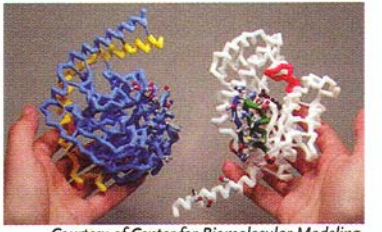
Building a 3-D Protein Model, Literally

3D Molecular Designs takes models off the computer screen and into researchers' hands

Until recently structural biology has been limited by the fact that it relies on two-dimensional computer representations of three-dimensional objects. Now 3D Molecular Designs (www.3dmoleculardesigns.com) of Wauwatosa, Wis., hopes to make the field truly three-dimensional, allowing new insights into known structures and giving hope to those not blessed with the space-manipulation skills needed to make sense of flat-screen images.



Courtesy of Center for Biomolecular Modeling, Milwaulkee School of Engineering

The company grew out of a small business-innovation research grant to Tim Herman and his colleagues at the Center for Biomolecular Modeling, Milwaukee School of Engineering, for modifying rapid prototyping technologies to make molecular models.

Herman's team worked initially with Roger Sayle, a designer of RasMol, the popular molecule-visualization freeware, to create software that would generate output from PDB files that could be read by the rapid prototyping machines. Now, they can create α-carbon-backbone or ball-and-stick models in nylon or plaster. In addition to off-the-shelf models such as immunoglobulin and the ribosome, the company offers custom model services.

"The models are irreplaceable for the purpose of communication," says customer David Klein, of the National Institute of Child Health and Human Development in Bethesda, Md. Klein notes that his six N-acetyltransferase models often stimulate him to develop new ideas. "Other people have picked [the models] up and they are absolutely stunned ... it's like they are getting re-familiarized with an old friend," he says.

Depending on size and complexity, production of a custom model usually takes two weeks, and a three-inch GFP model will set you back about $400 (US). But for those who are strapped for cash, Herman and colleagues offer a library service through the Milwaukee School of Engineering Web site (www.rpc.msoe.edu/cbm/index.php). For the price of shipping, any high school or undergraduate teacher can borrow one of their models for 10 days.

The technology is "extremely useful" for teaching purposes, according to catalytic RNA researcher Samuel Butcher, who teaches introductory biochemistry to 500 undergraduates at the University of Wisconsin-Madison. "If a student can physically hold a molecule such as chymotrypsin, hemoglobin, or the ribosome, then they can immediately and intuitively appreciate how structure relates to function."

—**Helen Dell**