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212 229 6825 piim.newschool.edu

Tracks Series: Visualizing the Travel Patterns of Bess Beetles

BRITTANY RANSOM, MFA

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ABSTRACT Track Series is an exploratory series of photographic, videographic, and motion capture images mapping the habitual travel patterns of bess beetles. In order to accurately capture such patterns the bess beetles are each affixed with their own trackable "back-pack." These are made from a self-adhesive hook and loop fastener, a small watch battery, and variable light-emitting diodes. Due to the beetle's necessity to constantly burrow and make tunnels through hard woods, such as oak, elm, and other deciduous trees, these beetles have a unique, brute strength unrivaled by many other organisms. This allows them to carry their illuminated backpacks with little hindrance respecting their motion. This project is conceptually rooted to the notions of emergence, travel, and the revealing of formerly unrecognized path making. Additionally, it furthers the author's persistent desire to collaborate (albeit uninvitedly) with insects.

RECORDING THE TRACKS OF BESS BEETLES

This research-based project focuses on patterns and voyage paths made by bess beetles. Bess beetles are classified under the binomial name *Odontotaenius disjunctus* under the order *Coleoptera.* These beetles are an imperative species that aid in the decomposition of waste and dead vegetation, specifically within forests; bess beetles are commonly found in decaying logs from Texas to Florida and as far north as Canada.[1] Bess beetles live in pairs within a colony and are semi-social insects. They pair with one other beetle and share housekeeping and larval care over a 14–16 month period of time.[2] Through the process of stridulation they are able to generate a wide range of communicative, acoustic signals. Bess beetles travel within their "homes," which are excavated galleries and connecting tunnels within rotting timber, to feed and to care for their young.[3] They also travel externally, upon the surface of their log homes—it is this surface travel, photographically captured, that generates the patterns that are the basis of this research-based endeavor: *Track Series.*

Track Series is an exploratory combination of ongoing photographic, videographic, and 3D motion capture

FIGURE 1:
Through long-exposure photography, the pathways made by bess beetles were captured as they traced on the surface of a rotting tree trunk.

images mapping the patterns of bess beetles when introduced to wooded environments. In order to accurately capture such patterns the bess beetles are each affixed with their own trackable backpack. These are made from a self-adhesive hook and loop fastener, a small watch battery, and variable light-emitting diodes. Due to the beetle's natural function to constantly burrow and make tunnels through rotting hard woods, such as oak, elm, and other deciduous trees, these beetles have a unique, brute strength unrivaled by many other organisms. In fact, bess beetles are used in many K-12 biology classes under an experiment called the "Penny Pull," "Tractor Pull," or "Beetle Pull." In this experiment, a petri dish, functioning as a sled, is carefully harnessed through a length of string to the "waist" (between front and middle legs, the two segments of the thorax) of a bess beetle. As the dish is pulled by the beetle across a flat surface pennies or other weights are added to the dish in order to determine maximum puling power.[4] Based upon my results after conducting this experiment the average of my collection of bess beetles could pull approximately 112.83 grams of weight. If this is equated to a human weighing 164 pounds that human would need to be able to pull 18,504 pounds to possess commensurate strength of an average adult bess beetle. Therefore, the fabricated beetle "backpack" is easy for the beetle to carry. Also, as the "backpack" is easily detachable, the beetles were able to free themselves from their backpack if desired by rubbing their body against logs. Doing so does not harm the beetle.

The beetles were carefully introduced into various wooded environments in Ohio, Illinois, and Wisconsin after they were prepared with their LED backpack. Using a Nikon D700, and a remote shutter, the travel patterns of the beetles were captured (both individually and as groups) via long-exposure photography taken between the hours of 10:00 p.m. and 3:00 a.m. central standard time. The beetles (or beetle groups) were photographed for a minimum of 3 hours. Multi-color images are indicative of beetle groups, as each participant wears a different color LED backpack: therefore such captured patterns denote groups of beetle movements. Some of the current results of the Tracks Series experiments and research are presented here as digital photographs.

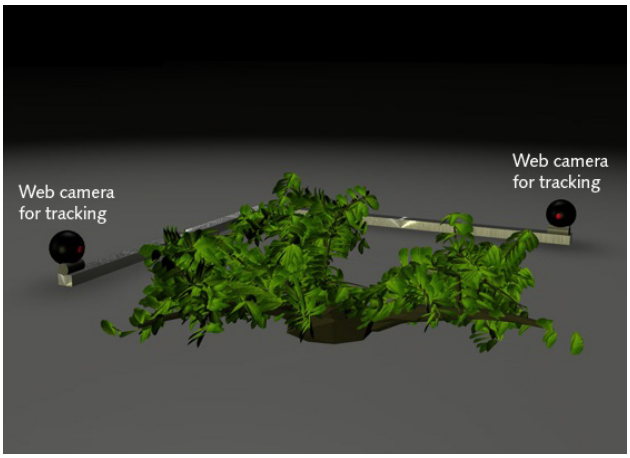
Other forms of travel path capture experimentation have taken place and are still under development. Videographic experimentation and 3D motion capture have also been a source of visual recording and exploration. Accessing the shared community Instructables.com, experiments of 3D path making have been tested by adapting instructions found here: http://www.instructables.com/id/3D-Motion-Capture/. Future iterations will include rapid prototyped paths exhibited as sculpture. This is a system in progress, loosely depicted in FIGURE 3.

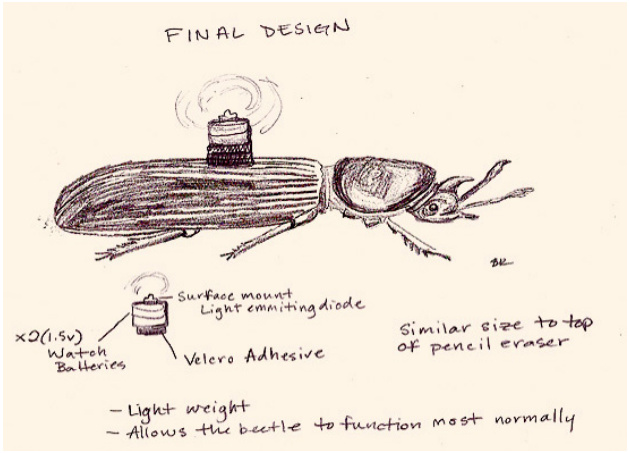
This project is conceptually rooted within the notions of emergence, travel, and unrecognized path-making as well as my always-persistent desire to collaborate (albeit uninvitedly) with insects. We exist in a world that is dominated by highly advanced mapping and tracking

FIGURE 2:
The images of the Beetles LED Backpack were taken between 1:00 p.m. and 3:00 a.m. central standard time in wooded areas of Ohio, Illinois, and Wisconsin.

technologies that offer us countless opportunities to locate ourselves, as well as to be located by others. For this project, I chose to deeply immerse myself within several different wooded areas, an area that though trackable, allows for one to become easily lost and decontextually immersed, especially at night. This is a world in which the beetles can navigate with impeccable accuracy due to their innate senses. Fascinated by their ability to exist naturally and navigate through this environment, I submerged myself within their world, following their patterns and recording them through a multitude of ways (while I found it difficult to personally navigate these spaces). The tracks are paths of navigation. The series of images presented pay homage to the work that goes on beneath our feet and within our forests while we are sleeping—activity vital to our planet's survival. Just as we are sometimes oblivious to the way modern technologies track our movements, I mapped the travel paths of the bess beetles with 3D motion capture, video documentation, and poetic, long-exposure photography.

My goal is to discover ways that human beings may forge a positive relationship between insects based on the knowledge of how insects navigate space and form intricate societies. As humans we are instinctively drawn to animals that are closer to our own realm of experience—animals that are most often feathered or furry. We anthropomorphize many of the behaviors and responses of these animals, establishing an emotional bond with them, far more easily than we ever could with beetles or other insects. Often characterized as unthinking and unfeeling, insects rarely illicit from us the feelings of empathy we easily afford many other mammals. By making such small connections, such as recognizing emergent trends and travel characteristics, it is my hope is that the gap between the insect world and the human world becomes smaller.





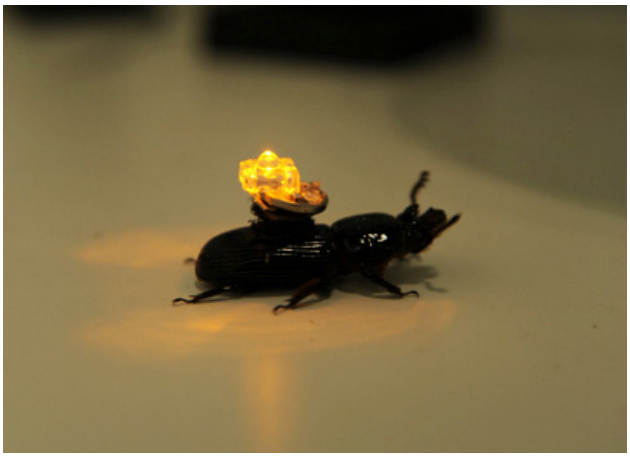


FIGURE 3, FIGURE 4, *and* FIGURE 5: *Planning for the long-exposure capture of the bess beetles involved two primary concerns: the preparation of the environment for recording movement, and the preparation of the bess beetles for their role in providing a readable host. Here a 3D rendering of the capture set up, diagrams for installing the light emitting diode, and the actual, prepared bess beetle are depicted.*

BIOGRAPHY

Brittany Ransom is an artist and educator living and working in Chicago, Illinois. She recently received her Master of Fine Arts degree with a concentration in New Media Arts (formerly Electronic Visualization) from The University of Illinois at Chicago. She is currently a College Art Association Fellow, former two-time Lincoln Fellow, and recipient of the Provost Award at the University of Illinois at Chicago. Prior to her time in Chicago, Ransom was living in Columbus, Ohio. While in Columbus she participated in numerous exhibitions and worked as an exhibit technician at the Center of Science and Industry. She received her Bachelor of Fine Arts from The Ohio State University with distinction with a concentration in Art and Technology in 2008. Ransom is currently a Visiting Adjunct Professor and Artist in Residence at Southern Methodist University teaching Physical Computing in the Center of Creative Computation within the Department of Art in Dallas, Texas. Brittany has exhibited her work both nationally and internationally. Ransom is originally from Lima, Ohio.

NOTES

1 Fross Web Science Curriculum, "Bess Beetles," http://lhsfoss.org/fossweb/teachers/materials/plantanimal/bessbeetle.html (accessed April 10, 2010).

2 Ibid.

3 Connecticut's Beardsley Zoo, "Bess Beetle," http://www.beardsleyzoo.org/kids/animal.asp?mc_id=821 (accessed April 12, 2010).

4 Little Rock School District, "Bess Beetle Lab," www.lrsd2.org/files/edservices/10sBessBeetleLab.doc (accessed September 20, 2011).