Water Surface Vibration Signals Utilized by the Japanese Water Strider, Aquarius elongatus, to Locate Prey and Mate

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The giant water strider, Aquarius elongatus, is one of the most noticeable semiaquatic insects in Japan. Because of its agility when skating, and ability to float on the water surface, this bug is often referred to as the ‘Ninja-insect’. Our research group set up a biotope-like tank that simulated the natural habitat and thus provided an appropriate environment for the water strider in the laboratory. The tank was efficient for long-term (6 month) observations on water striders and facilitated constant observations of the water strider’s ecology and ethology. Three novel tools were developed to clarify the effects of surface wave signals on water striders: a device constructed from an electric fan for generating surface waves; an acrylic water tank for measuring wave amplitude; and a model shaped like the male A. elongatus, made of iron wire, to generate vibrations and elicit courtship behaviors in females. The results revealed the following: (1) Surface vibrations are employed more frequently than visual cues for feeding and mating in A. elongatus, (2) A. elongatus recognizes surface vibrations with amplitudes of =2.5 mm and initiates predatory behavior promptly after detecting these vibrations, and (3) female A. elongatus respond to the 13 Hz surface vibrations that are produced by males using their paired fore and hind legs to initiate courtship. The present efforts clearly demonstrated how water surface vibrations are selectively used by A. elongatus, and will contribute to our understanding of the intraspecific communication systems that have evolved in water striders.

Awards Won:
Acoustical Society of America: Honorable Mention