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SHORT COMMUNICATION

ACTIVITY OF JUVENILE TARANTULAS IN AND AROUND THE MATERNAL BURROW

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ABSTRACT. Despite their notoriety, little is known about tarantulas in their natural environment. Here we describe activity of juvenile tarantulas (*Brachypelma vagans*) in and around the maternal burrow as well as emergence and dispersal behavior. Juveniles remain within the natal burrow for several weeks and undergo at least one molt after emerging from the egg sac. Small numbers of juveniles are active at night and emerge along with the adult female where they remain close to the entrance of the burrow. Most juvenile activity outside the burrowed occurred in the early morning shortly after sunrise when the female was no longer active or visible at the burrow entrance. We also observed juveniles dispersing en masse from the maternal burrow. Spiderlings moved away from the burrow in lines, following one behind each other.

Keywords: Juvenile dispersal, natal burrow, tarantulas

Cooperation and coordinated movement and activities are common behaviors among social spiders (see reviews in D'Andrea 1987; Avilés 1997; Uetz & Hieber 1997). However, these types of behaviors have also been observed in solitary spiders which, during early developmental stages, often undergo a brief gregarious phase (Gundermann et al. 1986; Horel et al., 1996; Reichling 2000, 2003; Jeanson et al. 2004). Here we report on activities and behaviors of juvenile tarantulas, *Brachypelma vagans* (Ausserer 1875) still living in the maternal burrow and also describe their unique aggregative dispersal (see also Reichling 2000, 2003).

Study site.—Our field site was located on a private dairy ranch in Puebla, Mexico, 0.8 miles west the town Venustiano Carranza. At this site in May 2003, we monitored 117 tarantula burrows in the mowed lawn (approximately 0.5 hectares) immediately surrounding the family ranch house. We conducted field observations as part of an ongoing study of the life history of tarantulas. Females with egg sacs were observed in mid-April (pers. Comm.), and on 16 May 2003, we found juveniles still within the natal burrows along with the female ($n = 6$). These burrows were closely monitored for a two week period. All observations were made from approximately 50 cm from the burrow entrance and substrate vibrations caused by our movements were kept at a minimum to avoid disturbing the animals. If tarantulas were startled they quickly retreated into their burrows but typically reappeared within 5–10 minutes if there were no further disturbances. The majority of observations were performed using a red flashlight but white light was sometimes used briefly for greater clarity.

Females were visible within their burrows soon after sunset (~ 8:02pm). As sit-and-wait predators, they remained around the burrow entrance for most of the night and were often motionless for more than an hour at a time. In a typical ''waiting posture'' females positioned themselves halfway out of the burrow with their legs on the 1–2 cm silk collar around the entrance (Fig. 1) (see also Minch 1978). Juveniles appeared at the burrow entrance at least 30 minutes after the female's nightly emergence. During nocturnal observations, the maximum number of juveniles visible was 15. They always emerged from the burrow on the side that was not occupied by the female (Fig. 1). Although they actively moved around and often climbed over each other, there was little physical contact with the female. Juveniles were active throughout the night and constantly changed positions on the silk collar and/or moved in and out of the burrow. They were approximately 6 mm in length (including legs) and, unless they were moving, were sometimes difficult to see in the vegetation surrounding the burrow. Because of the constant movement in and out of the burrow, we could not determine if the same individuals were active throughout the night. In addition, because of their small size and the low light conditions, it was not possible to determine if they

Figure 3.—Exoskeletons from juveniles around the entrance of the natal burrow. White arrows indicate some of the individual exoskeletons.

were actively involved in prey capture although we assumed this was the purpose of their emergence from the burrow.

Females often remained at the burrow entrance throughout the night and retreated into their burrows around sunrise (7:05 am) and were not visible during daylight hours. The end of the nocturnal foraging period was signaled when the female started laying a thin silk covering over the burrow entrance. Surprisingly, juveniles often remained active and visible for up to one hour after the female had retreated. They were able to move easily through the web covering laid by the female over the burrow entrance and during these times we observed as many as 64 individuals around the burrow entrance (Fig. 2). We suggest that the presence of the female may limit juvenile activity at night. The silk network around the burrow provides an important chemotactic cue for orientation (Minch 1978) and juveniles probably remain in contact with this network at all times. When the female forages at night, she occupies a substantial portion of the silk collar so less area is available for juvenile activity.

Dispersal of juveniles.—Dispersal of juveniles was observed from only one of the six burrows. On 24 May 2004, the female emerged shortly after sunset and removed the silk covering from the burrow entrance. She remained inside the burrow with her first pair of legs and pedipalps at the burrow lip. However, at approximately 8:30 pm she disappeared into the burrow and many juveniles suddenly started to emerge. Although we were unable to count individuals because of the large numbers we estimated that there were $>$ 100 juveniles. Although clutch sizes for *B. vagans* have not been reported, it is not unusual for tarantulas to produce more than 100 offspring in a single egg sac (see summary in Punzo & Henderson 1999). Because of the large number of individuals, many juveniles moved off the web collar lining the burrow but they remained around the burrow entrance. Within a few minutes of this mass emergence, individuals started to move

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Figure 1.—Female and juvenile tarantulas at the burrow entrance. The double-headed arrow indicates the silk collar and the three single-headed arrows point to three of the spiderlings around the burrow.

Figure 2.—Juveniles around the natal burrow after sunrise. Note the thin silk strands across the burrow entrance.

Figure 4.—Female burrow with egg sac at entrance. The egg sac was discarded from the burrow after all juveniles had dispersed.

away from the burrow, starting with the individuals at the outer edge. Instead of dispersing randomly in all directions, juveniles left the burrow in three lines, following one behind each other. Similar lines of juvenile *B. vagans* have been observed in Belize (Reichling 2000, 2003). We followed the longest line which initially had 52 individuals in a single column. There was no discernable silk trail but juveniles closely followed the path of the individuals ahead of them. At a distance of over 3 meters from the burrow, the line suddenly forked. This started when a single individual left the main column and headed in a different direction. At random intervals, other individuals also left the main column and instead followed the new path. At this point, we continued to follow the longest column of individuals and used flags to indicate the path that they traveled. Over a 2.5 hour period, several additional ''forks'' occurred and the number of individuals in the observed column was eventually reduced to three. Because of their small size, these individuals were quickly lost in the grass. The distance traveled by these three individuals while we were following them was 14.3m, however; the maximum distance from the maternal burrow was 9m. Over the 2.5 hour period, the path curved around and seldom followed a straight-line direction away from the natal burrow. There did not appear to be any specific directionality to the movement nor was it influenced by the slope of the terrain. Instead ''leaders'' appeared to choose the easiest path through the vegetation.

The next morning (25 May 2003) we observed many juvenile exoskeletons around the natal burrow (Fig. 3). Presumably, the female had discarded them from the burrow although we did not observe this behavior. The small exoskeletons were only visible around the burrow entrance for approximately one day. Because of their light weight, we assumed they were dispersed by air currents or crushed by the female's movements around the entrance within a very short period of time. Later that same evening, we observed seven additional juveniles emerging from the burrow soon after sunset. Their behavior was similar to that of their siblings the night before. They sat around the lip of the burrow for only a few minutes and then started to move away. Interestingly, they started along the same path as the column we had followed the previous night which suggests they were able to detect a chemical or tactile cue laid down by their siblings.

Finally, on the morning of 26 May 2003, we observed the egg sac at the entrance to the female's burrow (Fig. 4). After removing the egg sac from the burrow, we did not see any other juveniles in or around the burrow although juveniles were still present at the other five burrows. Unfortunately we did not observe emergence and dispersal of juveniles from the other burrows although by the end of May 2003, juveniles had disappeared from two additional burrows.

The emergence and dispersal from the natal burrow occurs very suddenly and from our observations we were unable to predict when these behaviors would occur. More information is needed to better understand and explain the gregarious phase in these typically solitary animals and to identify the mechanisms underlying this type of collective dispersal. As suggested by Reichling (2000) these behaviors may explain aggregations of tarantula burrows in their natural environment and may allow spiderlings to cluster in a more favorable environment (Jeanson et al. 2004).

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