

Third College Junior working with Professor of Chemistry Dr. Lemuel Bowie on cure for sickle cell anemia

September 10, 1974

They don't fly or float. They're to look at - to study. But someday they may help find a cure for Sickle Cell Anemia.

Casper "Chip" Glenn, 20, is a junior biology major in The Third College at the University of California, San Diego. During the past year he has worked in the laboratory of Dr. Lemuel Bowie located in the Veterans, Administration Hospital adjacent to the UCSD campus.

Bowie, a staff chemist at the hospital and an Assistant Adjunct Professor of Chemistry at UCSD, is working on the problems of Sickle Cell Anemia. Specifically, he is seeking a drug to aid Sickle Cell Anemia victims.

Bowie and his colleagues are interested in Diphospho Glyceric Acid (DPG) and the manner in which DPG binds with Human Deoxy-Hemoglobin. According to Bowie, many drugs in use today against Sickle Cell Anemia act somewhere near the DPG binding site. One drug, cyanate, is known to react very near the DPG binding site on the hemoglobin molecule.

"We want to synthesize a drug, similar to cyanate but which will react more specifically with hemoglobin and not with other body proteins," Bowie said.

And that is where the work of Chip Glenn comes in. He has used a set of high resolution (2.5X) coordinates developed through x-ray diffraction by Dr. Max Perutz and others in Cambridge, England, and put together a model of a Human Deoxy-Hemoglobin molecule.

The molecule is too intricate and involved for the researchers to formulate in their own minds all the possible interactions in and around the binding site. In order to visualize all the possible interactions, a three-dimensional model was needed.

Chip worked on the hemoglobin model during the spring quarter as an assistant in Bowie's lab. To do so, he was enrolled in a special studies class which means he got academic credit but no pay for the hours of study, figuring and building that he did.

He began with a computer printout of coordinates from x-ray diffraction data obtained from Perutz and built his model from those figures. One problem he overcame was raising the model off the base so that it could be viewed from below. It meant adding an extra 30 centimeters to each of the several hundred vertical coordinates and mounting the model on a series of rigid rods for support.

The finished model, about the size of a beachball, is made up of hundreds of white, gray, red, blue, purple and yellow plastic pieces which fit together to give the researchers a complete 3-D picture of the molecule. By studying the model from any angle, they are better able to follow the many possible interactions within the molecule, something that would be almost impossible for any scientist with nothing more than a computer printout to work with.

The Human Deoxy-Hemoglobin molecule is Chip's second model and since these coordinates were only recently available, it is probably one of the first molecule models developed with such high resolution.

Does the success of this model mean that he will build more? Possibly, but Chip isn't sure. In fact, his future, at this point, is kind of vague. He says medical school is a possibility but he doesn't intend to make up his mind until sometime during the coming academic year.

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