

Video Article

November 2014: This Month in JoVE: Flow Cytometry in Space, Venom Extraction from Spiders, Decision Making in Honeybees, and Oceanic Microbial Communities

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URL: <http://www.jove.com/video/5557>

DOI: [doi:10.3791/5557](https://doi.org/10.3791/5557)

Keywords: This Month in JoVE, Issue 93,

Date Published: 11/5/2014

Citation: Chao, W., Kolski-Andreaco, A. November 2014: This Month in JoVE: Flow Cytometry in Space, Venom Extraction from Spiders, Decision Making in Honeybees, and Oceanic Microbial Communities. *J. Vis. Exp.* (93), e5557, doi:10.3791/5557 (2014).

Abstract

Here's a look at what's coming up in the [November 2014 issue](#) of [JoVE: The Journal of Visualized Experiments](#).

In [JoVE Biology](#), we have a lot of videos that use [flow cytometry](#), which detects particles in suspension based on their fluorescence or their ability to absorb or scatter light. This technology allows blood and other heterogeneous cell mixtures to be sorted into cell populations. This has many biomedical applications, and this month, JoVE takes flow cytometry to a whole new level with a protocol that can be performed in space.

[Phipps et al.](#) demonstrate how to construct a flow cytometry rig that can operate in zero-gravity conditions. Then, they take it aboard a reduced-gravity aircraft, which creates a weightless environment at certain points in its parabolic flight path. Besides showing how to operate the flow cytometer, Phipps et al. demonstrate techniques for staying in control and avoiding nausea on reduced-gravity aircrafts, known affectionately as "vomit comets" to those who have flown on them. With these methods, vital diagnostics and experiments based on flow cytometry may be taken into space.

Also in [JoVE Biology](#), we examine the western black widow spider. The female western widow makes deadly venom that is full of neurotoxins, so scientists are interested in isolating and characterizing the venom's components. [Garb](#) demonstrates how to extract the venom, which can be subjected to protein analysis or functional assays. It also shows how to isolate venom glands from the spiders for gene expression studies. These methods may reveal important cellular pathways that are induced by venom, or provide leads for drug development.

In [JoVE Neuroscience](#), bees are often used to model learning, memory, and behavior. This month, [Orbán and Plowright](#) use two automated systems to study choice behavior in bumblebees. One method is based on radio frequency identification (RFID). The researchers place RFID-enabled tags on the bumblebees and show them artificial flowers with RFID readers. Every time a tagged bumblebee enters a flower, it is automatically recorded. In a second method, the bumblebees receive colored tags with numbers, and motion-sensitive high-definition video cameras capture various behaviors associated with choice, like approach, hovering, and landing. These techniques can reveal how bees choose one flower over another, and delve into the root of perception and choice in animals.

In [JoVE Environment](#), many natural resources come from the ocean, and tiny microorganisms and chemicals are critical components of marine ecosystems. This month, [Haas et al.](#) describe how to collect seawater samples, and present a series of validated protocols to analyze chemical and microbial components. The set of protocols provides an up to date approach to studying the microscopic and chemical makeup of the ocean.

You've just had a sneak peek of the [November 2014 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/5557/>

Protocol

Reduced-gravity Environment Hardware Demonstrations of a Prototype Miniaturized Flow Cytometer and Companion Microfluidic Mixing Technology

William S. Phipps¹, Zhizhong Yin¹, Candice Bae¹, Julia Z. Sharpe¹, Andrew M. Bishara², Emily S. Nelson³, Aaron S. Weaver³, Daniel Brown⁴, Terri L. McKay³, DeVon Griffin³, Eugene Y. Chan¹

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Spaceflight blood diagnostics need innovation. Few demonstrations have been published illustrating in-flight, reduced-gravity health diagnostic technology. Here we present a method for construction and operation of a parabolic flight test rig for a prototype point-of-care flow-cytometry design, with components and preparation strategies adaptable to other setups.

Radio Frequency Identification and Motion-sensitive Video Efficiently Automate Recording of Unrewarded Choice Behavior by Bumblebees

Levente L. Orbán, Catherine M.S. Plowright

School of Psychology, **University of Ottawa**

This video describes Radio-Frequency Identification (RFID) and motion-sensitive video recording methods to monitor choice behavior by bumblebees.

Extraction of Venom and Venom Gland Microdissections from Spiders for Proteomic and Transcriptomic Analyses

Jessica E. Garb

Department of Biological Sciences, **University of Massachusetts Lowell**

This article provides a protocol for the extraction of venom from spiders using electrical stimulation in order to 1) conduct proteomic characterization, 2) stimulate venom gland gene expression, and 3) perform functional studies of venoms. This is followed by a description of venom gland microdissections for gene expression studies.

Unraveling the Unseen Players in the Ocean - A Field Guide to Water Chemistry and Marine Microbiology

Andreas Florian Haas¹, Ben Knowles¹, Yan Wei Lim¹, Tracey McDole Somera², Linda Wegley Kelly¹, Mark Hatay¹, Forest Rohwer¹

¹Department of Biology, **San Diego State University**, ²Scripps Institution of Oceanography, **University of California San Diego**

Here, we present a comprehensive protocol to assess the organic and inorganic nutrient availability and the abundance and structure of microbial and viral communities in remote marine environments.

Disclosures

No conflicts of interest declared.