

Video Article

July 2014: This Month in JoVE - Shrinkage Stress in Dental Fillings, Olfactory Learning in Honeybees, Age-related Balance Changes, and Chemical Distribution in the Environment

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Abstract

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

Going to the dentist to get a cavity filled is pretty unpleasant. Even worse, the resin composites used in dental fillings shrink as they set. This can cause the filling to debond-allowing new cavities to form under the filling. Alternatively, the shrinkage may cause the tooth to crack. These problems call all result in more trips to the dentist. In *JoVE Clinical & Translational Medicine*, [Li *et al.*](#) analyze the shrinkage strain and stress of polymerizing fillings. They do this by making a glass model of a tooth cavity and filling it with a resin composite. Then they use digital image correlation to show the areas and types of shrinkage strain, such as horizontal tensile strain or contraction strain. This method can help scientists develop improved resin composites that will hopefully result in fewer trips to the dentist.

In *JoVE Neuroscience*, [Brill *et al.*](#) demonstrate how honeybees learn through olfaction, or the sense of smell. They stimulate the bees with odors and pheromones while using electrodes to record from two tracts in their olfactory pathway. This technique allows stable long-term recordings for hours or even days. Our authors use these recordings to reconstruct the neuronal architecture in 3D. This method can help scientists better understand how olfaction contributes to learning and memory.

In *JoVE Behavior*, we feature two standard behavioral tests for assessing balance performance in mice. In the rotarod test, mice walk along rotating and accelerating dowels; when they lose their balance, they fall. In the balance beam test, mice walk along a narrow, circular rod into the shelter of a dark box. Trials are recorded with a video camera for later analysis. [Tung *et al.*](#) use both of these tests to show how balance changes with age. Older mice will fall faster on the rotarod test and take longer to traverse the balance beam. These simple and non-invasive tests can provide insight into age-related changes. They can also be used to study neuromuscular and inner ear disorders.

In *JoVE Environment*, chemical management is a major concern as more and more chemicals end up in our soil. These include pesticides, fertilizers, biological hazards, and industrial waste. This month, [Matteson *et al.*](#) integrate two methods for studying the fate of chemicals in the environment: lysimetry and porewater sampling. The lysimeters in this protocol are made of rolled and welded steel sheets. They are driven into the test site, and the porewater samplers are pushed into the lysimeter. At the desired time points, the lysimeters are extracted, and samples are taken for analysis. This technique can establish the distribution and potential risks of chemicals in the environment.

You've just had a sneak peek of the [July 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/5413/>

Protocol

Simultaneous Long-Term Recordings at Two Neuronal Processing Stages in Behaving Honeybees

Martin Fritz Brill, Maren Reuter, Wolfgang Rössler, Martin Fritz Strube-Bloss

Department of Behavioral Physiology and Sociobiology (Zoology II) Biozentrum, **University of Würzburg**

Simultaneous extracellular long term recordings from two different brain neuropiles or two different anatomical tracts were established in honey bees. These recordings allow the investigation of temporal aspects of neuronal processing across different brain areas at the single neuron as well as at the ensemble level in a behaving animal.

Shrinkage of Dental Composite in Simulated Cavity Measured with Digital Image Correlation

Jianying Li, Preetanjali Thakur, Alex S. L. Fok

Minnesota Dental Research Center for Biomaterials and Biomechanics, School of Dentistry, **University of Minnesota**

In order to understand the spatial development of polymerization shrinkage stress in dental resin-composite restorations, Digital Image Correlation was used to provide full-field displacement/strain measurement of restored model glass cavities by correlating images of the restoration taken before and after polymerization.

Behavioral Assessment of the Aging Mouse Vestibular System

Victoria W. K. Tung¹, Thomas J. Burton², Edward Dababneh¹, Stephanie L. Quail¹, Aaron J. Camp¹

¹Discipline of Biomedical Science, **University of Sydney**, ²The Bosch Institute Animal Behavioural Facility, **University of Sydney**

Motor control and balance performance are known to deteriorate with age. This paper presents a number of standard noninvasive behavioral tests with the addition of a simple rotary stimulus to challenge the vestibular system and show changes in balance performance in a murine model of aging.

Integrated Field Lysimetry and Porewater Sampling for Evaluation of Chemical Mobility in Soils and Established Vegetation

Audrey R. Matteson^{*1}, Denis J. Mahoney^{*2}, Travis W. Gannon², Matthew L. Polizzotto¹

¹Department of Soil Science, **North Carolina State University**, ²Department of Crop Science, **North Carolina State University**

Field lysimetry and porewater sampling allow researchers to evaluate the fate of chemicals applied to soils and established vegetation. The goal of this protocol is to demonstrate how to install required instrumentation and collect samples for chemical analysis during integrated field lysimetry and porewater sampling experiments.

Disclosures

No conflicts of interest declared.