Video Article

April 2015: This Month in JoVE - Studying Locomotion in Drunken Worms, Preserving Human Liver for Transplantation, and Visualizing Bacterial Swarms

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Abstract

Here's a look at what's coming up in the April 2015 issue of JoVE: The Journal of Visualized Experiments.

In JoVE Neuroscience, it is clear that alcohol has profound effects on the brain. But why do different individuals respond so differently to alcohol, and why are some more prone to abuse? Some of the answers lie in our genes. In the nematode worm *C. elegans*, genes are easy to manipulate, and the neurobiology is simple. So it's an excellent model to study the effects of alcohol on behavior. Davies *et al*. use copper rings to corral worms with different genotypes on agar plates containing alcohol. They take videos of the worms at set time points and measure the locomotion of each genotype using object recognition software With this procedure, *C. elegans* can help unravel the molecular basis of alcohol sensitivity and tolerance, as well as the risk of abuse.

In JoVE Medicine, alcohol doesn't just affect the brain; it also affects the liver, and for many patients with alcoholic liver disease, liver transplantation is the only hope. But there is a severe shortage of livers available for transplants. Therefore, Bruinsma *et al*. present an alternative way to preserve donor livers, which are traditionally stored statically on ice. In this new method, the donor liver is kept alive by a perfusion machine and perfused at 21°C-warmer than ice, but lower than normal body temperatures, which allows the liver to be assessed for function and transplantability. This technique may greatly expand the pool of donor livers available to patients in need of transplants.

In JoVE Biology, one of the most commonly studied modes of bacterial motility is called swarming. However, the reproducibility of swarm plate assays can be difficult to achieve, so Morales-Soto *et al*. present a method that standardizes parameters (such as moisture content of plates) that affect swarming motility. By using bacterial strains expressing different fluorescent proteins, they can observe swarming competition dynamics between different species in a fluorescent time-lapsed video. This method can help elucidate various aspects of bacterial growth, such as how bacteria colonize different types of surfaces.

In JoVE Behavior, Labots *et al*. demonstrate the modified hole board. This behavioral testing apparatus consists of a protected box and a board containing small cylinders. In one type of experiment, the board can be baited with tasty food rewards. In some cylinders, the treat is locked under a grid, and in differently colored cylinders, the treat is accessible. Small laboratory mammals (such as rats) are conditioned to the food reward and tested for behaviors such as object recognition or food intake inhibition. This test can help measure unconditioned behavior of small laboratory mammals and analyze their cognitive abilities.

You've just had a sneak peek of the April 2015 issue of JoVE. Visit the website to see the full-length articles, plus many more, in JoVE: The Journal of Visualized Experiments.

Video Link

The video component of this article can be found at http://www.jove.com/video/5707/

Protocol

Preparation, Imaging, and Quantification of Bacterial Surface Motility Assays

Nydia Morales-Soto[1,2], Morgen E. Anyan[1], Anne E. Mattingly[1], Chinedu S. Madukoma[1], Cameron W. Harvey[3], Alber Mark[3], Eric Déziel[4], Daniel B. Kearns[5], Joshua D. Shrout[1,2,6]

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Swarming motility is influenced by physical and environmental factors. We describe a two-phase protocol and guidelines to circumvent the challenges commonly associated with swarm assay preparation and data collection. A macroscopic imaging technique is employed to obtain detailed information on swarm behavior that is not provided by current analysis techniques.

The Modified Hole Board – Measuring Behavior, Cognition and Social Interaction in Mice and Rats

Maaike Labots[1,2], Hein A. Van Lith[1,2], Frauke Ohl[1,2], Saskia S. Arndt[1,2]

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This protocol describes the modified hole board, which is a behavioral test set-up that comprises the characteristics of an open field and a traditional hole board. This set-up enables the differential analysis of unconditioned behavior of small laboratory mammals as well as the analysis of cognitive abilities.

Functional Human Liver Preservation and Recovery by Means of Subnormothermic Machine Perfusion

Bote G. Bruinsma*[1], James H. Avruch*[2], Pepijn D. Weeder[1], Gautham V. Sridharan[1], Basak E. Uygun[1], Negin G. Karimian[1], Robert J. Porte[3], James F. Markmann[2], Heidi G. Yeh[2], Korkut Uygun[1]

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We describe a method of *ex vivo* machine perfusion of human liver grafts at subnormothermic temperature (21°C).

An Assay for Measuring the Effects of Ethanol on the Locomotion Speed of *Caenorhabditis elegans*

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C. elegans is a useful model for studying the effects of ethanol on behavior. We present a behavioral assay that quantifies the effects of ethanol on the locomotion speed of crawling worms; both initial sensitivity and the development of acute functional tolerance to ethanol can be measured with this assay.

Disclosures

No conflicts of interest declared.