University of Florida Book of Insect Records
Chapter 39 *Fastest Runner*

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31 July 1999

Australian tiger beetles, genus Cicindela*, subgenus* Rivacindela*, (Coleoptera: Cicindelidae) are the fastest running insects known. The fastest,* Cicindela hudsoni*, can run 2.5 meters per second (5.6 miles per hour).*

Throughout time, races have been run in order to decide who or what is the fastest of its kind. Yet there has never been a race to determine the fastest insect in the world. Recently scientists studying movement and defense have published data on how fast some insects can run. Which insect is judged the fastest may depend on whether speed is measured in absolute terms (e.g., meters per second [m/s]) or in relative terms (e.g., body lengths per second [bl/s]). This paper will decide that question and name a champion.

Methods

I gathered information from professors and colleagues at the University of Florida about possible candidates. To confirm these candidates and to find additional candidates I searched *Biological Abstracts* and *CAB* databases for relevant articles. *Web of Science* was later used to search for articles that cited the articles that I had already obtained. I gathered other possible candidates through a posting on the Entomo-L Listserv. Finally, I attempted to contact authors of relevant papers through e-mail.

The criteria established to determine the fastest insect are set as follows: 1. At least five speed measurement runs must have occurred.. 2. The top speed of the insect must be within a plausible range compared to the multiple test runs. 3. The methods and results must be published in a refereed journal.

Results

I narrowed the field to three contenders for the fastest land insect: the American cockroach, *Periplaneta americana*, and two Australian tiger beetles, *Cicindela hudsoni* and *C. eburneola* (subgenus *Rivacindela*). Young (1998) named *P. americana* the current record holder with a maximum speed recorded at 1.5 m/s (3.4 mph). Full and Tu (1991) measured this speed using a specially designed pressure sensitive plate inserted into the roach's raceway. A computer recorded the pressure and time of each footfall, from the first footfall to the last, as the roach crossed the 10.7 cm plate. They also used high-speed cameras to measure time and movement over the set distance. Kamoun and Hogenhout (1996) reported that both *C. hudsoni* and *C. eburneola* were faster than *P. americana*, with maximum recorded speeds of 2.49 m/s (5.57 mph) and 1.86 m/s (4.16 mph).

C. eburneola has a greater relative speed (171 bl/s) than both *P. americana* (50 bl/s) and *C. hudsoni* (120 bl/s). Kamoun and Hogenhout (1996) originally derived the speeds of the tiger beetles by measuring the time and distance the beetles moved when disturbed. The speeds were later reconfirmed for a few of the species of Australian tiger beetles, including *C. eburneola*, by using video imaging. *C. hudsoni* was not reconfirmed, but the method used to measure its speed was verified (Kamoun 1999).

Discussion

Many insects travel at great speeds for their own insect order but did not fall within the criteria established. One example is that Adams (1999) observed a tiger moth caterpillar, *Apantesis vittata,* that he recorded traveling at 3.13 mph (1.4 m/s) over a table top. However, the measurement was made only once and never published.

The insects that were reviewed for this paper have some physiological modifications to their style of movement. The American cockroach was able to increase its speed to 1.5 m/s by running on its two hind legs (Full & Tu 1991). While it is known that most tiger beetles flee their potential predators through flight, for some tiger beetles flight is a waste of valuable energy and even a possible hazard to reproducing, since their natural habitat is isolated and food is scarce. Natural selection has helped to fix this problem by increasing their ground speed to the point where wings aren't needed. These tiger beetles evolved into a form with only vestigial wings and/or fused elytra. A few of the many species studied from the subgenus *Rivacindela* have vestigial or deformed wings, including the two speedsters *C. hudsoni* and *C. eburneola* (Kamoun & Hogenhout 1996).

The final question now is which measurement of speed to use for the selection of the fastest runner: relative or absolute? If relative speed is the choice, the fastest running insect is *C. eburneola.* To convert its relative speed into human terms, a 6-foot man would move about 1026 feet per second or approximately 1/5 of a mile per second or 720 mph. This speed almost breaks the sound barrier at sea level (732 mph) and would seem to clearly indicate a winner. Nonetheless, I decided that absolute speed would be the deciding factor for fastest land insect. The reasoning came from human contests for fastest land vehicle (763.035 mph; Young 1998); here size of the vehicle did not matter, only its absolute speed. In addition, for the fastest land animal size was not considered, again only its top speed (cheetah, 70 mph; Young 1998). Therefore, by this criterion the tiger beetle *Cicindela hudsoni* is the fastest running insect.

Acknowledgements

I thank Dr. T.J. Walker, Dr. S. Kamoun of Ohio State University, and Dr. J. Adams of Dalton State College for their help and information on this subject.

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