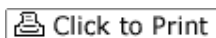


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Genetic mapping bacteria could lead to blood substitute

HONOLULU (AP) — Scientists using supercomputers to study the bacteria that thrive in Hawaii's inhospitable environments say mapping the genetic patterns of the microorganisms could lead to a number of medical breakthroughs, including possibly creation of a blood substitute.

Researchers at the Maui High Performance Computing Center have received a grant from IBM to study the organisms found in the acidic, heated waters surrounding the submerged Loihi active volcano, a formation in 3,000-foot waters about 20 miles off the Big Island.

The research builds on work unveiled two years ago that sequenced the genome of a rare bacteria collected from the volcano's vent, a deep-sea habitat similar to the primordial pools from which life sprung 3.5 billion years ago.

Maqsdul Alam, a University of Hawaii scientist working on the project, said the bacteria's DNA includes proteins — including myoglobin and hemoglobin — that mirror those of humans.

That means the organisms could be studied to model a blood substitute for use in emergency rooms and for the enhancement of drugs that treat globin protein-related illnesses, Alam said.

Myoglobin is used in the body to store oxygen, while hemoglobin is used to carry blood to organs. Proteins, one of the most fundamental building blocks of life, also build up bodily tissues, muscles and organs.

The researchers hope to use supercomputers to understand how the proteins in archaic bacteria change shape to produce reactions.

The study could produce drugs that would block certain proteins while triggering the work of others. Alam likened the way proteins change shape to the face contortions made when smiling or frowning.

The potential drugs would provoke "good faces" and inhibit "bad faces," he said.

Alam said he is hopeful his team will be able to provide a simulated computation of a blood substitute within two years. Even if that occurs, hospitals wouldn't see the emergency blood transfusion replacement for a decade or more, he said.

Another possible application for Alam's research is the creation of a biological sensor, which could be used to measure the amount of oxygen in inaccessible places, such as in deep waters.

Tak Sugimura, a manager for business development with the Maui supercomputer center, said conducting the research in Hawaii is key to its success.

"If Darwin had fallen upon the Hawaiian Islands instead of the Galapagos, we wouldn't hear about the Galapagos because of the biodiversity here," he said.

"Maybe if life started in these volcanic vents, some of those things are preserved over time. Maybe there are some things we can learn from them."

The Maui computer center is an Air Force research laboratory managed by the university. It is ranked as one of the top such sites in the world.

The research will be conducted with a \$1 million IBM eServer p690 system, which was donated to the

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Maui center by the company, said Margaret Ashida, IBM's director of corporate university relations.

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