: Notes on Nests, Prey, and Distribution

(Hymenoptera: Sphecidae)

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During a trip by air and rental car to Baja California Sur in early June 1975, my assistants and I collected 9 species of Bembicini and obtained nesting data on two of these. We had hoped to study *Bembix magdalenae*, described from Bahia Magdalena by C. L. Fox in 1926 and not recovered since. Although we spent several days on the shores of Magdalena and adjacent bays, we failed to find *magdalenae* but did find nesting aggregations of the related and equally unstudied species *B. rugosa* Parker. This proved to be a reasonably typical member of the genus in nesting behavior despite its unusual structural features. Brief notes are also presented on other Bembicini collected, as there has been little systematic collecting of Sphecidae in Baja California Sur.

BEMBIX RUGOSA PARKER

This species was described from Arizona and to my knowledge has not previously been taken in Baja California Sur. We found it to be not uncommon in two localities on Bahia Magdalena, on the Pacific side of the peninsula. On June 9 we took several females on tall composites along the roadside about 3 km east of San Carlos, and later the same day we found several females nesting in a man-made excavation into an anchored sand dune, about 1 km from San Carlos but only 100 m from the shores of the bay. The wasps nested in flat or slightly sloping soil within the excavation, but not in the steep-sloping soil walls; we did not see any on top of the dune or in adjacent, more active dunes. The soil in the nesting site was a whitish sand of somewhat coarse texture, with occasional streaks of more compact clay-sand. Empty, broken *Bembix* cocoons of previous generations were abundant on the sand surface and at depths to 20 cm. Evidently they were in the process of being exposed by the winds from the bay; the active nest-cells we found were deeper than 20 cm.

Several of the empty cocoons dug from the sand had fragments of prey around them. These proved to be wings and body fragments of muscoid and syrphid flies, as well as one bombyliid. Several old but

unbroken cocoons were measured and found to be 8-9 mm in maximum diameter, 20-25 mm in length; the number of pores per cocoon varied from 3 to 6 ($\bar{x} = 4.7$, $N = 12$). In one old cell containing an inviable cocoon, at a depth of 20 cm, there was a female mutillid, *Dasymutilla gloriosa* (Saussure). These mutillids were also seen walking over the sand in some numbers. We have no firm evidence that this species is a parasite of *Bembix*.

From 1000 to 1130 we watched one female *B. rugosa* make 110 trial burrows, no more than 0.5 cm deep, before finally remaining at one point and digging persistently for several hours. Each trial burrow required only a few seconds of digging, and all were within an area of about 3 square meters. When she finally persisted at one site, she backed out periodically, spraying the sand a considerable distance and producing a rather flat mound. She dug intermittently and had reached a depth of only 25 cm by 1600 hours.

We marked several apparently active nests and excavated three of these. One which was open most of the day was found to have a straight, oblique burrow 105 cm long that reached a depth of 40 cm and then rose several cm before terminating blindly. We assume this to have been an incomplete nest that had been abandoned. A second nest was of similar structure, the burrow passing obliquely downward for 35 cm, then obliquely upward for 9 cm, then gradually downward for 3 cm before reaching a cell 4 cm long at a depth of 22 cm. The cell was empty, so we assume this nest had also been abandoned, or at least temporarily evacuated.

The third nest was of similar structure although with two lateral turns near the bottom. The major part of the burrow was 70 cm long, forming about a 45 degree angle with the surface that later steepened to about 65 degrees. The female was at the bottom of this burrow, at a depth of 35 cm. Beyond her the burrow passed obliquely upward for 6 cm; then obliquely downward for 5 cm before reaching a horizontal cell measuring 4 cm long by 1.5 cm high. The cell contained a single fly, *Psilcephala* sp. nr. *tergisa* (Say) (Therevidae) lying on its back, with a wasp egg 5 mm long attached erect to its side.

We also encountered *B. rugosa* at a locality about 60 km further south, at a site about 2 km south of Puerto Chale, on Bahia de las Almejas, which is an extension of Bahia Magdalena. An estimated 12 females and a few males occupied the top of a low sandhill only 50 m from the mangrove-fringed bay. The hill was covered with cacti and bushes; the wasps nested in bare areas but were much attracted to one large bush which was in bloom. Males flew about the flowers and open areas in

the morning hours of June 10, and several attempted matings were observed. About 6 nests were marked in various stages of construction.

One female dug intermittently for the greater part of the day, then at 1640 made an initial closure of an apparently completed nest. The mound at the nest entrance measured 25 cm long by 14 cm wide and 1.5 cm deep in the center. For 3 minutes the wasp passed over that half of the mound closest to the entrance in irregular zigzag patterns, partially leveling this half of the mound but leaving the other half intact. She then made an elaborate closure, during which she made 18 radiating lines, 9–14 cm long, emanating from the entrance. Between each line she made a short flight, landing at or near the entrance and initiating another line. The result was a small heap of sand covering the entrance and flanked by radiating lines on both sides. This behavior also required about 3 minutes, after which the wasp dug through the entrance and closed behind her at 1646 hours. Precisely the same behavior was observed at the nest of a second individual that had been digging most of the day.

We did not excavate either of these nests, but rather spent much time digging out another nest which was being provisioned during the afternoon. This nest was very deep and difficult to excavate because of the dry, powdery condition of the sand and the fact that the burrow had two sharp lateral curves. It began at about a 45 degree angle with the surface, then steepened to about 60 degrees; the female was found in this burrow about 1 m from the entrance. At 110 cm from the entrance the burrow made a right angle turn, then went down another 10 cm, to a vertical depth of 78 cm, before passing upward 3 cm and making another right angle bend before passing obliquely downward 4 cm to a cell. The cell measured 1.5×4 cm and contained 3 fresh flies and many fly remains, as well as a nearly full-grown wasp larva. Two of the flies were Asilidae (*Ablautus flavipes* Coquillett), one Mydidae (*Pseudonomoneura* sp.).

We observed an apparent final closure of a fourth nest. This female left a hole 4 cm long by 2 cm wide and 3 cm deep, to one side of which there were about 20 radiating lines each measuring about 15 cm long. We were unable to trace this burrow, which was tightly packed with sand. We did attempt to excavate a fifth nest and were able to follow the burrow for 1.3 m, to a vertical depth of 75 cm, but we failed to find a cell.

BEMBIX SAYI CRESSON

This species has previously been reported from La Paz by C. L. Fox (1923), and there is a pair from Cabo San Lucas in the California

Academy of Sciences. Its nesting behavior has been described from Florida, Kansas, Colorado, and New Mexico by Evans (1957, 1966). We encountered the species at only one locality, 16 km west of La Paz, on June 12. About 20 nests were scattered over the flat bottom of an arroyo, about 0.3 km from the shore of Bahia Pichilingue. The nesting area measured about 3×10 m, no nests being closer together than 0.5 m and most much more widely spaced than that. The area was surrounded by tall cacti and bushes. We found no males at this site, and all females showed much wear of the wings and mandibles.

Most nest entrances were open during the day, and a bombyliid fly, *Exoprosopa sima* O.S., was observed flying from hole to hole, apparently ovipositing in them. Several *Bembix* females were provisioning during the morning hours. One of them brought in 4 flies in a 30 minute period from 1005 to 1035, in one instance requiring only 3 minutes to obtain prey. In each case she plunged quickly into the open hole and emerged within a few seconds. We dug out this nest in the afternoon, at which time it was closed from the inside. It was surprisingly shallow considering the extreme heat and very dry soil in this locality. The burrow was oblique, 46 cm long, reaching a cell at a vertical depth of 22 cm. The female was about 35 cm from the entrance and there was a small closure between her and the cell as well as one at the entrance. The cell was 4 cm long by 1.5 cm high and contained a half grown larva, 8 fresh flies, and many fly remains.

The flies in this cell were identified as *Diacrita costalis* Gerstaecker (4) (Otitidae), *Peleteria neotextensis* Brooks (2) (Tachinidae), and *Copestylum isabellina* (Williston) (2) (Syrphidae). We also found the remains of flies around several old cocoons unearthed during our excavations. A sample of these revealed the following: 14 Syrphidae of two species, 3 Sarcophagidae, 1 *Callitroga* (Calliphoridae), and 1 *Diacrita costalis* (Otitidae).

We observed two instances in which females were engaged in building large mounds of sand, presumably following final closure of the nest. These females would land on top of the mound, then turn off to one side for a distance of 7–10 cm kicking sand behind them, then make a brief flight and land on top of the mound to repeat the performance over a slightly different track. One female made 40 such lines radiating from the mound over a period of 50 minutes, then started a new nest 40 cm away. This "mound-building behavior" was reminiscent of that of *B. littoralis* Turner, an Australian species which, however, performs the behavior at the initial nest closure (Evans and Matthews, 1973). It is also reminiscent of the still larger mound of *Stictia lineata* (Fabricius) in

South America (Evans and Matthews, 1974). The function of these large mounds is in no case understood.

Measurements of one of the *B. sayi* mounds showed it to be 25 cm long by 17 cm wide and 2.5 cm deep in the center. In one case we were able to locate an oblique, open burrow, 20 cm long, at one end of the mound. This is presumably the "back burrow" described for U.S. populations. Although U.S. wasps make an elaborate final closure involving radiating lines, then make a "back burrow," leaving the mounds from both burrows intact, there is no present evidence that they actually build up these mounds (Evans, 1966, Fig. 157). This example of apparent geographic variation in behavior seems worthy of further study.

BEMBIX OCCIDENTALIS W. J. FOX

We observed females of this species capturing flies from dead fish lying on the beach a few km west of La Paz. We did not discover where they were nesting. The species was not encountered within the nesting areas of *B. sayi* or *B. rugosa*. It is, however, widely distributed in Baja California Sur, and in fact part of the type series was from San José del Cabo. There are specimens in the California Academy of Sciences from Mulege and Coyote Cove (Bahia Concepcion), both on the Gulf of California.

BICYRTES VARIEGATA (OLIVIER)

Two females of this species were seen digging on the beach, well below the high water mark, 16 km west of La Paz. C. L. Fox (1923) recorded *variegata* from La Paz and from Bahia Concepcion, both records also being from June.

MICROBEMBEX ARGYROPLEURA BOHART

We took 1 male of this species near San Carlos, and 4 males in dunes near Puerto Chale, 60 km south of San Carlos. It has not previously been reported from south of El Arco, Baja California Norte (Bohart, 1970). Quite possibly some of the *Microbembex* reported by C. L. Fox (1923, 1926) from the La Paz area properly belong to this recently described species. Alcock (1975) has studied its nesting behavior in Arizona.

STENIOLIA DUPLICATA PROVANCHER

This is an abundant wasp in Baja California Sur. We collected 2 females and 3 males at Todos Santos, 1 female near La Paz, and 2 males 77 km northwest of La Paz. Gillaspay (1964) presented several addi-

tional records. Evans and Gillaspay (1964) reported on several nests from western Texas.

GLENOSTICTIA BITUBERCULATA (PARKER)

We took two males at flowers of Umbelliferae at Todos Santos. The species has not previously been reported from Baja California, but I have also seen a male from 1.5 mi. east of San Jorge, B.C. Sur, collected July 25, 1971 (Real & Main) [Calif. Acad. Sci.]. Our specimens were compared with the type in the U.S. National Museum.

GLENOSTICTIA BIFURCATA (C. L. Fox)

We also took 1 male of this little known wasp on Umbelliferae at Todos Santos. The species was described from Baja California Norte (Isla Angel de la Guarda and Bahia de Los Angeles). C. L. Fox (1923) also described *Stictiella directa* from Bahia de los Angeles and recorded it from Isla del Carmen and Isla Espiritu Santo, B.C. Sur. I have studied part of his type series and regard *directa* as a synonym of *bifurcata* (new synonymy).

GLENOSTICTIA GILVA GILLASPAY

We took a female and 3 males on flowers near La Paz, June 11-14. This species was misidentified as *exigua* W. J. Fox by C. L. Fox (1923), who recorded it from Isla Espiritu Santo and Todos Santos. Notes on the nests and prey were presented by Evans (1966) and by Alcock (1975).

ACKNOWLEDGMENTS

I am indebted to the following specialists for identifying the fly prey and parasites: G. Steyskal, C. W. Sabrosky, L. Knutson, W. Wirth, and F. C. Thompson. I am especially indebted to Darryl T. Gwynne and William L. Rubink, who accompanied me on the trip to Baja California Sur and assisted in collecting and making field observations. This paper is part of a study of the comparative behavior of solitary wasps, supported by the National Science Foundation, grant GB43790.

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