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Robot scientist 'Adam' solves genetic problems

Honda's ASIMO can conduct an orchestra but a British robot has played a pioneering role in scientific research

Lewis Smith, Science Reporter

A robot has become the first of its kind to make a scientific discovery by solving a problem that human researchers have failed to crack for decades.

The robot, called Adam, was able to work out where an important gene would be located and to develop experiments to prove its theory. It had been challenged to identify a gene in yeast for which its human counterparts had been searching since at least the 1960s. The robot, devised at Aberystwyth University, was able to identify the gene, which controls an enzyme crucial to the production of lysine, an amino acid essential to growth.

It is thought that robots like Adam, and its successor, Eve, which is soon to be switched on at Aberystwyth, offer new hope in the battle against disease.

Professor Ross King, who led the project, said that malaria and schistosomiasis, an infection caused by a parasitic worm, were among the diseases that robots should be able to help to defeat. Adam’s discovery, he said, was likely to play an important role in developing new treatments for fungal diseases such as athlete’s foot.

Fungi have a different mechanism from that of animals to produce lysine, so if a drug can be developed that can disable the gene it should be possible to treat people for fungal diseases without affecting their ability to make lysine.

Robots are proving increasingly valuable because they can carry out large numbers of repetitive tests that in a person would induce boredom and loss of concentration. To take Adam a step farther than simple automation the research team, which reported its findings in the journal *Science*, developed software that enabled the machine to search for the lysine gene in yeast.

Professor King said that teaching the robot to develop a hypothesis was “the easy part”. The biggest challenge was for Adam to put together a series of experiments that were sensitive enough to detect tiny changes in the yeast related to the gene. The changes measured by Adam enabled it to pinpoint the gene. Adam was equipped with a database on genes that are known to be present in bacteria, mice and people, so it knew roughly where it should search in the genetic material for the lysine gene in baker’s yeast, *Saccharomyces cerevisiae*.

Professor King said: “We hope to have teams of human and robot scientists working together in laboratories. Because biological organisms are so complex it is important that the details of biological experiments are recorded in great detail. This is difficult for human scientists, but easy for robot scientists. Yeast is well understood. It’s been studied for over 100 years. We knew this enzyme must be there, but we didn’t know where.”

Douglas Kell, of the Biotechnology and Biological Sciences Research Council, which funded the project, said: “Robot scientists could provide a useful tool for managing such data and knowledge, making scientific procedures easier and more efficient.”

— Researchers at Cornell University in the United States have developed a program that enables computers to work out natural laws. In tests a computer observing a pendulum worked out the laws of motion developed by Isaac Newton. The success raises hope a computer will be able to identify natural laws that as yet are unknown.

Machines on the move

— The word “robot” was invented by Josef Capek. It was first used in the 1921 play R.U.R, written by his brother, Karel, about a factory producing human-like machines

— Leonardo da Vinci made sketches of a “mechanical knight” now known as Leonardo’s Robot

— The Elektro robot at the New York World Fair in 1939 was led by voice commands. It could move its head and arms and even smoke

Sources: Karel Capek Society, Leonardo da Vinci’s Robots, Robotics Online