

GENERAL SCIENCE

Winners' Scientific Work

The 40 top students in the Science Talent Search will exhibit their projects in Washington. \$11,000 in Westinghouse Science Scholarships will be awarded.

► THE NATION'S top young scientists, and probably tomorrow's scientific leaders, will come to Washington March 7-11 to take part in the Sixteenth Annual Science Talent Institute.

They will meet some of the nation's top scientists and visit many of the nation's top laboratories surrounding the nation's capital. The work they have done on their own time and, in many cases, in their own home laboratories should be an inspiration to other aspiring young scientists throughout the country.

Here are descriptions of some of the projects that helped win them the trip:

Blood Test Method

► THE LOCAL hospital in Marshfield, Wis., is using a blood analysis technique developed by a high school senior.

When he was 15 years old and a sophomore, Robert William Adler, who is now a senior at Columbus High School, learned to do bovine blood analysis. He would get samples for his experimentation from the local veterinarian. He read about blood studies, experimented some more and became efficient in doing human blood analysis. In spite of working full time during vacations in his father's bakery, Robert found time to work out his own methods and apparatus for the electrophoretic analysis of human blood.

Robert's method results in what are known as scans which show the separation of blood serum into its five proteins. Proteins are stained and the values in density of color indicate the amount of each protein in the serum. Test strips of normal blood serums look very much alike. Diseases, on the other hand, show marked differences in the balance of proteins.

Effect of Auxin on Plants

► WHEN a boy and a girl, who live more than 1,000 miles apart, meet in Washington for the first time early next month they will be able to discuss a mutual problem—a hormone regulator found in plants.

Dorothy Anita Hollingshead, 17, at Murphy High School, Atlanta, Ga., concentrated her attention on the effect of auxin, the regulator, on the roots of plant cuttings. Robert Edward Goldstein, 16, at Monroe High School, Rochester, N. Y., observed the effect of auxin on the upper parts of his plants.

Dorothy's aim was to find the exact proportion of a chemical solution which would bring about maximum root production in

the *Coleus vulgaris*, a plant selected for its quick root growth from cuttings. Dorothy's experiments showed that a concentration of 2.5 parts per million of indoleacetic acid proved most effective, and she thinks that further experiments in this line could lead to discoveries important to agriculture.

While weeding in his garden, Robert observed the properties of the black swallowtail, a climbing weed, which grows profusely around Rochester. He decided to study the amount and the effect of auxin in the various parts of the growing plant. He gathered 75 healthy plants and potted them by fives in 15 numbered pots. He frequently collected and ground samples from various parts of the plants and subjected them to analysis. His careful drawings and charts bear out some conclusions: Greatest amount of auxin in the plant is produced by the apex; a decapitated plant still grows profusely because numerous small buds compensate for the loss of its apex.

Cancer Research Project

► A CANCER RESEARCH project has led to a college assistantship for a 17-year-old high school senior in Neodesha, Kans.

Because of the research work Rochelle Ruth Beach has completed on the antagonisms between some molds and bacteria, she will enter the University of Kansas this fall with an assistantship in biochemistry.

Rochelle devised her own method for culturing molds. She even raised chickens to guarantee a constant supply of test animals for her scientific experiments.

Concentrating on the field of study that has already given the world a multitude of antibiotics, Rochelle selected and isolated colonies of bacteria from wheat and corn. She then collected 13 molds from soil samples and food and tested them against four typical bacteria. Fifty-two combinations yielded one that showed an antagonism.

Rochelle, who is a senior at Neodesha High School, is completing her scientific studies in a search to find an effective antibody against the viral chicken disease known as *Rous sarcoma*.

Spider Venom Studied

► A STUDY of spiders found in her neighborhood earned an outstanding award for 17-year-old Violette Elizabeth-Emma Schlatter of Archbold, Ohio. A senior at Archbold High School, Violette studied the effects of black widow spider venom.

For her project, Violette carefully extracted the poison from the spiders' glands. This required quick work, since the poison weakens as the glands dry in the air. She prepared solutions, calculating the amounts to be injected into test animals so as to correspond to the amount of poison in actual spider bites. A black widow, she found, injects only a part of its total poison in one bite.

Devises Thermotron

► BECAUSE the temperatures of his gas burner were not high enough for his chemical experiments, Warren Carleton Rauscher, 17, a senior at Abraham Lincoln High School in San Francisco, Calif., built his own high frequency induction furnace which he called Thermotron.

It aims at an output of 1,000 watts and for economic reasons has a frequency range of from five to 30 megacycles.

He plans to use it to study the effects of these high frequency currents on the melting of various metals and to experiment with the energy produced as a food cooker.

Tests Air Flow Principles

► WATER has been substituted for wind to study the principles of aerodynamics.

Dennis Clifford Ehm, a 17-year-old senior, at College High School, Greeley, Colo., found that wind tunnels were too expensive. He also found that there was a similarity between the characteristics of liquids and gases.

This led the young aviation-minded student to devise a method for testing the principles of air flow by substituting water for wind. He built a water table to permit water to flow over a plate of glass. A sheet of white paper, marked off with reference lines, served as a measuring device.

Dennis then introduced various shapes into the flowing stream of water and photographed the results. With his homemade device, Dennis found that he could study the principles of air flow; learn the reasons why some shapes make better airfoils than others; and show from his photographs that the average person's conception of a streamlined design is pretty accurate.

Sub-Atomic Particles

► TRACKING down the trails of sub-atomic particles has led a 17-year-old scientist to design an automatic device to do the job for him.

Brett Marcus Nordgren, of Central High School, South Bend, Ind., has perfected an automatic cloud chamber that permits him to view and photograph vapor trails of sub-atomic particles. These particles, invisible to the naked eye, leave a tell-tale trail when passing through his argon-filled aluminum cylinder. Brett can photograph the trail through a lucite window, if he is quick enough, for within one second the trail diffuses and disappears.

The young scientist explained that thou-

sands of pictures may have to be snapped before one of the trails is caught. This is why he made the process automatic. As a further improvement to his cloud chamber, Brett wants to add a counter that would trip the camera trigger before the vapor disperses.

Classify Fossil Finds

Sonia Ruth Anderson, of Omaha, Nebr., and David Bachrach Adams of Neosho, Mo., are both lucky in that they live in regions where the upper layers of the rock formations are rich in traces of living creatures imbedded there millions of years ago.

Sonia, now a senior at Technical High School in Omaha, has been collecting Nebraska fossilized rocks ever since she was 10 years old. But the real labor began when she started to classify them. After it was accomplished, she found she had a neatly classified collection of over 42 eastern Nebraska fossils, found mostly along the Missouri River basin. Sonia also determined some of the organisms and conditions that existed there during past geologic ages. Her conclusions were that among others, gigantic turtles, camels and rhinoceroses must have existed in her neighborhood.

David, a senior at Neosho High School, found that the very hill on which he lived was a chert formation, full of fossil remains. From there and elsewhere he built up a collection of around 2,500 specimens and made it his project to identify and classify them. He found that there were very few descriptions of the local chert fauna in existence. David had to compare his specimens with descriptions of the fauna of that era in other parts of the country.

David concentrated his efforts on 10 species and one variety of *Neosho productidae*, a shell with two valves.

Studies Low Organisms

➤ A KEEN desire to solve eventually problems that will end some of man's suffering has led 16-year-old Edward Jay Pollock to experiment with the living tissue of certain low organisms from which we derive much of our knowledge about wound healing.

This Niles (Ill.) Township High School senior gathered the 600 flatworms he needed for his research from the culverts in Schiller Park in Skokie, Ill. Small sections of individual worms have the capacity to grow heads, tails, or other missing parts, to become complete organisms again.

But, certain poisons are known to inhibit this trick of nature.

Edward chose to study the effect of the two chemicals, nitrogen mustard and maleic acid hydrazide, on the reconstitution of cut sections. He found that nitrogen mustard acted much faster but that both substances produced abnormalities, some of which were not classified before. Thus, he concluded, these substances can be added to the list of agents which affect growth.

Tests Color Blindness

➤ MERRY A. MARGOLISH puts rearing a family at the top of her list of what she really would like to be doing 10 or 15 years from now. She also hopes to do medical research.

To help her place as a winner, Merry, of New Rochelle (N. Y.) High School, found an improved method for testing color blindness. From 200 different devices and methods now used, Merry chose and modified the standard "H.R.R. test," because she felt it was easy to administer.

Merry then devised an original color wheel and her own test forms which made the test even more simple to give and the results easier to tabulate.

From testing her fellow students, Merry tabulated over 40 cases of different types and degrees of color blindness. With some further testing planned, Merry expects her charts to show exactly what color confusions characterize each defect.

Chromatography Expert

➤ YOUNG John Douglas Reichert, a senior at Stephen F. Austin High School in Austin, Texas, seems to know a great deal about chromatography, a system for analysis that causes a chemical to "paint" a picture of its composition on specially treated paper. He became so skilled that a university professor hired him to run the chromatograms for his research.

After experimenting, checking and counterchecking with a whole range of chemicals and several alloys, John satisfied himself that he had discovered a way of using the chromatographic process to show not only which, but also how much of a chemical was present in the solution tested. He then began to wonder whether, by making use of the electrographic process as well, and maybe by combining the two methods,

he might get even better results. John thinks he is on the track of discovering some really useful new method for inorganic analysis.

Build Computer Systems

➤ AUTOMATION and electronic brains are popular these days. Charles Thomas Phillips, 16, from South Lincoln, Mass., and Philip Meade Ryan, 17, from Scarsdale, N. Y., have each built a computer system of his own design.

Charles, of Weston (Mass.) High School, designed an electronic adding circuit which uses relays and switches to analyze the symbols fed into the machine. An open circuit stands for "true," a closed one for "false." For the machine to add, numbers are translated into a binary system and recorded by a series of lights. When Charles found that his system was getting too complex and cumbersome, he hit on the idea of locking relays which permitted successive addition with fewer switches, a device which endows the machine with "memory."

Philip built his first digital computer during his junior year at Archbishop Stepinac High School in White Plains, N. Y. When thinking of a better model, Philip soon discarded the idea of merely building a big brother to his ELDIRC. With the help of some advanced algebra he had just learned he tried to figure out a number of different ways to make a machine do the work of a brain, in arithmetic.

His DIQUAC is all set to solve quadratic equations. His most difficult problem was to reduce the extraction of a square root to a series of simple repetitious operations each of which could be represented easily by a piece of electrical circuitry. The answers found by the machine are in binary numbers. These are converted into decimals by a system of relays and small telephone-type bulbs.

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LABORATORY ACCIDENT—Dr. Lewis Thomas of the New York University-Bellevue Medical School, in a study to find if the body can be protected against damage from certain enzymes, injected the enzyme papain from the green papaya into the veins of rabbits. Three or four hours later he was surprised to find that the rabbit's ears drooped like a spaniel's; left alone, the limp ears straightened up naturally in a few days. On investigation he found that something in the papain was dissolving out the cartilage matrix. He is now trying to isolate and identify that constituent of papain responsible for this effect as he feels many problems in cartilage chemistry can be explored by use of this laboratory tool.