

ASTRONOMY

First Instrument Measures Star Diameter

► THE WORLD'S first star-measuring instrument of its kind, an intensity interferometer, is being set up by Sydney University at Narrabri, New South Wales, Australia, to measure the diameter of stars.

The device consists of two mirrors, each 20 feet in diameter, weighing about five tons. These are mounted on wheels and move along rails. Each mirror will cost about \$40,000.

Movement of the mirrors in conjunction will enable scientists to work out mathematically the diameter of stars.

Manchester University, England, is co-sponsoring the project. Prof. Harry Messel, head of the school of physics at Sydney University, and Dr. R. Twiss, Commonwealth Council for Scientific and Industrial Research, have chosen a site for the instrument, which will be operated by Dr. Twiss.

Dr. Twiss said diametric measurements would give scientists a much clearer idea of a star's appearance. From the measurements, they could tell whether stars were flattened through rotation and whether they were large or small bodies.

He will go to England to supervise construction of the interferometer. Building it will take 18 months and testing, six months. It is hoped the device will be operating in two and one-half years.

The first project with the interferometer will be the examination of 100 of the brightest stars in the Southern Hemisphere. This will take four to five years.

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BIOPHYSICS

Understanding of Cell Foreseen in Ten Years

► WITHIN TEN YEARS we may understand the living cell and its complex structure and processes, a biophysicist has predicted.

Dr. Ernest C. Pollard, chairman of Yale University's department of biophysics, said biophysics has already given us the ultimate unit of molecular structure—the molecules that make up the living cell. We must understand molecular structure, he pointed out, if we are to understand genetics and heredity.

Citing the recent virus studies of Prof. Seymour Benzer of Purdue University, Dr. Pollard said that we may have discovered the smallest unit that can mutate.

The "muton," as this unit is called, is measured by a nucleic acid grouping. The ultimate unit of molecular structure, the "recon," was found equal to one base pair of nucleic acid. The muton was approximately ten base pairs long. These units can help explain how mutations occur.

Dr. Pollard also told those attending his lecture, one of a series in Washington, D. C., sponsored by the National Science Foundation and the American Association for the Advancement of Science, about recent biophysics research at Yale.

Ionizing radiation is being used to learn more about the structure of a cell, its contents, size and shape. For example, researchers have determined the probable shape and size of two amino acids, methionine and proline. Bombarding a cell with atomic particles is a useful technique, Dr. Pollard explained, since a scientist can learn what is in a cell, how big the "thing" is and where it is located.

In another research project, tritium-labeled thymidine has been given to cells to trace where nucleic acid, or DNA, is found. Thymidine, which goes into DNA, definitely pinpointed the nucleic acid in the nucleus.

Study of the living cell and molecular biology is making great progress. If we are gentle in the way we take a cell apart, Dr. Pollard said, we can learn about the parts of the cell, which are important in themselves, and about the living cell itself.

Science News Letter, June 14, 1958

ENGINEERING

Foresee Electricity From Earth's Steam

► ELECTRICITY for Californians generated from steam rising from earth's hot rocks close to the surface is foreseen by Michael P. McIntyre of San Jose State College, San Jose, Calif.

The Thermal Power Company is drilling bores in rock to tap the subterranean steam at Big Geysers, a few miles north of Santa Rosa, Calif. The aim is to harness this natural energy for the production of electrical power.

It is believed to be the first such project in the United States, although "geothermal" power, as it is called, has been tapped both recently in New Zealand and for many years in Italian Tuscany.

The "hot land" at Big Geysers involves 3,200 acres extending for about five miles along the north side of a fault-line canyon. Release of pressure on the magma (molten rock) at the time of faulting, or slipping, accounts for the presence of hot rocks relatively near the surface.

Eight shallow wells and one deeper well are blowing an estimated 6,000 kilowatts of energy into the air. Temperatures at the 600-foot level have been determined as 600 degrees. If temperatures continue to rise in proportion to depth, 1,500-foot bores should yield the equivalent of at least 4,000 kilowatts per well.

Steam from Big Geysers areas has so far proved to be dry, an advantage since wet steam can corrode turbines more quickly.

Engineering reports show wells can be drilled as close together as 150 feet without reducing production of their neighbors. If a substantial portion of the property proves productive, Mr. McIntyre estimates at least 30 wells could be drilled, yielding 100,000 kilowatts of electricity.

If these results can be achieved, geothermal steam can compete very favorably in power production, Mr. McIntyre reported.

Science News Letter, June 14, 1958

IN SCIEN

AERONAUTICS

Atmosphere's Energy Could Propel Satellite

► THE CHEMICAL ENERGY stored in the earth's high atmosphere might be used to propel a satellite indefinitely at an altitude of 60 miles. (See SNL, July 13, 1957, p. 20.)

A preliminary study of such a "fuelless" satellite has been reported by the National Advisory Committee for Aeronautics.

Drs. Lionel V. Baldwin and Perry L. Blackshear of the NACA's Lewis Flight Propulsion Laboratory, Cleveland, Ohio, have investigated the possibility of tapping the energy held by reactive chemicals in this part of the atmosphere using a ramjet engine that would recombine the chemicals to produce thrust.

Their calculations indicate that up to one-half the chemicals present at 328,000 feet could be recombined if the nozzle were 100 feet long with an inlet radius of 20 feet. This would give a thrust to the ramjet greater than the drag. It would also overcome the heating problem.

More definite information on the recombination rate for atomic oxygen than now available is needed, the scientists reported, before the feasibility of such a chemically powered satellite can be positively determined.

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ENTOMOLOGY

Well-Fed Plant Resists Attacking Insects

► WELL-FED lima beans, plants supplied with proper amounts of nitrogen, phosphorus and potassium for good growth, are better able to fight off attacking insects, the U. S. Department of Agriculture reports.

Experiments conducted at the USDA's Agricultural Research Center, Beltsville, Md., indicate that an insect's resistance to insecticides may actually represent changes in susceptibility caused by a plant's nutrition.

USDA entomologist Thomas Henneberry and Dr. N. W. Stuart, a plant physiologist, found that spider mites attacking pole lima beans were "easy to kill" with malathion when the beans received proper nutrients. However, susceptibility of mites to an insecticide decreased when nutrient levels were either above or below the plant's requirements.

Further experiments may show how insect control practices could be timed with seasonal variations in the nutrients in plants, thus getting better results with commonly used insecticides.

Science News Letter, June 14, 1958

CE FIELDS

MEDICINE

One-Shot Plastic Hypo Syringe Being Tested

► A DISPOSABLE medicine container that becomes a hypodermic syringe for use by diabetics, as well as in first aid kits, has been made by a plastics manufacturer for market testing.

A pilot sample of the throw-away plastic container and syringe, which looks like a small transparent toothpaste tube, was displayed at the Exposition of Chemical Industries, New York, by Minnesota Mining and Manufacturing Company's Jersey City Chemical Division, which produces the plastic from which the product is formed.

The container-syringe, made from a heat-resistant plastic called KEL-F, can be sterilized in boiling water, in a high pressure steam autoclave, or by radiation.

A company official said the high strength imparted to KEL-F plastic by its carbon, fluorine and chlorine molecular structure means a diabetic or heart patient can carry the pre-filled syringe in his pocket without fear of breakage or cracking that would contaminate the contents. Because the plastic is not penetrated by alcohols, essential oils and many other chemicals, the container-syringes can be filled with most medicines.

Minnesota Mining and Manufacturing will not produce the disposable syringes, but is now forming a small quantity of them for a plastics customer who will use the samples to gain opinions from physicians and pharmacists.

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BIOCHEMISTRY

Some Plants Accumulate High Radioactive Fallout

► EVIDENCE that certain plants pick up radioactive fallout "to an extraordinary degree" is reported in *Nature* (May 31).

The plants are those having a low mineral intake and growing on extremely acid soils. One such plant is the bog moss *Sphagnum papillosum*, Dr. Eville Gorham of the Freshwater Biological Association, Ambleside, Westmorland, England, reports.

Strontium-90, since it is taken up by the bones in the body as calcium is, is believed to be the most deadly product for humans in radioactive fallout. Dr. Gorham reported that the high concentration of strontium-90 in the bones of upland sheep may be due partly to the animals' reliance on mosses for fodder, particularly in hard times.

He analyzed samples of 71 species of plants and 11 samples of stream and lake waters in his preliminary study by drying them, then turning them into ashes at bright red heat. Radioactive levels of the ashes

were then determined by counting the disintegrating particles thrown off by each sample.

The high radioactivity of plants growing on acid soils, Dr. Gorham reports, is due to the fact that radioactive fallout accounts for a greater proportion of the soluble or adsorbed chemicals available to the vegetation. The radioactivity of such plants has increased as much as 50-fold in the past ten years, he found by comparing specimens collected in 1958 with others collected prior to 1947.

Average increase for all plants was ten-fold, declining to as little as two-fold for plants grown on the best soils.

Dr. Gorham believes the radioactivity of today's vegetation is presumed due largely to fallout from nuclear explosions. He found no increase associated with the Windscale accident, which spread radioactive material over 200 square miles in significant quantities following overheating of a nuclear reactor at the Windscale plutonium works.

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ROCKETS AND MISSILES

Nation Short-Changed On Air Defense Dollars

► AMERICAN TAXPAYERS continue to get less and less defense per dollar, even at a time when Secretary of Defense Neil McElroy has set as a major Pentagon goal "a hundred cents worth of fighting power for every dollar we lay out."

That frank admission was made by the head of the Navy's Bureau of Aeronautics Purchasing Branch during the first national Missile Industry Conference, Washington, D. C.

Cmdr. Edward E. Sack said "more defense per dollar" can be accomplished only by severe cost-cutting by contractors and by an effort to cut out mechanical frills and technical refinements that are not absolutely needed in defense equipment.

"Constantly and unending rising costs which give us less defense per dollar will continue to do so until the trend is made to start down," Cmdr. Sack said.

He emphasized that the downward price trend must be "forced," because it will not go down of its own accord.

As a result of rising costs, the Navy had to cut its number of expected aircraft models in half at the middle of fiscal year 1958.

In the guided missile field, the number of missiles actually purchased was reduced 9% to 46%, depending on the model.

"The sad fact of life from where we sit," the Navy purchasing officer said, "is that few firms feel a great need to make deep slashes in their costs."

He stressed that defense costs must be cut by:

1. A concerted, purposeful and continuing effort on the contractors' part to pare costs to the bone; and

2. A constant effort on the part of the technical services to eliminate frills and unnecessary mechanical refinements, sticking only to the basic elements necessary for a piece of equipment to do a satisfactory job.

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PUBLIC HEALTH

Venezuela Expects No Malaria by 1960

► AN ANTI-MALARIA war that has been waging for over 20 years is now nearly over.

In Venezuela, the final pockets of resistance have been discovered and mopping up operations have begun. Complete extermination of the mosquito responsible for the disease has been predicted by 1960.

Most of the country is already free from malaria, due to the efforts of the men of the Institute of Malariologia in Maracay. In 1935 they launched an extensive program to treat the sufferers of this tropical malady.

Swamps were drained, health practices were improved and anti-malaria drugs were administered. Despite all of these weapons, by 1945, there were still more cases each year than could be treated.

That same year, a new wonder weapon was released by the armed forces, DDT. Armed with this new insecticide, Dr. Arnoldo Gabaldon, a Venezuelan, and his associates sprayed more than 500,000 homes.

Results of the program show the effect of this new weapon.

The population of Venezuela swelled to over 6,000,000. Only nine malaria deaths were reported last year. Only 899 cases of malaria were discovered. This is less for the whole country than were found in single towns in 1935.

The last evidence of malarial resistance includes carriers who enter the country and spread the disease, and children under ten years of age.

It is the hope of Venezuelan scientists that by 1960 the last case of malaria originating from within the country will have passed into the record books.

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GEOPHYSICS

Satellite's Radio Signals Show Its Future Orbit

► THE FUTURE ORBIT of an earth satellite can be predicted quite accurately from the change in frequency of its radio signals as received at a single station during a single pass of the object.

Drs. William H. Guier and George C. Weiffenbach of the Applied Physics Laboratory, Johns Hopkins University, Silver Spring, Md., found their Doppler system worked for both Russian and U. S. satellites, which broadcast on different frequencies.

The radio-signal method of predicting satellite orbits would be much more accurate if observations from successive passes at two or more widely separated receiving stations were combined, they report in *Nature* (May 31).

The system is based on the fact that the frequency of the radio signal broadcast by a satellite changes as the satellite passes by the earth, being higher when it is approaching the receiver, and lower when receding from it. This effect is known as the Doppler shift.

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