Melodious Genes

In the corner of a small art gallery in Queens, a white plaster pedestal supports a square wooden sculpture containing 64 silicon buttons. With the help of a willing gallery visitor, the piece can convert genetic code from the influenza virus into music.

The interactive artwork is the creation of Jeff Kim, a scientist who uses the basic biology he studies to make art in his spare time. Taking that mental leap out of the lab and into a gallery gives him a fresh perspective on his research. Usually, his artwork drives ideas for experiments. “It’s kind of a guilty pleasure,” he says.

Kim is a doctoral student in the Rockefeller University lab of HHMI early career scientist Sean Brady, who mines vast quantities of environmentally derived DNA—for example, from soil-dwelling bacteria—looking for genes that could lead to bioactive natural products, such as antibiotics and anticancer agents.

One of Kim’s recent tasks in the lab was developing an easy way to visualize lots of genetic information in an intuitive manner. As a proof of principle, he focused initially on a protein involved in influenza virulence. There are nine versions of the viral enzyme, each with a slightly different genetic code.

It’s hard to get a snapshot of all nine versions at once. Usually that information comes in a series of charts, graphs, and sequences of letters. Kim was stumped on how to proceed until he brought the problem to his artist friends. They suggested layering the information—somehow.

So Kim plotted the DNA base pairs—A, T, C, and G—as a grid of translucent, colored squares. The squares changed in color intensity based on whether the base pair existed in that particular version of the enzyme.

By layering the nine different grids, Kim created a simple map that revealed mutations: Squares with more intense colors meant the base pairs stayed the same for all nine types. Faded or discolored squares meant a change in the base pair. Suddenly, Kim could see interesting information about several versions of the enzyme at once, in an aesthetic way.

The grid became a central part of Kim’s art. Which is where the sculpture comes in.

The piece is modeled after a section of his grid: inside a wooden frame are 64 keys, each connecting to a chip that communicates with a computer program. Each key corresponds to a colored square on the grid, which in turn corresponds to a different section of a piece of music Kim composed.

People can play the instrument by pressing different keys. The computer program registers the pattern and, from a desktop computer, strings together tracks of Kim playing the cello, based on the order in which the keys are pressed.

The grid is useful for intuitively visualizing complex genetic information, but the sculpture lets people interact with that information in an unexpected way, Kim says.

When he came to New York, seven years ago, Kim tried focusing on music, his first love. At Rockefeller, he learned that science could be a creative outlet and that both fields could complement one another.

“The music thing was fun but it was hard to survive solely on musical pursuits,” he says.

Now, science keeps him fed, but his mind still sees genes and hears notes.

—Shelley DuBois

WEB EXTRA: To see and hear Kim interact with his grid sculpture, visit www.hhmi.org/bulletin/nov2010.