Novel subtle acoustic communication: Successful elucidation of the cryptic ecology of runner plant bugs (Hallodapus spp.) with emphasis on their stridulatory mechanisms

Animal Sciences

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Due to having a cryptic habitat, very little is known about the life history characteristics and stridulatory devices found in runner plant bugs (Hallodapus spp.) and several other members belonging to the tribe Hallodapini in the plant bug family Miridae (Heteroptera). In order to demonstrate stridulation in these bugs, we established new methods for capturing sufficient specimens and developed a unique system for recording the faint noises that they produce. Specifically, we carefully observed specimens, examined the microstructure of their stridulatory devices, and recorded their stridulations. We successfully demonstrated the following: 1) the stridulatory device, which comprises the forewing edge and dorsal metafemur, is used for intraspecific communication (at least for courtship); 2) an engine-vacuum-net is the safest and the most effective sampling method for capturing many epigeic targets; 3) the unique life cycle, behavior (including an enigmatic intraspecific conflict), immature forms, and feeding habits within the Miridae is documented for the first time; 4) the morphology of the stridulatory device is described after examination by scanning electron microscopy, and reliable hypotheses are proposed regarding how these could be used to infer phylogeny and construct a robust classification for runner plant bugs.
Further, a method for rearing and maintaining all of the developmental stages of runner plant bugs is established. Initial results show that our synthetic diet is more effective than the conventional diets used to mass-produce biocontrol agents, which will facilitate a reduction in the use of chemical pesticides and promote environmentally friendly pest management.

1. In this research project, the student directly handled, manipulated, or interacted with (check ALL that apply):

human participants | potentially hazardous biological agents

vertebrate animals | microorganisms | rDNA | tissue

2. I/we worked or used equipment in a regulated research institution or industrial setting (Form 1C):	YES	✘ NO
3. This project is a continuation of previous research (Form 7):	YES	✘ NO
4. My display board includes non-published photographs/visual depictions of humans (other than myself):	YES	✘ NO
5. This abstract describes only procedures performed by me/us, reflects my/our own independent research, and represents one year's work only:	✘ YES	NO
6. I/we hereby certify that the abstract and responses to the above statements are correct and properly reflect my/our own work.	✘ YES	NO

The stamp or embossed seal attests that this project is in compliance with all federal and state laws and regulations and that all appropriate reviews and approvals have been obtained including the final clearance by the Scientific Review Committee.