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Journal Item

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Leptophyes punctatissima is a medium sized, flightless tettigonid. Adults emerge in late July after six nymphal instars. The peak of mating is during August and adults are active day and night. Previous field work on this species is limited, though a study by Duncan (1960) suggested that nymphs feed on low vegetation while adults move up into trees to mate. However, he did not identify individuals. My study of a population in an old apple orchard in northern Germany, in collaboration with David Robinson (Open University) and Juergen Rheinlaender (University of Frankfurt), aimed to monitor the movements of individually marked adults in three-dimensional space.

We built a 5m $\times$ 10m platform at a height of 1.7m around two adjacent 5.5m tall apple trees to give us access to all parts of the canopy and the low vegetation surrounding the base of each tree (Fig. 1). All adults were captured shortly after emergence. They were marked with a number painted on the back with yellow modeller's enamel paint. Yellow was chosen because many of the leaves of the apple tree had yellow patches, so the numbers did not disrupt the animals' camouflage. Based on an idea from Heller and von Helverson (1990), each insect was also given a tag on its leg with a matching number. The tag was made from highly reflective sticky tape (Scotchlite reflective self adhesive tape: 8850 silver with pressure sensitive adhesive, made by 3M). This was inconspicuous during the day but could be used to locate the insects at night. Shining a torch on the tag revealed it as a bright spot in the dark, even from 50 metres away or more. As well as giving us access, the platform allowed us to record the position of any insect in 3-D space using X,Y and Z coordinates. Taking one corner of the platform as the origin, we marked X and Y coordinates along the edges. Z coordinates were measured with a ruler above (+) and below (-) the platform, which was absolutely level rather than parallel to the ground. Inter-observer reliability measurements of insect positions based on these coordinates gave an error of ±4cm.We scanned the two trees and the area surrounding them several times in each 24-hour period and quickly recorded the position of each marked adult by placing a small numbered peg next to it and noting the number of the insect against each peg number. This allowed us to record all insect positions in a short space of time, with minimal insect movement, after which we could go back and measure coordinates at our leisure. Positions outside the area of the platform were recorded approximately in two dimensions, based on distances from the platform origin.

Figure 1. Experimental platform for observing the position of speckled bushcrickets in the canopy.

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The distance an individual moved between consecutive position records was estimated as a straight line in 3-D space between the two sets of coordinates. Obvously, this is a minimum distance since it does not allow for meandering or backtracking. Results showed that, for a flightless insect, adults can move large distances, with some recorded more than 50 m from where they were originally caught. Males move around more than females, mainly because they are very active when singing. Mean height in the vegetation also increases with age for both males and females, which fits with Duncan's observations. However, this is not a straightforward gradual movement up into the tree canopy. Some adults stay low down and some nymphs are found high in the trees. Movement is not unidirectional and individuals move out horizontally from the low vegetation at the base of the tree as well as vertically up the tree. The pattern is more one of random dispersal in three dimensions rather than moving higher per se.

References

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