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RESEARCH NOTES

PHIDIPPUS AUDAX (ARANEAE, SALTICIDAE) PREDATION UPON A CICADA (*TIBICEN* SP.) (HOMOPTERA, CICADIDAE)

In Washington Co., Mississippi, at 1200 on 30 July 1985, an annual cicada (*Tibicen* sp.) (Homoptera) was observed perching in a plum tree in a residential area. This cicada was situated one meter above the ground, 0.5 m from the main trunk on a branch ascending at a 45° angle. Ten cm further up the branch was perched a penultimate instar female of *Phidippus audax* (Hentz) (Araneae, Salticidae). When the cicada began to sing, the jumping spider immediately changed the orientation of its body by 180 degrees so that it was facing the cicada. The spider then approached until it was within 5 cm, paused ca. 5 seconds, then jumped upon the cicada. The cicada immediately stopped singing and fell to the ground with the spider's chelicerae attached to the frons region. On the ground the spider remained attached and the cicada did not move for 5 minutes, whereupon both predator and prey were placed in a 95 mm diam, 65 mm high screen-clear plastic container and moved indoors for further observations. At an ambient temperature of ca. 25°C and local photoperiod, the spider in the next 5½ hours appeared to feed from seven different attachment sites on the cicada as follows: 1200, frons between clypeus and right eye; 1430, prothorax between dorso-ventral margin and right procoxa; 1445, prothorax at rear edge of right operculum; 1500, abdomen between left ventral segments 4 and 5; 1530, abdomen at ventral midline of 2nd segment; 1545, prothorax between metacoxae; 1600, prothorax at left dorso-ventral margin. The prey was finally abandoned at 1730, with the spider positioning itself in an upper corner of the container at the maximum possible distance from the cicada. Observations at 15 minute intervals until 2400 indicated a lack of spider movement. When observations were resumed at 0600 the next morning, the spider was wandering about the container but did not touch the dead cicada. This behavior continued until 0800, when the spider was removed to another container.

The body length of the *P. audax* was 12 mm and the body length (excluding wings) of the *Tibicen* sp. was 38 mm, indicating a predator:prey size ratio of 1:3.2. The weight of the cicada after the spider had completed feeding was 0.77 g and the weight of the spider after feeding was 0.35 g, indicating a predator:prey weight ratio of ca. 1:2.2.

We believe these observations to be important because of the paucity of information both on the predators of cicada species and on the prey of *P. audax*. The principal predators of adult cicadas are probably birds (e.g. Maier 1982), though large orb-web species are probably also important (e.g. Fitch 1963). We have found no records in the literature of *Phidippus* spp. predation on adult cicadas (e.g. Edwards 1980). It is generally believed that salticids are limited to prey smaller than themselves or to soft-bodied/defenseless forms (Enders 1975). In the genus *Phidippus*, this has been documented by field observations on *P. johnsoni* (Jackson 1977) and by laboratory experiments with *P. coccineus* (Gardner 1966). *Phidippus audax* may be an exception to this generalization, however. In the field, this species has been observed attempting to catch flying

dragonflies considerably larger than itself (Fritch 1963), and has been observed eating prey (cockroach, grasshopper, wasp) of much larger size (Bilsing 1920, Edwards 1980). In laboratory experiments, prey larger than itself has been consumed, though prey the same size as the spider seems to be preferred (Givens 1978, Freed 1984).

Robinson and Valerio (1977) describe a technique employed by several neotropical salticids for capturing prey larger and/or stronger than themselves. After jumping upon a large prey in an arboreal situation, the spider drops below the substrate on its dragline and holds the prey with its chelicerae, letting the prey hang below while envenomation or exhaustion occurs. This technique may have been attempted by the *P. audax* individual described herein, but the cicada prey may have been too heavy and was not supported by the dragline.

The observed predation by *P. audax* on a singing and stationary cicada leads to the intriguing suggestion that the spider was able to orient to the prey by receiving auditory and/or vibratory signals and that these signals were sufficient to release the final attack on the prey. Prior to the start of our observations, the spider may have seen the cicada fly to the branch site and begun to move toward the site. When our observations began, the spider may have just arrived and made a reorientation to the prey based on non-visual cues. Thus the initial orientation to the prey may have been by visual detection of movement, thought to be a requirement for eventual prey capture (Land 1971). There is sufficient general evidence to suggest that the spider could have detected auditory and/or vibratory signals from a singing cicada (Barth 1982), though the demonstration of this specific phenomenon has yet to be recorded.

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