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**TITLE PAGE**

**Predatory behaviour of theraphosid spiders in  
Northern Queensland**

**Thesis submitted by  
Bjørn Egil BERGE Candidatus Magisterii  
in January 2003**

**for the research Degree of Master of Science  
in Zoology and Tropical Ecology  
within the School of Tropical Biology  
James Cook University**

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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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## Table of contents:

<b>Abstract.....</b>	<b>3</b>
Acknowledgements.....	5
Table of contents.....	6
<b>Chapter 1: Introduction.....</b>	<b>15</b>
<b>Chapter 2: Spider senses and the predatory behaviour of theraphosids, a literature review.....</b>	<b>19</b>
<b>Abstract.....</b>	<b>19</b>
<b>2.1. About theraphosids.....</b>	<b>20</b>
<b>2.2. Australian theraphosids.....</b>	<b>21</b>
<b>2.3. Spider senses.....</b>	<b>23</b>
2.3.1. Visual sense.....	23
2.3.1.1. General background.....	23
2.3.1.2. Structure.....	25
2.3.1.3. Resolution and sensitivity.....	26
2.3.1.4. Fields of view.....	27
2.3.1.5. Polarised light.....	28
2.3.2. Chemical senses.....	29
2.3.2.1 Types of chemical stimuli.....	29
2.3.2.2. Spider chemoreceptors.....	29
2.3.2.3. Finding mates.....	30
2.3.2.4. Locating prey.....	31
2.3.3. Vibration detecting senses.....	32
2.3.3.1. General background.....	32
2.3.3.2. Tactile hairs.....	33
2.3.3.3. Spines.....	34
2.3.3.4. Scopula hairs.....	34
2.3.3.5. Trichobothria.....	34
2.3.3.6. Slit-sense and Lyriform organs.....	36
2.3.3.7. Proprioceptors.....	38
2.3.4. Thermal sensing.....	38
<b>2.4. Predatory behaviour/behavioural studies.....</b>	<b>40</b>
2.4.1. Prey detection and recognition.....	40
2.4.1.1. General background.....	40
2.4.1.2. Vibrations in sand.....	41
2.4.1.3. Vibrations through plants.....	42
2.4.1.4. Vibrations in water.....	43
2.4.1.5. Vibrations in air.....	44
2.4.1.6. Vibrations from subsurface prey.....	45



2.4.2. Communication.....	45
2.4.3. Hunting and prey capture.....	50
2.4.3.1. Hunting.....	50
2.4.3.2. Prey capture.....	53
2.4.4. Navigation.....	55
2.4.4.1. General background.....	55
2.4.4.2. Optical cues.....	55
2.4.4.3. Gravitational cues.....	56
2.4.4.4. Substrate-related cues.....	56
2.4.4.5. Chemical cues.....	56
2.4.4.6. Internal cues.....	56
2.4.5. Respiration rate and activity level.....	57
2.4.6. Anti-predatory behaviour.....	57
<b>2.5. Discussion.....</b>	<b>59</b>
<b>2.6. Conclusion.....</b>	<b>61</b>
<b>Chapter 3: Materials and methods.....</b>	<b>62</b>
<b>3.1. General methods.....</b>	<b>62</b>
3.1.1. Locating spiders for laboratory experiments and field observations.....	62
3.1.2. Spider housing, handling and maintenance in the laboratory.....	63
3.1.2.1. Housing.....	63
3.1.2.2. Handling.....	64
3.1.2.3. Maintenance.....	65
3.1.3. General video techniques.....	65
3.1.4. Behavioural categories used in field observation and video analysis.....	66
<b>3.2. Experimental procedures and data analysis.....</b>	<b>67</b>
3.2.1. Locomotory behaviour.....	68
3.2.1.1. Experiment 1: Locomotory behaviour in individual holding terraria.....	68
3.2.1.2. Experiment 2: Locomotory behaviour in large terrarium.....	70
3.2.1.3. Data analysis.....	70
3.2.2. Importance of vision in prey detection.....	71
3.2.2.1. Laboratory experiment.....	71
3.2.2.2. Data analysis.....	74
3.2.3. Importance of chemical senses in prey detection.....	75
3.2.3.1. Experiment 1: Dead food items.....	75
3.2.3.2. Experiment 2: Substrate-related chemical cues.....	76
3.2.3.3. Experiment 3: Olfactory stimulus.....	77
3.2.3.4. Data analysis.....	80

3.2.4. Function of vibration detecting senses in prey detection.....	81
3.2.4.1. “Hole in the ground set-up”.....	81
3.2.4.2. Experiment 1: Accuracy of spider responses to vibratory stimulus .....	83
3.2.4.3. Experiment 2: Responses to various “vibrational signatures” .....	85
3.2.4.4. Experiment 3: Is detection of vibrations aided by silk or other items... ..	86
3.2.4.5. Data analysis.....	86
3.2.5. 3D detection of prey stimulus position.....	87
3.2.5.1. “Propeller set-up”.....	87
3.2.5.2. Data analysis.....	89
<b>3.3. Field observations.....</b>	<b>90</b>
<b>Chapter 4: Locomotory behaviour.....</b>	<b>91</b>
<b>4.1. Introduction.....</b>	<b>91</b>
<b>4.2. Results.....</b>	<b>94</b>
4.2.1. Experiment 1: Locomotory behaviour in individual holding terraria.....	94
4.2.2. Experiment 2: Locomotory behaviour in large terrarium.....	96
4.2.3. Observations common in both studies.....	98
4.2.4. Field observations.....	99
<b>4.3. Discussion.....</b>	<b>102</b>
4.3.1. General discussion.....	102
4.3.2. Conclusion.....	105
<b>Chapter 5: Importance of vision in prey detection.....</b>	<b>106</b>
<b>5.1. Introduction.....</b>	<b>106</b>
<b>5.2. Results.....</b>	<b>107</b>
5.2.1. Direct observations.....	107
5.2.2. Control recordings.....	107
5.2.3. Responses to stimulus.....	108
5.2.4. Other observations.....	108
<b>5.3. Discussion.....</b>	<b>109</b>
5.3.1. General discussion.....	109
5.3.2. Conclusion.....	112

<b>Chapter 6: Importance of chemical senses, in prey detection.....</b>	<b>113</b>
<b>6.1. Introduction.....</b>	<b>113</b>
<b>6.2. Results.....</b>	<b>115</b>
6.2.1. Experiment 1: Dead food items.....	115
6.2.2. Experiment 2: Substrate-related chemical cues.....	115
6.2.3. Experiment 3: Olfactory stimulus.....	116
6.2.4. Responses to stimulus.....	116
<b>6.3. Discussion.....</b>	<b>117</b>
6.3.1. General discussion.....	117
6.3.2. Dead food items.....	117
6.3.3. Substrate-related chemical cues.....	118
6.3.4. Olfactory stimulus.....	119
6.3.5. Conclusion.....	120
<b>Chapter 7: Function of vibration detecting senses in prey detection</b>	<b>121</b>
<b>7.1. Introduction.....</b>	<b>121</b>
<b>7.2. Results.....</b>	<b>123</b>
7.2.1. Experiment 1: Accuracy of spider responses to vibratory stimulus.....	123
7.2.2. Experiment 2: Responses to various “vibrational signatures”.....	128
7.2.3. Experiment 3: Is detection of vibrations aided by silk or other items?...	129
<b>7.3. Discussion.....</b>	<b>131</b>
7.3.1. General discussion.....	131
7.3.2. Conclusion.....	135
<b>Chapter 8: 3D detection of prey stimulus position.....</b>	<b>136</b>
<b>8.1. Introduction.....</b>	<b>136</b>
<b>8.2. Results.....</b>	<b>138</b>
<b>8.3. Discussion.....</b>	<b>139</b>
8.3.1. General discussion.....	139
8.3.2. Conclusion.....	141
<b>Chapter 9: Other observations.....</b>	<b>142</b>
<b>9.1. Use of silk.....</b>	<b>142</b>
9.1.1. Silken curtains.....	142
9.1.2. “Urticating moulting cradle”.....	142
9.1.3. “Washing the floor”.....	143
<b>9.2. “Plugging” the retreat entrance.....</b>	<b>143</b>
<b>9.3. Drinking rain water.....</b>	<b>144</b>
<b>9.4. Threats to theraphosids.....</b>	<b>144</b>

<b>Chapter 10: Discussion and conclusion.....</b>	<b>145</b>
<b>10.1. General discussion.....</b>	<b>145</b>
10.1.1. Introduction.....	145
10.1.2. Practical aspects and problems.....	145
10.1.3. Locomotory behaviour.....	146
10.1.4. Senses and prey detection.....	147
10.1.5. Field work.....	149
10.1.6. Recommendations for further research.....	149
<b>10.2. Overall conclusion.....</b>	<b>150</b>
 <b>List of References.....</b>	 <b>151</b>
 <b>Appendices.....</b>	 <b>162</b>
A1: Locomotory behaviour.....	162
A2: Visual experiment.....	164
A3: Olfactometer experiment.....	166
A4: Prey capture experiment.....	168
A5: Behavioural categories.....	172

## List of illustrations and diagrams:

### Chapter 2: Spider senses and the predatory behaviour of theraphosids, a literature review.

<b>Figure 2.1:</b> <i>Phlogiellus sp.</i> .....	19
<b>Figure 2.2:</b> “Top-view” drawing of the eyes of a subadult theraphosid spider ( <i>Phlogiellus sp.</i> ).....	24

### Chapter 3: General materials and methods.

<b>Figure 3.1:</b> “Spider housing unit”.....	64
<b>Figure 3.2:</b> “Top-view” diagram of big terrarium.....	70
<b>Figure 3.3:</b> Schematic drawing of set-up to test for responses to visual stimuli.....	71
<b>Figure 3.4:</b> Two-way labyrinth, top view.....	76
<b>Figure 3.5:</b> Two-choice olfactometer, top and side view drawing.....	77
<b>Figure 3.6:</b> Two-choice olfactometer, top and side view... ..	78
<b>Figure 3.7:</b> “Hole in the ground set-up” side view drawing.....	81
<b>Figure 3.8:</b> “Hole in the ground set-up”.....	82
<b>Figure 3.9:</b> “Prey box”, top view.....	83
<b>Figure 3.10:</b> Symmetry line and random angle.....	84
<b>Figure 3.11:</b> “Propeller set-up”, top and side view drawing.....	87
<b>Figure 3.12:</b> Close up view of the propeller handles.....	88
<b>Figure 3.13:</b> Top/front view of the “test arena”.....	88
<b>Figure 3.14:</b> Vibration dampening “observation post”.....	90
<b>Table 3.1:</b> Overview of spiders used in this study for field observations or experiment....	63

## **Chapter 4: Locomotory behaviour.**

<b>Figure 4.1:</b> Walking distances for individual spiders in their individual holding terraria...	94
<b>Figure 4.2:</b> Temporal distribution between behavioural categories, as observed in individual holding terraria.....	95
<b>Figure 4.3:</b> Walking distances for individual spiders in a large terrarium.....	96
<b>Figure 4.4:</b> Temporal distribution between behavioural categories, as observed in a large terrarium.....	97
<b>Table 4.1:</b> Measures of tendencies from individual terrariums.....	95
<b>Table 4.2:</b> Measures of tendencies from large terrarium.....	98
<b>Table 4.3:</b> Results from observations of locomotory behaviour.....	99

## **Chapter 6: Importance of chemical senses, in prey detection.**

<b>Figure 6.1:</b> Results, contact chemoreception.....	115
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## **Chapter 7: Function of vibration detecting senses in prey detection.**

<b>Figure 7.1:</b> Average detection distances for each response type.....	125
<b>Figure 7.2:</b> Average detection angles for each response type.....	125
<b>Figure 7.3:</b> Overview of responses to crickets as vibratory stimulus.....	125
<b>Figure 7.4:</b> Remaining distance to prey position at time of detection, for various detection distances.....	126
<b>Figure 7.5:</b> Remaining distance after the initial strike, to prey position at time of detection, for various detection angles.....	126
<b>Figure 7.6:</b> Rest angle after the initial strike, from direct frontal alignment of the spider, towards the position of prey at time of detection, for various detection angles.....	127
<b>Figure 7.7:</b> “Scooping motion”.....	128
<b>Figure 7.8:</b> Angled chelicera.....	128
<b>Figure 7.9:</b> Responses to various abiotic stimuli falling onto the ground.....	129
<b>Table 7.1:</b> Spider responses to cricket prey.....	124

## **Chapter 8: 3D detection of prey stimulus position.**

<b>Figure 8.1:</b> Results, predatory responses of (n = 5) spiders to arhythmically turning propellers at various depths in substrate.....	138
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### **Appendices:**

<b>Table 1.1:</b> Results from observations in individual holding terraria.....	162
<b>Table 1.2:</b> Results from observations in large terrarium.....	163
<b>Table 2.1:</b> Results from visual experiment.....	164
<b>Table 3.1:</b> Results from olfactometer experiment.....	166
<b>Table 4.1:</b> Results for prey capture precision experiments in the “hole in the ground” set-up.....	168

**STATEMENT ON SOURCES**

**DECLARATION**

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