

Biology Base Camp

Biology Base Camp is a participatory lab where visitors put on lab coats, goggles, and gloves and conduct experiments that get to the cellular level of science. These activities are designed to be easy and fun—some are even simple enough for kindergartners to do (with a little adult supervision).

“This is an incredible area in *Expedition Health*,” said Nancy Walsh, Museum educator and coordinator of health gallery programs. “Our visitors of all ages will be able to perform real experiments, test hypotheses, and be a scientist for a day.”

An *Expedition Health* volunteer will greet individuals and groups, outfit them with lab gear, and help them get situated at lab benches with the proper materials for their experiment. A computer-based lab companion provides a short primer on what visitors will be doing during the experiment and explains how it relates to health and personal biology. From there, the lab companion will lead visitors through each step of the experiment, while volunteers circulate to answer specific questions and offer assistance when needed.

Visitors can choose from five different activities in the Biology Base Camp:

Extract DNA

Time: 15 minutes

Visitors learn that deoxyribonucleic acid (DNA) is an “instruction manual” that cells use to perform many of their varied tasks, depending on their body’s needs or developmental state. At this lab bench, visitors will perform an experiment to extract DNA from wheat germ, physically and chemically breaking it apart, uncoiling its DNA, and then spooling the DNA along a glass rod. Scientists use a very similar procedure to produce highly purified DNA. Visitors are encouraged to touch the DNA they extract to see what it feels like.

See Your Cells

Time: 10 to 15 minutes

Visitors learn that their bodies are made of trillions of cells that carry out all the complex biological processes that keep them alive. They have a chance to see some of their own cells—called epithelial cells—that form their skin and glands and line their organs, protecting them from injury. After gently harvesting a sample of epithelial cells from inside their cheek, visitors put the cells on a slide, stain them, and examine this small sample of their own body under a microscope.

Battle Bacteria

Time: 15 to 20 minutes

This experiment allows visitors to answer the question “Do antibacterial products kill bacteria better than regular soap or bleach?” They choose from various hand-sanitizing gels, regular and antibacterial soaps, and bleach and create a hypothesis about which cleaner will kill the most live bacteria.

“Live bacteria glow greenish yellow under UV light,” said Adam Schwindt, health sciences lab manager. “It is very obvious if the soaps have killed them because the dead bacteria stop glowing. It is a very visual demonstration of which soaps work best.”

In addition, visitors learn one of the undesirable effects of using antibacterial products—the creation of resistant strains of bacteria—and they find out how this adaptive process happens.

Food Chemistry

Time: 10 minutes

Visitors learn that what they eat provides their bodies with the energy and nutrients necessary for life. In this activity, they put two breakfast cereals to the test to determine which of them has the highest sugar content and how high-sugar foods impact the body and health.

Drug Impacts

Time: 15 minutes

Visitors learn that some chemicals in the food and drinks that people ingest impact biological systems that are necessary for life. In this experiment, visitors expose *Daphnia*, water fleas commonly used in scientific experiments, to caffeine, alcohol, nicotine, and sleeping pills and observe how they react. *Daphnia* are mostly transparent under a microscope, so their heart activity is easily seen when magnified after being exposed to the substances.

THE GENETICS OF TASTE AND SMELL PROJECT

In addition to its many other unique attributes, *Expedition Health* features the first health-based community research lab housed at a museum. This lab, located adjacent to the Biology Base Camp, will be used for a groundbreaking health education and research study called the Genetics of Taste and Smell Project. The project was funded by a \$655,000 Science Education Partnership Award (SEPA) grant from the National Center for Research Resources (NCRR), National Institutes of Health (NIH), a portion of which was used toward building the lab and creating the experiment. A majority of the funds will be used to operate the program for three years.

In the community lab, families will participate in a real research project about the genetics of taste. Taste sensation has been increasingly linked with diet and health and a person's ability to taste correlates with his or her food preferences. In a series of simple but highly specialized tests, participants will learn which gene variations they have and how these variations may influence how they taste food.

“Teaching the public about their genetic profile and its influence on taste may have a positive impact on major health threats such as cardiovascular disease and obesity,” said Bridget Coughlin, PhD, the Museum's deputy chief curator, curator of human health, and lead investigator for the grant.

The data collected from participants will be processed by Museum volunteers and sent to the Museum's academic partner, the University of Florida at Gainesville, for further analysis and inclusion in their own ongoing research analysis and publications.

“This lab experience will not only educate the public but will also advance research and offer a vivid model for how research is translated into the public domain,” said Coughlin.

“This project is a phenomenal way to expose students and teachers to science and inquiry-based investigation,” said Tony Beck, PhD, who oversees the SEPA program. “Genetics of Taste will engage the Denver community in an interactive dialogue on how medical research impacts personal health, providing them with an authentic research experience.”

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DMNS-09-010

Many of the Museum's educational programs and exhibits are made possible in part by generous funding from the citizens of the seven-county metro area through the Scientific & Cultural Facilities District.

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DID YOU KNOW? The patterns of your blood vessels are as unique as your fingerprints.