TITLE PAGE

Predatory behaviour of theraphosid spiders in Northern Queensland

Thesis submitted by
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Abstract:

The predatory behaviours of three theraphosid spiders (*Selenotypus plumipes*, *Selenocosmia stirlingi*, and *Phlogiellus* sp.) from Northern Queensland, Australia, were studied using laboratory experiments and field observations. The project investigated how theraphosids detect the presence and location of prey or enemy organisms, which senses they use, and indicated how accurate these senses are. Further, the project explored whether Australian theraphosids employ a pure "sit and wait" predatory strategy, or if they will regularly leave their retreat and temporarily search for prey in a more active manner.

The importance and sensitivity of the various senses were explored in purpose-built experimental apparatus, controlling which stimuli were available to the spider. Spider behaviour was recorded using IR video. Tapes were either analysed directly or were computer-digitised for frame-by-frame analysis. For field observations the observer was seated on a vibration-dampening base and used a red light for direct observation of spider behaviour.

Importance of vision was explored by testing responses to visual stimuli in a set-up of two terrariums, vibrationally and olfactorily isolated from each other. Responses to olfactory cues were studied in a two-choice olfactometer. The ability to detect substrate related chemical cues was explored in a two-way labyrinth, while the presence of taste was tested by introducing raw meat into the terrariums. An artificial spider burrow emerging into a "test-arena" was used to record and study prey capture responses, to measure precision and distance of prey detection, as well as observing methods of prey handling. This apparatus was also used to evaluate spider responses to falling leaves, sticks and a leaf "rattling" in wind, cues characteristic of abiotic noise.

An apparatus with four "propellers" at 0, 1, 3, and 5 cm depth in a "river sand" substrate was used to test whether spiders could detect depth of burrowing "prey". Locomotory activity was studied in individual holding-terrariums and in a large container.

Spiders did not respond to visual stimuli. Similarly, reactions to airborne and substrate-related chemical cues from prey were not detected. A sense of taste is present, as the meat was eaten by 6 of 10 spiders. Responses to vibratory stimuli were complex: prey

animals were detected at least 26 cm away, but seldom attacked at distances further than 10 cm. Falling leaves often initiated attacks, whereas falling sticks and a “rattling” leaf were mostly ignored.

Responses to propellers were clear-cut: at 3 and 5 cm depth the propellers were detected but not attacked. At 1 cm depth the spiders dug down and attacked the propeller, while no digging was observed when attacking the surface propeller.

Spiders in the laboratory walked considerable distances in their terrariums (max 113m in one night), until given an artificial burrow, whereupon they, like all spiders in the field, stayed close to their retreat at all times.

In conclusion, the patterns found in laboratory and field are consistent with a picture that Australian theraphosids predominantly hunt by ambushing prey near their refuge. Prey is primarily detected by air- and substrate-borne prey-generated vibrations. Different vibrational “signatures” are detected and can influence the types of spider response. Results indicate that surface and subsurface prey have different “signatures”, detected by the spiders. Prey capture, and responses to various vibratory stimuli appear dynamic and complex, and are recommended for further research.

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STATEMENT ON SOURCES

DECLARATION

I declare that this thesis is my own work and has not been submitted in any form for another degree or diploma at any university or other institution of tertiary education. Information derived from the published or unpublished work of others has been acknowledged in the text and a list of references is given.

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