GENERAL SCIENCE

Describe Winning Studies

The projects that helped 40 high school students win trips to Washington, D. C., to attend the 17th Annual Science Talent Institute cover many fields of scientific research.

➤ EVEN BRIEF descriptions of some of the projects that helped 40 students win honors in the Science Talent Search, made financially possible by Westinghouse Electric Corporation's Educational Foundation, and the privilege of attending the Science Talent Institute, in session in Washington, D. C., from Feb. 27 through March 3, would overwhelm the average adult.

No wonder he feels a thousand-bewildered-years-old when he looks over the hobbies that this generation plays with for relaxation: cyclotrons and radiation analyzers for instance.

Electrons and Cyclotrons

➤ A 17-YEAR-OLD boy in Newton, Mass., is having the time of his life designing and building a home-size cyclotron that fits in the side of one room. "A cyclotron is usually thought of as great in size, formidable in complexity, and fantastic in cost," says young Reinier Beeuwkes III, and goes on to explain that his original model is only as complex as a radio and cost within $150.

Reinier eliminated a good deal of cost and weight by winding two sets of coils, with several windings that can be separately controlled, to take the place of the usual iron core. He is now looking forward to finishing the accelerator so he can carry out some research projects with it.

Rodney Carlos Kirk, also 17, of Albany, Calif., on the other hand, has made a scintillation counter (or "gamma ray pulse height analyzer") out of salvage parts of outdated equipment. He says the counter is very versatile and can be used for gamma ray work and approximate energy determinations and studies of absorption properties. So far, Rodney has concentrated on measuring the percent of radiation absorbed from uranium by such materials as paraffin, paper and lead.

He was one of ten outstanding science students selected to work last summer with the Atomic Beam Group, department of physics at the University of California, Berkeley, and he has also found the energy and time to win a letter in swimming, play the saxophone, and carry on other hobbies such as photography, radioautography, and science club and fair activities.

Dyes in Kitchen

➤ CURRENT INTEREST in crafts and weaving, which has revived the use of natural dyes, prompted Jane Ruth Karau of Columbus High School, Marshfield, Wis., to study the exact color effects produced by dye samples made from 50 different plant and animal materials. Seventeen-year-old Jane could tell the old time quilters the results of adding alum, chrome, tin, copper and iron to natural dyes such as great-great-grandmother used, what differences the temperature of the dye can make, and the variety of colors produced by the same dye on assorted fabrics.

This high school senior spent two years and 1,000 hours on such experimenting. In the process she worked out her own ways of producing the dyes and devised a double-boiler method of dyeing, using ordinary kitchen equipment such as an enameled vegetable storage pan and double-boiler, peanut butter and canning jars, and a two-burner electric hot plate. She also originated a successful way to keep dyes for future use by chilling them in the kitchen refrigerator.

Most of Jane's dye materials were collected on local field trips. She dried some of the plants; others she used fresh. Included in the 50 sources she used for color were lichens; sumac berries; cypress roots; black walnut and hickory hulls; oak, apple, willow and birch bark; lily-of-the-valley leaves; and petals from dahlias, zinnias, salvia, marigolds and chrysanthemums.

Potato Spoilage Studied

➤ A SERIES of experiments, conducted by a high school senior, may lead to a way to keep potatoes from spoiling in storage.

Lynda Diane Wallace, of Saint Mary High School in Cheyenne, Wyo., devised her own methods of producing experimental materials and small laboratory instruments in order to carry out the project.

Although Lynda is active in a variety of school organizations, she found time to make more than 100 slides comparing the growth of bacteria in coconut milk and nutrient broth, as part of her experiments. Discovering that a bacterium causes potato agar to liquefy (and potatoes to spoil), she has tentatively identified the bacterium as *Mycoplana bullata* and now is trying to isolate a product of the bacterium's metabolism which seems to cause the liquefaction of potato agar.

She has also tested the action of antibiotics on the bacterial culprit. Neomycin and streptomycin controlled it, but it was unaffected or even encouraged by the antibiotics polymixin B, Chloromycetin, penicillin and viomycin.

Electron Microscope

➤ WORKING on a hunch that there may be ways to improve the magnetic electron microscope, one of the most powerful tools of modern research, a 17-year-old boy has devised a technique that may increase the efficiency of the "lens."

Attleboro (Mass.) High School senior Irving Herbert Thomae, who wants to teach physics and electronic theory, explains how the microscope uses electron beams instead of light rays to form images. The beams, he says, are focused and magnified by strong magnetic fields, which act as lenses. The field of this electronic lens is concentrated into a very small space by using iron pole pieces, the shape and spacing of which govern the efficiency and magnification of the lens.

In his project paper for the Science Talent Search, conducted by Science Clubs of America and SCIENCE SERVICE, Irving writes about the apparatus he will use to test several sets of these pole pieces in order to discover the best arrangement. His proj-

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ect has involved problems in vacuum, electron emission and insulation techniques. It has also required 20,448 turns of No. 24 copper wire wound on a copper pipe to make the electromagnet, which is the "heart" of his apparatus. Irving reports that even on a lathe the winding took three days.

Irving has also experimented with rockets and rocket fuels, built a small computer that can be used as a teaching aid, and put together a cardiograph using a beam of light, a mirror and a photo-electric cell for recording pulses.

Reports to Nobelist

➤ INVITED BY Nobelist Glenn Seaborg to work at the University of California's Radiation Laboratory, 18-year-old Neil Logan Nininger carried out his research project so successfully that he was asked to report on it to the Laboratory faculty.

Neil's special project concerned finding a way to make tantalum carbide filaments which can be used successfully in laboratory instruments. He controlled temperature and pressure until he was able to form filaments that would not break when touched and would not burn out below the melting point of 4,000 degrees centigrade.

He first met Dr. Seaborg during his sophomore year at Tamalpais High School, Mill Valley, Calif., when he appeared on a television program with the Nobelist who has been co-discoverer of most of the elements found since World War II. Dr. Seaborg was so impressed with Neil that he offered a summer fellowship at the Radiation Laboratory. He asked Neil to return last summer and again this coming summer.

Plant Photography

➤ TIME-LAPSE photographs of sundews can be used to make an original and unusually interesting study of this common but little-known swamp plant which devours insects.

Richard Melton Burger of Jamaica (N.Y.) High School gathered sundews, *Drosera intermedia,* from "bogs and pine barrens, between the honeysuckle, blueberry and bog spruce" and carefully carried them home in a plastic bag. After replanting them in a terrarium, he used his specially constructed time-lapse camera to study exactly what happens when an unwary fly lights on a sundew.

He kept careful time records of changes and movement in the leaf blades, stem, and dozens of independent tentacles of the little plant when it was stimulated by such "stand-ins" for an insect as a crumb of meat, a thin copper wire, a glass bead and casein dust.

Richard found that when an insect stops to investigate the leaf of a sundew, the plant is stimulated to action by the varying pressure of "a groping leg or a beating wing."

When the insect has been captured, its protein content acts as the chemical stimulus which is necessary to its being digested by the plant.

Science News Letter, February 22, 1958

PUBLIC HEALTH

Fallout Hazard Increasing

➤ THE AMOUNT of cancer-causing strontium-90 in the bones of children will reach four times its present level by 1977 even if there are no atomic tests in the future. Past tests will rain fallout on the earth.

This prediction, based on the most complete survey yet published concerning concentrations of strontium-90 in man, is made in *Science* (Feb. 7). Even with this increase, however, the levels will be far below what is now believed to be the highest permissible concentration.

Drs. J. Laurence Kulp and Arthur R. Schulert, Columbia University's Lamont Geological Observatory, and Dr. Walter R. Eckelmann, now at the Carter Research Laboratories, Tulsa, Okla., made the study on more than a thousand samples of human bone received from about 30 stations in a world-wide network.

They wanted to understand the movement and uptake of strontium-90 while the levels in man and his environment are still relatively small compared with natural background radiation. Their survey is supported by the Atomic Energy Commission.

When atomic and hydrogen bombs are tested, radioactive debris that includes strontium-90 is spewed high in the atmosphere. Some of it falls to earth's surface relatively soon, but there remains a huge reservoir stored in the stratosphere, which sifts earthward only over a period of years.

The radioactive strontium-90 can replace calcium, first in the soil. Plants then absorb the strontium-90 as they grow, as do the cows eating the plants. Eventually it lodges in man's bones through his diet, particularly milk and cereals. There, in large enough amounts, it can cause cancer.

The scientists found that, if bomb tests continue at about the recent rate, the level of strontium-90 in the bones of persons living in northeastern United States will reach 200 times the present level by the year 2100. This increase would make the concentration level then twice that now believed to be the maximum permissible.

They measured strontium-90 levels as the number of micro-micro-curies, or trillionths of a curie, present in a gram of calcium. One curie is a unit of radiation.

For any location studied, they found, the strontium-90 content of adult bone is independent of age. Only one or two percent of bone in adults is exchanged or remodeled each year.

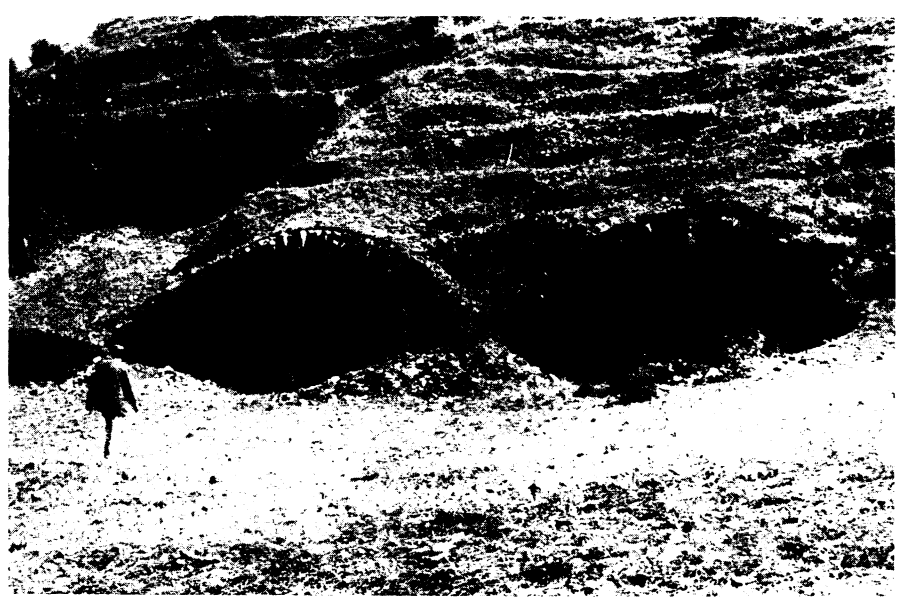
The regional differences in the strontium-90 levels in human bone are much smaller than the differences in total fallout. The level for the Southern Hemisphere when it reaches equilibrium will be about one-half that for the Northern Hemisphere.

The average concentration of strontium-90 in the skeleton for most of the world population at the end of 1956 was about two-tenths of a micro-micro-curie. The average for North American or European children was about seven-tenths of a micro-micro-curie, ten times higher than that for adults.

The highest permissible concentration for a large population is set at 100 micro-micro-curies.

For the more than a thousand samples analyzed, strontium-90 concentrations were about 15% higher for the average female than for the average male. The samples are believed to represent 70% to 80% of the world's population.

Science News Letter, February 22, 1958



CHAMBERS AT SARDIS—An expedition, sponsored by Cornell University, Harvard University and the Bollingen Foundation under the auspices of the American Schools of Oriental Research, will soon attempt to uncover the ruins at Sardis on the Turkish west coast, a city once ruled by King Croesus.