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Burrow entrance plugging behaviour in the tarantula *Aphonopelma chalcodes* Chamberlin (Araneae: Theraphosidae)

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Introduction

Studies on the burrowing tarantulas typical of the southern United States indicate that these spiders plug their burrow entrances during the winter months. This plug may consist of silk, leaves and soil (Gertsch, 1949). This behaviour is well documented for *Dugesiella hentzi* (Girard) in Arkansas (Baerg, 1958), and *Aphonopelma chalcodes* Chamberlin in southern Arizona (Minch, 1979). Descriptions of the methods used by tarantulas to form their plugs are lacking. Observations both in the field and laboratory are described here for *Aphonopelma chalcodes.*

Results

Laboratory Observations

A juvenile *A. chalcodes*, with a body length including chelicerae of approximately 3 cm, was maintained in the laboratory in a wide-mouth glass gallon jar at 23-27°C. The spider was given approximately 15 cm of potting soil substrate in which it constructed a burrow. It plugged its burrow on 2 November 1974.

This spider gathered soil from the middle region of the burrow's length after covering it with a thin layer of silk, and fashioned it into a thimble-sized ball. The spider then carried this up to the surface in the chelicerae and pedipalps, and added it to the plug. The silk helped to hold the soil ball together as it was gathered and transported to the plug. Since the spider had constructed its burrow along the clear walls of the jar, even events deep within the burrow were visible. These observations allowed each plugging cycle to be broken down into six steps (Table 1): (1) ascent; (2) packing plug; (3) silking on plug; (4) descent; (5) silking soil to be gathered; (6) gathering soil to be added to plug. In a few cases the spider was hidden from view and a step could not be timed. These were indicated with "ND". The seven cycles that were observed in their entirety had an average duration of 622 seconds.

Field Observations

In the field one spider was seen plugging its burrow for the winter at Molino Basin, Pima County, Arizona (altitude 1350 m) and a second was also engaged in plugging behaviour on the same morning at an altitude of 850 m, 9 km from Molino Basin. Both spiders were observed on 6 October 1974, which was a cool, cloudy day with intermittent rain in both locations.

At Molino Basin, the spider was discovered within its half-plugged burrow. The soil was collected too far within the burrow for observation. It was brought up in the chelicerae and pedipalps and added to the plug by the front legs and pedipalps. Nine loads of soil added at regular time intervals, over a period of 35 minutes from 08.05 to 08.40 completed the plug and prevented further observations. A plugging cycle required about 3 minutes to gather and transport the soil to the plug, and about 1 minute to pack it into the plug at the surface. The plug was flush with the ground level and blended in completely with the surrounding surface features.

The other spider was observed within its burrow for 115 minutes beginning at 09.55, during which time 23 loads of soil were added to the plug in a fashion similar to that of the Molino Basin spider. Again soil was gathered from within the burrow. Once, the spider gathered soil from the burrow wall in a region within my visual range, resulting in a shortened time of 2 minutes from descent within the burrow to arrival at the plug with the next load of soil. On six occasions this spider silked the soil after it had been packed into the plug. The silking periods lasted for 180, 120, 60, 60, 15 and 20 seconds, in that order. The variation from 2 to 9 minutes from descent by the spider within the burrow to arrival of the spider at the plug with the next load of soil resulted from differences in the depth within the burrow from which soil was gathered and from pauses occurring within some plugging cycles.

Discussion

Silking cycles in the field were of shorter duration than those occurring under laboratory conditions.

Cycle No.	Ascent	Packing plug	Silking on plug	Descent	Silking soil to be gathered	Gathering soil to be added to plug	Total duration of cycle
1	115	240	150	150	105	15	775
2	160	160	0	100	50	10	480
3	165	170	200	30	280	15	860
4	135	185	85	80	130	ND	ND
5	120	125	0	95	52	20	412
6	125	100	240	45	150	30	690
7	175	68	0	145	55	27	470
8	145	155	80	90	185	15	670
9	210	110	0	ND	ND	ND	ND
Mean	161	145	96	94	140	19	622
Range	115-210	68-240	0-240	30-150	50-280	10-30	412-860

Table 1: The duration of steps involved in plugging a tarantula burrow. Numbers represent seconds, while "ND" represents cases where the time could not be determined due to loss of visual contact with the spider.

This was probably due to the different soil types involved. In the field the spiders were packing a moist, clay soil into their plugs. Such soil tended to adhere together, thus promoting rapid incorporation into the plug. The soil used under laboratory conditions was a loose, dry potting soil that tended to fragment easily. Lengthy periods of time were spent by the tarantula incorporating this soil into the plug (Table 1). Despite the differences in the soils, both field and laboratory observations revealed similar behavioural sequences by tarantulas in the upper regions of their burrows.

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