

TECHNOLOGY

Machines Reproducing

A machine that can combine loose parts similar to its own into exact copies of itself may help scientists to learn how life began on earth—By Jonathan Eberhart

► A POPULATION explosion of machines? Not quite, but machines that reproduce themselves have cast a new light on what was thought to be a main difference between living and non-living things.

For example, a machine, first designed by L. S. Penrose of University College, London, can combine loose parts similar to its own into copies of itself.

Take a box of loose parts like those of the machine, shake it, and nothing happens. But add a completed two-part machine to the box, turn off the lights and shake the box again, and the loose parts will form themselves into exact copies of the parent model.

If the parent model is put together in a second fashion, the loose parts will produce exact replicas of the altered machine.

"There is, however, one misunderstanding of the biological interpretation of Penrose's basic model," said Dr. Edward F. Moore of Bell Telephone Laboratories, Murray Hill, N. J., an authority on the theory of self-reproducing machines.

He explained that many assume the two types of parts represent male and female. Actually, one assembled machine corresponds to an individual, while the loose parts correspond to molecules of the chemical compounds that make up chromosomes, the parts of the reproductive cell that transmit characteristics from one individual to the next.

One possible application of the theory of self-reproducing machines might lie in determining how life began on earth, from the chance interaction of non-living materials floating about in the primordial seas.

Biologists have often been interested in trying to compute how complicated a group of parts, in this case molecules, must be in order to have the self-reproducing property.

"In addition," Dr. Moore said, "they must have the property of being capable of undergoing evolution to produce much more complicated descendants."

There are two views of reproduction, as far as machines are concerned. One is the grouping together of parts to form the whole machine. The other follows one theory of reproduction of strands of deoxyribonucleic acid (DNA).

To reproduce, one strand must find another that is its exact opposite, almost like fitting into its own mold. Machines have not yet been made according to this method, Dr. Moore told SCIENCE SERVICE, but there is apparently no reason to assume that they could not.

Dr. Moore's most-asked question is: "What are some practical applications of self-reproducing machines?"

"It would be within the realm of possibility," Dr. Moore said, "to build an 'artificial living plant,' a machine in a natural

environment, like the desert or the ocean, that would chemically refine the materials around it into materials from which it could reproduce itself."

A machine might be placed in the middle of the ocean, where it would convert the minerals in the water into products necessary to rebuild itself.

When enough machines had been built, some could be stopped at intermediate stages in the process and the partially-changed minerals harvested, like picking apples from a tree. That particular tree will not go to seed, but will just go back and start over again making more.

• Science News Letter, 85:303 May 9, 1964

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