GENERAL SCIENCE

STS Winners' Research

The projects that helped 40 young scientists win a trip to Washington, D. C., cover many fields of science. Boys and girls worked on the projects on their own time.

➤ HERE ARE some of the research projects that helped 40 boys and girls become the top winners of the 18th Science Talent Search conducted by Science Service through its Science Clubs of America.

The 40 winners will visit Washington, D. C., from Feb. 26 through March 2, to attend the 18th Annual Science Talent Institute. They will meet eminent scientists, visit laboratories and be interviewed by a board of judges to determine the distribution of $34,250 in Westinghouse Science Scholarships and Awards.

Radiation Theory Studied

➤ TWO YOUNG scientists have been looking into current problems of radioactivity from the very different angles of the protection of people from radioactive fallout and the possible good effects.

Jonathan D. Leavitt, 16, of Easton, Pa., has an idea for a small, economy-size radiation counter that will run on penlight batteries. It could be produced for about $20 and distributed to civil defense groups. This scintillation counter would be transistorized, to make it as compact as possible, and simple enough to be used accurately by untrained people.

The counter has been designed specifically for use in indicating relative danger of incident radiation, and checking food and water for contamination.

Approaching the subject from a long-range historical viewpoint, Joseph P. Vajk, 16, of Princeton Junction, N. J., theorizes that radioactivity actually may be useful in speeding up evolution of the human species and making man more deserving of the "wise" part of his "homo sapiens" label.

Joseph has found that certain periods in evolution show outbursts or "explosions" of new groups, indicating an increased mutation rate. Since increased background radioactivity causes more mutations, Joseph explains periods of rapid evolution by means of radioactivity and periods of intensive mountain-building and volcanic activity.

An increase in radiation would result in a superior species, possibly with increased brain capacity, although such progress would be at the cost of harm to millions of individuals, Joseph indicates.

Vinegar Has Possibilities

➤ USING SUCH ingredients as plums, elderberries, highbush cranberries, grapes, sumac berries, malt, cattail roots, and dandelion flowers combined with oranges and lemons, Ronald E. Gates of Marshfield, Wis., has made and studied 22 kinds of vinegar. The cattail root formula is an original concoction of Ronald's.

Six kinds of vinegar were produced by the Quick Vinegar Process, using a glass generator that 17-year-old Ronald constructed for the purpose. He used the slower Orleans Method for 16 kinds and recommends this simple and practical process if you should want to experiment with your own varieties for new flavor in salad dressings.

The young biochemist explains that vinegars can be studied for both enzymatic and bacterial reactions, and the possibility of producing an even larger variety of acceptable vinegars.

Ronald's interest in photomicrography made possible the expert pictures of various stages of fermentation that illustrate his research paper.

Milk Proteins Studied

➤ A SENIOR at Bronx High School of Science, New York, 15-year-old Eileen C. Danies has done a series of electrophoretic analyses of various types of milk, making chromatograms of homogenized, skimmed and evaporated milk, as well as of sour milk curd and liquid at different stages of fermentation. She intends to try goat's milk and "approved" milk next, followed perhaps by tests of different brands of milk to compare the amount of protein in each.

These tests are made by passing an electric current through samples of milk on filter paper to ionize and separate the proteins according to their charge and weight.

To control the amount of milk tested in each chromatogram, Eileen improvised a rather unusual measuring device from a veterinarian's syringe she found at an antique auction.

Microscopic World

➤ A MICROSCOPIC world inhabited by one-celled fungi and plant-animals, invisible to unassisted human eyes, has been investigated by young scientists from Ohio and New York.

Radioactive carbon dioxide gas was used by 17-year-old Jeanne A. Zika of Cleveland, Ohio, to prove that, contrary to some previous ideas, heterotrophic bacteria make use of carbon dioxide to form their complex protoplasm. When she added the radioactive gas to the medium in which she was growing the bacteria, Jeanne observed that the bacteria "fixed" the CO_2 to form organic compounds and produce acids. Separating and identifying the acids, she found that they were radioactive.

Arnold J. Fetell, 16, of Brooklyn, N. Y., studied the plant-animal protozoa known as *Euglena gracilis* by exposing them to ultraviolet radiation for 50 seconds and by putting them in dilute acid solutions. He found that all the Euglena died within 50 minutes after exposure to ultraviolet and some died immediately.

The acid solutions, alone, destroyed chlorophyll in some of the Euglena. The chlorophyll in all of the organisms was destroyed if they were exposed to ultraviolet at the same time.

Arnold believes that his Euglena studies may serve as a basis for further work on both plants and animals, since the Euglena is considered a "link," with characteristics of both plants and animals. He has invented a special microscope slide that makes it possible to observe the effects of an electric current upon the protozoa.

Plants Get Indigestion

➤ THE VENUS FLYTRAP, a meat-eating plant from North Carolina, cannot digest food that has been sterilized.

Thomas C. Emmel, 17-year-old senior at Susan M. Dorsey High School in Los Angeles, found that the flytrap guests in his greenhouse much preferred unsterilized flies and washed curds of cottage cheese to anything else he served them. Sterilized flies, unwashed curds and egg white were rejected within 11 hours, with no digestion having taken place.

After many tests and analyses, he came to the conclusion that bacteria must play an important part in the flytrap's digestion. Since he suspects that enzymes secreted by the plant may also be involved, he is continuing his research in that direction.

Tom's ability as a photographer is evident in the color slides he made of each phase of his research. He is interested also in geology, paleontology, rocketry, chemistry and insect collecting.

Cybernetics Experiments

➤ A LOUDONVILLE, OHIO, boy, Kenneth E. Kloss, 17, has spent 2,000 hours during a year building "Alpha," a small, very compact digital computer that takes up only two-and-one-half cubic feet of space, weighs 140 pounds and can carry out all the essential processes of a large calculator.

Kenneth applied Boolean calculus in designing the midget calculator, which uses relays and rectifiers as its circuit elements. It requires only "a screwdriver, long-nosed pliers, a continuity tester and a vivid imagination" as maintenance tools.

In Chattanooga, Tenn., 16-year-old L. Daniel Massey, Jr., has been "teaching" his computer to read, add and subtract handwritten numbers. Dan believes his machine, which he calls a "Dactylostylograph," is the first of its kind. He also believes he has developed and used principles that eventually will make it possible to design computers capable of conversing with human beings.

By extending this system and related methods further, Dan believes it would be possible to design a cybernetic instrument that could translate hand or typewritten text from one language to another.