

GENERAL SCIENCE

Winners' Science Projects

Seven of the 40 top winners in the Science Talent Search won honors by studying the hearing of fish, building devices to study atoms and solving computer problems.

► TWO TEEN-AGED scientists may cause revised thinking on theories of learning and hearing of fish.

Combining electronics and biology has led the two young scientists to believe fish can hear and their learning is inherited. The youths are two of the top 40 winners of the Science Talent Search, conducted by SCIENCE SERVICE.

Carol Lee Foley, 17, of Waverly, Pa., started in 1959 to find out if responses are inherited in animals: what makes birds always build nests and why salmon always spawn upstream? Since then she has won several science awards for studies in this area.

Carol conditioned planaria flatworms and guppies to make certain motions at the sight of light flashes from 200- and 300-watt bulbs accompanied by shocks of electricity and sound, and found that second and third generations learned to respond more quickly than did first generations.

"Since the DNA (deoxyribonucleic acid) structure embodies a highly condensed molecular code bearing all the information necessary to design living organisms, it may reasonably be assumed that inherent traits are also determined by the DNA code," she wrote in her project report.

The detailed studies and her outstanding findings placed her in the top young scientist category.

Uses Delicate Surgery

Delicate surgery to place electrodes in the brain of a fish and the painstaking studies of the effects of sound on these fish rated another top place to Lewis Binoth Haberly, 17, of Severance, N. Y.

Lewis investigated the hearing function of fish by implanting electrodes in the brain of a brown bullhead and connecting the electrodes to an audio oscillator. Many months of patient surgery and experimentation with types of electrodes were necessary before he finally achieved success.

Results revealed facts which may affect former theories on the hearing of fish, a subject that has long been disputed.

Carol and Lewis will have the opportunity to discuss their ideas with 38 other student winners when they come to Washington to spend six days at the Science Talent Institute, Feb. 28 through March 5. The winners will compete for \$34,250 offered as Westinghouse Science Scholarships and Awards.

With atom smashers and accelerators capturing an important position in the world of science, two other youths decided to build their own devices to study atoms and smaller particles.

A 400,000-electron-volt Van de Graaff generator, accelerator and glass cloud chamber for the study of artificial nuclear reactions won 18-year-old Donna Gene Hayes of Toledo, Ohio, top honors.

Donna has been working in this field for nearly three years, and is now in the process of constructing a Freon-13B1 bubble chamber.

"The bubble chamber will combine the advantages of the continuous operation of the cloud chamber with the dense target medium of a nuclear emulsion," she wrote in her report.

The electron accelerator and cloud chamber were built to study nuclear reactions. With the exception of a few required electronic parts, the two machines were constructed with inexpensive scrap materials.

Donna plans to study nuclear physics in college and perhaps teach and conduct nuclear research at a large university.

The other nuclear energy researcher is Charles Frederick Rogers, 17, of Vancouver, Wash. Charles built a proton accelerator from "scraps of material and scientific 'bailing wire'."

He describes his proton accelerator as "a small, primitive, distant relative of the giant machines which perform miracles almost daily in scientific institutions throughout the world." Even so, his machine will assist him in investigating the nature of atoms.

The youth is not, however, content with only one scientific machine. He has also built a miniature rocket test chamber, a spectroscope (using Army surplus prisms and lenses), a cathode ray tube and a cloud chamber. But his accelerator was part of his entry in winning top honors in the Search.

Charles intends to study physics and would like to become engaged in astro-technology research in physics for the Government "because this would best combine my national and scientific interests."

Develops Robot "Animal"

A tape-controlled robot "animal," a method for machines to distinguish colors and a new system to replace the "awkward, slow, and inefficient" compilers for the IBM 650 computer brought honors to three more talented youths.

"Prometheus," an experiment in remote control and automation, is "a rudimentary mechanical animal, whose activities can be programmed on magnetic recording tape," according to designer Barry Paul Cook, 16, of Revere, Mass. Prometheus was designed for use in environments too harsh

for man, such as on the moon, in the ocean depths, and at nuclear test sites or missile launching pads.

The robot contains three sections, joined by electric cables; a tape recorder for voice source, a control panel and a mobile slave unit or box vehicle which may be driven on rubber wheels across rugged terrain.

A second young scientist has under development a method for allowing a machine to recognize visual patterns with the effectiveness of any biological organism.

Ronald James Williams, 17, of Lomita, Calif., explained the theory has five distinct levels of information processing, three of which perform learning. His ultimate goal is the simulation by a machine of pattern recognition as it is performed in the brain. He would have machines think in color and of color, in order to perform the simple tasks of human optics.

Ronald has done much in his few years of working with computers. He produced a tic-tac-toe machine, and has worked on robot "animals" and other learning processes by computer programs.

Makes Improved Compiler

The development of a new and improved compiler system for the IBM 650 computer helped place Robert Evan Strom, 15, of New York City as a winner.

Young Robert, who gained national recognition by his large winnings on the CBS-TV program \$64,000 Question," has been a several-times winner in many science fairs and contests across the country. His older brother, Stephen, was also a prize-winner in the science field.

"My research was motivated in June, 1960, when I found existing compilers for the IBM 650 to be awkward, slow and inefficient," Robert explained in his project report. "After 18 months of application, I created a new compiler, SCALP (Symbolic Compiler for Arithmetic and Logical Programs)."

The new compiler has been commended by officials of IBM.

He has also worked on a new code system for the blind which will allow speedier reading and writing, and allow the blind to study higher mathematics, chemistry and other sciences.

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The vast expanse of the tropical Amazonian forest on both sides of the Amazon River is the greatest reserve of natural forest left in the world.

Some 117 different varieties of wood have been counted within a single half-square-mile area of the Amazon basin.

The normal human eye can distinguish about ten million different colors.