GENERAL SCIENCE

Science Versus Magic

➤ NON-TECHNICALLY trained people, who in many cases have administrative power over science, often confuse science with magic.

This is what a scientist, Dr. George E. Valley, professor of physics, Massachusetts Institute of Technology, Cambridge, Mass., told the Air Force Association convention in Philadelphia.

He said this confusion is caused by thought habits and ideas people pick up without thoroughly studying the subject.

Such "non-educated" persons act as if the fruits of science, namely technology, are gathered by means of magic. This is the kind of magic from the fairy tale and ghost story in which "you get a big effect for a small effort."

When the real understanding of science and technology is lacking, certain superficial similarities between magic and use of scientific achievements are evident. In the modern world today it is unpopular to believe in magic, but it is considered commendable to believe in science. Therefore the scientific "miracles" take the place of magic in untrained minds.

For example, a magician can utter magic words and get knowledge of a distant place. In symbolic effect this may not differ too much from the long distance telephone.

But it does differ. The use of the telephone is not secret as are the wizard's formulas. The benefit of the telephone goes to many people instead of only the magician.

Dr. Valley summed up the characteristics of science and technology as they differ from those of magic:

1. "No fact of science or product of technology, however it may be classified, can be known to but a single man. 2. The benefits of science and technology can accrue to any one of us only through the cooperation of many people. 3. The benefits of technology can accrue to a particular person not simply because he is that person but because he is enabled to place himself physically in position to receive those benefits. 4. The devices of technology are fallible, sometimes they need repair. 5. The knowledge and the predictions of science are never perfect, perfection being regarded as an approachable but unattainable limit. 6. Technological devices unlike magical ones do neither protect their users from harm nor do they necessarily cause harm to people. 7. From science and technology you do not always get what you want; all you can have is what men know how to make possible from their always imperfect understanding of nature."

• Science News Letter, 80:237 October 7, 1961

NATURAL RESOURCES

Cheaper Water From Sea

➤ LOWER COST conversion of undrinkable sea or brackish water to potable fresh water will come closer to practicality through use of $75,000,000 appropriated by Congress for the next six years.

Lowest cost achieved so far is one dollar per thousand gallons compared with the cost from ordinary sources of 30¢ per thousand.

The money is for research and development in the Government's saline water conversion program. Eventual goal of the program is to supply the nation with cheap drinking water from the oceans and brackish water.

The bill provides a strong stimulus to the present program, which spent only $1,300,000 during the last fiscal year.

The water supply problem is becoming quite serious in the United States because of increasing water needs and pollution of available water resources. Water demands have jumped from 40 billion gallons daily in 1900 to 312 billion gallons today. The figure is expected to top 435 billion gallons 15 years from now.

Nine years of Government research have whittled the cost of salt water conversion from four dollars for 1,000 gallons of fresh water down to one dollar a thousand. The latter figure was reached at an experimental plant constructed last year in Freeport, Texas.

Plants utilizing various processes are also being built in San Diego, Calif., Roswell, N. M., Webster, S. Dak. and Wrightsville Beach, N. C.

Methods currently being tested include the freezing, ion-exchange and the time-honored distillation process.

The freezing process, the most promising method thus far, cools the sea water to a slush of ice crystals and brine. The ice crystals are then separated and washed off.

The ion-exchange process uses an electric field and thin plastic membranes to separate the dissolved salt in the water. It is best for brackish waters and is now being tested on the slightly salty waters trapped in the rocks beneath the Webster plant just completed.

The 1,000,000-gallon Freeport plant is trying a slight variation of the oldest known process for converting salt to fresh water—distillation. Government scientists are trying to cut down the high cost due to the expensive fuel and scaling normally associated with distillation. Arid oil-rich Kuwait already has a distillation plant reclaiming nearly 5,000,000 gallons of fresh water a day from the sea. The cost is high, but the people have no choice.

• Science News Letter, 80:237 October 7, 1961

POWERFUL MAGNET—A magnet wound from a superconductor is the first to achieve the outstanding magnetic strength predicted by theory. It is considered the forerunner of future super-strength magnets that may make possible the direct generation of electric power, more powerful atomic reactors and the harnessing of nuclear fusion.

TECHNOLOGY

Superconducting Magnet Generates High Field

➤ A SUPERCONDUCTING magnet that is expected to help harness the enormous energy of the hydrogen bomb for peaceful purposes has been developed in Pittsburgh by Westinghouse scientists.

For its size, weight and energy consumption, the superconducting magnet is believed the most powerful ever built. It produces a magnetic field of 43,000 gauss, about a third the most powerful produced in the United States, yet is only the size of a doughnut and weighs only one pound.

The new magnet is wound from a wire that is a superconductor, a material that loses all apparent electrical resistance at temperatures near absolute zero, or 459.7 degrees below zero Fahrenheit. Once started, electrical currents flow through superconductors without loss in strength.

Dr. J. K. Hulm, associate director of the Westinghouse research laboratories, said development of the superconducting magnet would make possible a "whole new generation of powerful atom smashers." It also makes possible some of the "far-out methods" proposed for long-distance space travel.

The new, low-temperature electromagnet is made of an alloy of niobium and zirconium. It contains about a half-mile of wire about the diameter of sewing thread, which is immersed in liquid helium to cool it to temperatures near 450 degrees below zero Fahrenheit.

• Science News Letter, 80:237 October 7, 1961