

Reproductive behaviour of *Plectreurys tristis* (Simon) (Araneae:Plectreuridae)

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Summary

Males of *Plectreurys tristis* engage in prolonged sperm induction, during which they are capable of locomotion. Mating lacks courtship and consists of the alternate insertion of each palp once on the opposite side of the female, resembling to a high degree that seen in theraphosid spiders. The eggs are placed within a silk dome that is open from the bottom, the bottom then being completed to yield a thinly silked egg sac. The mating season appears to be in spring. A comparison of these observations for a species of *Plectreurys* with another account given for a species of the genus *Scytodes* affirms the separation of the two genera into separate families.

Introduction

Plectreurids were termed primitive hunters by Gertsch (1949). These spiders construct a silken tube in a protected situation such as under a flat stone in which they station themselves to await passing insects (Gertsch, 1958). Usually there is a network of threads extending up to several centimetres from the mouth of the tube, which though lacking adhesive properties, can supply the spider with information as to the presence of potential prey. The males possess a tibial spur very similar to that seen in mygalomorph spiders and, upon becoming adult, wander in search of females (Gertsch, 1958). It has been believed that the male, upon finding the female, employed the tibial spurs to hold either the legs or chelicerae of the female (Gertsch, 1949). Sperm induction, mating, and egg case construction will be described in this paper for the first time in a species of this family.

Materials and Methods

Specimens of *Plectreurys tristis* (Simon) were collected in their webs under stones at 1350 m at Molino

Basin in the Catalina Mountains situated in Pima County, Arizona. Specimens were collected from the middle of March to the end of May and returned to the laboratory, where males and females were paired and placed either in wide mouth jars provided with bark for the spiders to hide under, or else in small vials provided with soil substrate. It was thought that specimens in the large jars would act more naturally, while those housed within the vials would be much more visible for detailed observations during copulation, thus observations from the two groups would complement each other. Observations of mating were carried out at 27°C, while those on sperm induction were made at 23°C.

Results and Discussion

A male in one of the large jars was observed to be engaged in sperm induction. The sperm drop was white and opaque. The palps contacted this sperm drop alternately at a rate of 181 contacts per minute. The male was on the underside of bark with the sperm drop appearing to rest on the anterior lip of the sternum. Sixteen minutes after the initial observation, the sperm drop was noticeably smaller and the rate of palpal contacts had slowed to 169 contacts per minute, despite a constant temperature. I then disturbed the male by an accidental jolt, causing him to seek cover deeper under the bark. The sperm induction process was never interrupted during this movement, thus it may be possible that one function of the unusual basal fusion of the chelicerae in this family (Gertsch, 1958) might be to form a pocket with the anterior lip of the sternum to prevent loss of sperm during periods of mobility while sperm induction is taking place. This might be advantageous if this process occurs in nature in close proximity to the female, as was the situation in this observation. While it was not possible to make further detailed observations on this male after it retreated under the bark, it was possible to fix the time of the completion of the process as being seventy-seven minutes after the spider was first noticed to have been engaged. It is not known how long sperm induction had been taking place when it was first noticed.

Three matings were observed in the vial group. One mating was difficult to observe, as it occurred against the opaque cover of the vial. Good observations were possible in the other two cases.

The pair did not seem to orientate to each other until physical contact had been established, indicative of the poor eyesight of these primitive hunters (Gertsch, 1949). An apparent lack of courtship was noted during this initial phase.

It was observed that, as postulated by Gertsch (1949), the male tibial spurs held the female's legs, and it was further noted that this was at the proximal end of the anterior leg femora. The male's second leg tarsi contacted the posterior lateral region of the female's abdomen during the entire duration of copulation. The positions of the mating partners were very similar to that given by Petrunkevitch (1911) for a theraphosid spider.

In the two matings that were observed in detail, each palp was inserted once in alternate fashion, the male's right palp being inserted on the female's left side, while the female's right side received the left male palp. One male began with the left palp, while the other did so with the right. The palps were extended forward from the male directly to the female. The first palpal insertions lasted six and eight minutes, while the second palpal insertions lasted six and twelve minutes respectively. In each case there was a two minute period while the second palp was being inserted. The third mating was twenty-two minutes in duration as compared to total times of fourteen and twenty-two minutes recorded for the two detailed observations. No palpal moistening was observed at any time.

The female was motionless until after the second palpal insertion, at which time she began to struggle, causing the male to make a rapid retreat. The female was capable of immediate locomotion after copulation.

One female from the large jar group was observed to have formed an inverted silk cup on the outer edge of the bark. The next day this cup had been filled with eggs and the lower half of the silk sphere completed. The egg case was thin enough to allow one to see the eggs inside. Thus these spiders are capable of filling an egg sac that is open from the bottom. Similar observations have been made in *Latrodectus*. Kaston (1970) suggests that the sticky quality of the eggs may prevent their falling out until the egg case is completed from the bottom.

Males and females may coexist for prolonged periods. One female spared the male for twelve days,

while two others still tolerated the male thirty-eight days after introduction, despite the presence of an egg sac with one pair.

The mating season in the field for this species seems to be in the spring. Males and females were discovered sharing the undersides of rocks on 12 March 1976 and again on 15 April 1976. A wandering male was detected on the night of 10 May 1976, with another discovered on the night of 29 May 1976. A female with a completed egg case was also discovered under a rock in her web on 29 May 1976. During the majority of this period the soil was moist from spring rains, and numerous insects provided a possible source of food, as these used the same rocks probably as refuges from night cold which may drop below freezing.

The genus *Plectreurys* was formerly placed within the family Scytodidae (Comstock, 1912). A comparison of these observations with those of Bristowe (1958) reported for *Scytodes* sp. shows a number of major variations in mating habits. While *Plectreurys tristis* pairs face each other with the male below, *Scytodes* males approach from under the female with the venter directed upwards. *Plectreurys tristis* males show alternate insertion of the palps while males of *Scytodes* employ a simultaneous pattern. Males of *Plectreurys tristis* employ tibial spurs to clasp the females' first legs, while one finds females of *Scytodes* provided with ventral abdominal chitinized pockets, into which the male inserts his chelicerae. These two organisms share only the apparent lack of courtship and orientation to each other by means of vision. Such vast differences in mating seem to support the erection of a separate family from the Scytodidae for the genus *Plectreurys* as according to Gertsch (1949, 1958).

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The female of *Philodromus praedatus* O. P.-Cambridge

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During a survey of Powerstock Common, Dorset, a single male of *Philodromus praedatus* O. P.-Cambridge was taken in a pitfall trap in July 1974 (see Merrett and Snazell 1975).

A thorough search of the sparse ground layer vegetation carried out during the following year yielded no more specimens. It was therefore thought likely that the habitat of the spider would be in the canopy of the oaks. The previous British records were from Bloxworth rectory (O. P.-Cambridge 1879-81, 1912) which had many large oaks in the vicinity, from the New Forest (a possible forest site) and from Shrewsbury (habitat unknown) (Locket, Millidge and Merrett, 1974). The European records of Simon (1875, p. 300) are from two forest sites and one of unknown habitat.

On 29 May 1975, a further male *P. praedatus* and two very distinctive female *Philodromus* were taken by beating the lower branches of oaks around the edges of a large clearing in the same general area and

habitat type as where the original male was taken. A further three of these distinctive females were beaten from other trees in the vicinity, but no other species of *Philodromus* were collected. It is therefore assumed that these females belong to *P. praedatus*.

The female of *P. praedatus* has been described previously only by Simon (1875). It is closely related to *P. aureolus* (Clerck), from which it cannot be distinguished with certainty on the basis of the epigyne (Fig. 2) or vulva (Figs 3-4). The vulva of *P. praedatus* sometimes shows a chitinised bridge (Fig. 4-a), but this is not a constant feature. The epigyne and vulva of most *Philodromus* species are variable (Braun, 1965), making the determination of females of some species impossible by sexual characters alone. However, the female of *P. praedatus* is very striking in general appearance and only an extremely dark, heavily marked specimen could be confused with *P. aureolus*.

The carapace is reddish-brown suffused with much pale yellow and white, giving a mottled effect not seen in *P. aureolus*. A wide pale central band is flanked by a lateral row of faint pale patches. The legs are yellow with some darkening distally on all femora and on both ends of tibiae I-III. The abdomen (Fig. 1) is pale straw yellow with a striking dark brown sagittate mark antero-dorsally. Posterior to this are two dark brown impressed dots. Chevrons are only occasionally present and then very faint. The sides of the abdomen show a small amount of darkening near the spinners. The total length of the females taken varies between 5.2 and 5.9 mm.