

Video Article

2016: This Year in JoVE

Nicola Chamberlain¹, Aaron Kolski-Andreaco¹

¹JoVE Content Production

Correspondence to: Aaron Kolski-Andreaco at aaron.kolski-andreaco@jove.com

URL: <https://www.jove.com/video/5827>

DOI: [doi:10.3791/5827](https://doi.org/10.3791/5827)

Keywords: This Month in JoVE, Issue 119,

Date Published: 1/6/2017

Citation: Chamberlain, N., Kolski-Andreaco, A. 2016: This Year in JoVE. *J. Vis. Exp.* (119), e5827, doi:10.3791/5827 (2017).

Abstract

Welcome to JoVE's Year in Review, where we highlight some of the most interesting video protocols of the past year.

In January 2016 JoVE started out with a bang...or rather, it didn't need to...as [JoVE Engineering](#) gave us a protocol for the production of [synthetic nuclear melt glass](#). This is a valuable tool for forensic study of post-detonation, without the boom.

February was a treasure of a month for JoVE - not only did we publish our 6000th article, but in [JoVE Chemistry](#) we showcased research on [gold nanoparticles](#) from the laboratory of a Nobel Prize winner.

In March, [JoVE Biology](#) described [RNA interference](#) in the malaria vector Mosquito *Anopheles gambiae*, through direct pupal injection. This promising research may pave the way for the next generation of mosquito-borne disease control.

April heralded the launch of a new Science Education collection - [Chemistry](#). Here, we unveiled protocols covering the fundamentals of general, organic, and Inorganic chemistry - giving students the chance to explore lab techniques, common equipment, and core theories of Chemistry.

Shhh! In May, [JoVE Environment](#) profiled a novel technique for tracking and [identifying individual cheetahs](#) from just their footprints...allowing researchers to better monitor and protect Africa's most endangered large Felid.

June gave us the new Science Education [Clinical Skills](#) collections, providing a foundation for performing physical examinations of patients including the assessment of vital signs, and basic external and internal evaluations.

In July, [JoVE Neuroscience](#) was buzzing with cool science. We showcased research into the taste [perception of honeybees](#) to different nutrients and toxins and how this influences the feeding behavior of these critical pollinators.

[JoVE Medicine](#) got to the heart of the matter in August...profiling a new method to help investigate [angina](#) and identify constrictions in coronary arteries.

September launched three new JoVE Journal sections covering Genetics, Cancer Research, and Biochemistry. These new collections include groundbreaking research into topics as diverse as genetic engineering of unconventional [yeast strains for biofuels](#)...mass spectrometry for [meat authentication](#)...and mixed cell culture models to mimic [tumor microenvironments](#).

In October, JoVE [Immunology and Infection](#) took us behind the scenes in a Biosafety Level 4 facility. In a four article series, we showed how researchers operate [aerobiology chambers](#)...use [safety suits](#) and [biosafety cabinets](#)...and perform [medical imaging](#) in an environment containing life threatening diseases like the Ebola virus.

November's [JoVE Behavior](#) explored...um...oh yes...memory. Our authors showed that [turtles](#) actively use memory and recall to find their seasonal habitats, and not simply environmental cues.

Finally, in December, [JoVE Bioengineering](#) helped us to see things more clearly, with a new technique for performing [3D super-resolution microscopy](#) of individual cell structures and components.

This Year in Review was just a sampling of more than 1100 video-articles that JoVE published in 2016. Browse the [JoVE archives](#) for thousands of other videos, and come back each week to see brand-new material in [JoVE: The Journal of Visualized Experiments](#)

Video Link

The video component of this article can be found at <https://www.jove.com/video/5827/>

Protocol

Production of Synthetic Nuclear Melt Glass

Joshua J. Molgaard¹, John D. Auxier II^{2,3}, Andrew V. Giminaro^{2,3}, Colton J. Oldham², Jonathan Gill², Howard L. Hall^{2,3,4}

¹Department of Physics and Nuclear Engineering, **United States Military Academy**, ²Department of Nuclear Engineering, **University of Tennessee**, ³Radiochemistry Center of Excellence (RCoE), **University of Tennessee**, ⁴Institute for Nuclear Security, **University of Tennessee**

A protocol for the production of synthetic nuclear melt glass, similar to trinitite, is presented.

A Simple Method for the Size Controlled Synthesis of Stable Oligomeric Clusters of Gold Nanoparticles under Ambient Conditions

Marlon Lawrence¹, Anze Testen¹, Tilen Koklic², Oliver Smithies¹

¹Department of Pathology and Laboratory Medicine, **University of North Carolina at Chapel Hill**, ²Condensed Matter Physics Department, Laboratory of Biophysics, **Jozef Stefan Institute**

We describe a simple method for producing highly stable oligomeric clusters of gold nanoparticles via the reduction of chloroauric acid (HAuCl₄) with sodium thiocyanate (NaSCN). The oligoclusters have a narrow size distribution and can be produced with a wide range of sizes and surface coats.

RNAi Trigger Delivery into *Anopheles gambiae* Pupae

Kimberly Regna¹, Rachel M. Harrison¹, Shannon A. Heyse¹, Thomas C. Chiles¹, Kristin Michel², Marc A. T. Muskavitch^{1,3}

¹Biology Department, **Boston College**, ²Division of Biology, **Kansas State University**, ³Discovery Research, **Biogen**

RNA interference (RNAi) is an extremely valuable tool for uncovering gene function. However, the ability to target genes using RNAi during pre-adult stages is limited in the major human malaria vector *Anopheles gambiae*. We describe an RNAi protocol to reduce gene function via direct injection during pupal development.

Spotting Cheetahs: Identifying Individuals by Their Footprints

Zoe C. Jewell¹, Sky K. Alibhai¹, Florian Weise^{2,3}, Stuart Munro², Marlice Van Vuuren⁴, Rudie Van Vuuren⁴

¹WildTrack and Nicholas School of the Environment, **Duke University**, ²N'a'an ku sê Research Programme, ³Division of Biology and Conservation Ecology, School of Science and the Environment, **Manchester Metropolitan University**, ⁴N'a'an ku sê Foundation

The cheetah (*Acinonyx jubatus*) is an iconic, endangered species, but conservation efforts are challenged by habitat shrinkage and conflict with commercial farmers. The footprint identification technique, a robust, accurate and cost-effective image classification system, is a new approach to monitoring cheetahs.

A Novel Behavioral Assay to Investigate Gustatory Responses of Individual, Freely-moving Bumble Bees (*Bombus terrestris*)

Carolyn Ma, Sébastien Kessler, Alexander Simpson, Geraldine Wright

Institute of Neuroscience, **Newcastle University**

A novel behavioral assay is described for investigating the short term gustatory responses of the mouthparts of freely-moving bumble bees (*Bombus terrestris*) toward nutrients and toxins in solution.

Intracoronary Acetylcholine Provocation Testing for Assessment of Coronary Vasomotor Disorders

Peter Ong, Anastasios Athanasiadis, Udo Sechtem

Department of Cardiology, **Robert-Bosch-Krankenhaus**

Intracoronary acetylcholine testing has been established for the assessment of epicardial coronary spasm more than 30 years ago. Recently, the focus has shifted towards the microcirculation and it has been shown that microvascular spasm can be detected using ACH-testing. This article describes the ACH-test and its implementation in daily routine.

A Mimic of the Tumor Microenvironment: A Simple Method for Generating Enriched Cell Populations and Investigating Intercellular Communication

Jason D. Domogauer, Sonia M. de Toledo, Edouard I. Azzam

Department of Radiology, New Jersey Medical School, **Rutgers University**

We adapted a permeable microporous membrane insert to mimic the tumor microenvironment (TME). The model consists of a mixed cell culture, allows simplified generation of highly enriched individual cell populations without using fluorescent tagging or cell sorting, and permits studying intercellular communication within the TME under normal or stress conditions.

Genetic Engineering of an Unconventional Yeast for Renewable Biofuel and Biochemical Production

Ai-Qun Yu^{1,2}, Nina Pratomo^{1,2}, Tee-Kheang Ng^{1,2}, Hua Ling^{1,2}, Han-Saem Cho^{1,2}, Susanna Su Jan Leong^{1,2,3}, Matthew Wook Chang^{1,2}

¹Department of Biochemistry, Yong Loo Lin School of Medicine, **National University of Singapore**, ²NUS Synthetic Biology for Clinical and Technological Innovation (SynCTI), Life Sciences Institute, **National University of Singapore**, ³Food Science and Chemical Engineering, **Singapore Institute of Technology**

We herein report methods on the molecular genetic manipulation of the *Yarrowia lipolytica* Po1g strain for improved gene deletion efficiency. The resulting engineered *Y. lipolytica* strains have potential applications in biofuel and biochemical production.

Species Determination and Quantitation in Mixtures Using MRM Mass Spectrometry of Peptides Applied to Meat Authentication

Yvonne Gunning¹, Andrew D. Watson¹, Neil M. Rigby², Mark Philo¹, Joshua K. Peazer^{1,3}, E. Kate Kemsley¹

¹Analytical Sciences Unit, **Institute of Food Research**, ²**Institute of Food Research**, ³School of Chemistry, **University of East Anglia**

We present a protocol for identifying and quantifying the components in mixtures of species possessing similar proteins. Mass spectrometry detects peptides for identification, and gives relative quantitation by ratios of peak areas. As a tool food for fraud detection, the method can detect 1% horse in beef.

Safety Precautions and Operating Procedures in an (A)BSL-4 Laboratory: 3. Aerobiology

J. Kyle Bohannon, Krisztina Janosko, Michael R. Holbrook, Jason Barr, Daniela Pusl, Laura Bollinger, Linda Coe, Lisa E. Hensley, Peter B. Jahrling, Jiro Wada, Jens H. Kuhn, Matthew G. Lackemeyer

Integrated Research Facility at Frederick, National Institute of Allergy and Infectious Diseases (NIAID), **National Institutes of Health (NIH)**

As high-consequence pathogens can potentially infect subjects through airborne particles, aerobiology has been increasingly applied in pathogenesis research and medical countermeasure development. We present a detailed visual demonstration of aerobiology procedures during an aerosol challenge in nonhuman primates in an animal biosafety level 4 maximum containment environment.

Safety Precautions and Operating Procedures in an (A)BSL-4 Laboratory: 1. Biosafety Level 4 Suit Laboratory Suite Entry and Exit Procedures

Krisztina Janosko¹, Michael R. Holbrook¹, Ricky Adams¹, Jason Barr¹, Laura Bollinger¹, Je T'aime Newton², Corrie Ntforo², Linda Coe¹, Jiro Wada¹, Daniela Pusl¹, Peter B. Jahrling¹, Jens H. Kuhn¹, Matthew G. Lackemeyer¹

¹Integrated Research Facility at Frederick, National Institute of Allergy and Infectious Diseases (NIAID), **National Institutes of Health (NIH)**,

²Environmental Health and Safety, Biological and Chemical Safety Program, **University of Texas Medical Branch**

Although researchers are generally knowledgeable about procedures and safety precautions required for biosafety level 1 or 2 (BSL-1/2) experiments, they may not be familiar with experimental procedures in BSL-4 suit laboratories. This article provides a detailed visual demonstration of BSL-4 suit laboratory systems check, laboratory entry, movement, and exit procedures.

Safety Precautions and Operating Procedures in an (A)BSL-4 Laboratory: 2. General Practices

Steven Mazur, Michael R. Holbrook, Tracey Burdette, Nicole Josleyn, Jason Barr, Daniela Pusl, Laura Bollinger, Linda Coe, Peter B. Jahrling, Matthew G. Lackemeyer, Jiro Wada, Jens H. Kuhn, Krisztina Janosko

Integrated Research Facility at Frederick, National Institute of Allergy and Infectious Diseases (NIAID), **National Institutes of Health (NIH)**

Performing viral assays in a BSL-4 laboratory is more involved compared to work in a BSL-2 laboratory due to required additional safety precautions. Here, we present an overview of practices and procedures used inside a BSL-4 laboratory illustrating proper Class II biosafety cabinet usage, waste management/disposal, and sample removal.

A Buoyancy-based Method of Determining Fat Levels in *Drosophila*

Kelsey E. Hazegh, Tânia Reis

Department of Medicine, Division of Endocrinology, Metabolism, and Diabetes, **University of Colorado Anschutz Medical Campus**

Here we present a method to measure organismal fat levels in the third instar (L3) larval stage of *Drosophila melanogaster*. This method exploits the comparatively low density of fat tissue to differentiate between larvae with altered fat stores. Buoyancy-based analysis is a valuable tool for rapid, reproducible, and economical screening.

Using Pharmacological Manipulation and High-precision Radio Telemetry to Study the Spatial Cognition in Free-ranging Animals

Timothy C. Roth^{*1}, Aaron R. Krochmal^{*2}, William B. Gerwig, IV¹, Sage Rush³, Nathaniel T. Simmons², Jeffery D. Sullivan⁴, Katrina Wachter⁵

¹Department of Psychology, **Franklin and Marshall College**, ²Department of Biology, **Washington College**, ³**University of Pennsylvania**,

⁴School of Forestry and Wildlife Sciences, **Auburn University**, ⁵Morsani College of Medicine, **University of South Florida**

This paper describes a novel protocol that combines the pharmacological manipulation of memory and radio telemetry to document and quantify the role of cognition in navigation.

Disclosures

No conflicts of interest declared.