

BACTERIOLOGY

Germ Resistance to Penicillin Is Studied

► GERMS that do not cause disease are able to become resistant to the action of penicillin, just as disease germs are, and it is quite likely that they acquire this resistance in much the same way. This has been found out by a 'teen-age scientist, Leon Cooper, 16, senior at the Bronx High School of Science, New York, and one of the 40 Science Talent Search winners, in an independent research project on which he is still working.

Mr. Cooper used as his microscopic guinea pigs the common soil-dwelling organism known as *Bacillus subtilis*, already known to be sensitive to the action of penicillin. By growing cultures of it in penicillin solutions of graded strengths, he was able to produce several strains more resistant to the drug's action than the original one.

One of the ways in which some bacteria are able to survive in the presence of penicillin is by producing an enzyme that destroys it, called penicillinase. Mr. Cooper is testing his resistant strains by filtering out the liquid in which they grow, and comparing its action with that of liquid filtered from tubes of non-resistant cultures. He is also making filtrates from cultures of various ages, to find out at what stage of growth the penicillinase is produced most rapidly.

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PLANT PHYSIOLOGY

Changes in Plant Cells Induced by Acenaphthene

► CHANGES in plant cells, similar to those induced by colchicine, have been made with the vapor of acenaphthene by Arthur P. Mattuck, 16, a senior in Midwood High School, Brooklyn, N. Y. He reports them in an essay submitted in connection with the Sixth Annual Science Talent Search, conducted by Science Clubs of America under the sponsorship of Science Service.

The plant used in his experiments was the common low-growing, ornamental portulaca, often called flowering moss or rock rose. He treated it in two ways: by putting a budding branch into a short, wide test-tube coated inside with acenaphthene crystals, and by strewn seed on a blotter above some of the crystals in a covered dish.

By varying the lengths of exposure, he found the time intervals that would produce results without killing the buds or seeds outright. Best time for the buds seems to be between 12 and 15 hours; for the seeds, three days or less.

Pollen grains from flowers produced by the treated buds showed abnormal structures in their protoplasm. Mr. Mattuck fertilized other flowers with this pollen, and saved the resulting seed. As soon as he is able to plant them he will grow the new, and presumably changed, portulacas, to observe the treatment's effects.

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ORNITHOLOGY

Crowded Living Causes Birds to Move Elsewhere

► SOME BIRDS show a migration behavior suggesting that of some human communities in the past: they build up a greater population than the home territory can support, then burst out in a massive migration wave.

This population-pressure theory is offered as tentative explanation for the appearance of swarms of dovebies, small sea-birds of the auk family, far south of their normal winter range, by Martin Karplus, 16-year-old Newton High School senior of Newtonville, Mass. The theory is put forward in an essay submitted in connection with the Sixth Annual Science Talent Search, in which he is one of 40 successful contestants.

More local movements of the dovebie, along with two other species of sea-birds of the same family, Brunnich's murre and the razor-billed auk, may be correlated with shifting of immense swarms of minute sea plants and animals, which are the ultimate source of food for these birds.

Food supply is again the answer to the riddle of the restricted range of a fourth sea-bird, the black guillemot, in Mr. Karplus' opinion. This species is found only in the neighborhood of rocky coasts primarily because the food it depends on is found only in such places.

This young ornithologist, whose work is already appearing regularly in scientific publications, is among 40 leading high school seniors from all over the country who will attend the Science Talent Institute in Washington, D. C., Feb. 28 through March 4.

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IN SCIENCE

PHYSICS

Magnetized Wire Records To Give Better Music

► BETTER MUSIC from magnetized wire records, whether in homes or theaters, will result from a new testing instrument that makes a continuous picture on a lighted screen of the magnetic properties of the wire as it is passed through the device.

The new instrument, called a "cathode ray oscilloscope hysteresis loop tracer," can also be used to test the magnetic properties of alloys at each stage in the manufacture into wire. The device, and methods of use, were revealed to the American Institute of Electrical Engineers by D. E. Wiegand and W. W. Hansen of The Armour Research Foundation, Illinois School of Technology.

The equipment includes a 35-pound exciting coil with pick-up coil at its center, an amplifier and integrating circuit, and a cathode ray oscillograph. It operates on power-line frequency without the use of oscillators or motor power, and was described as rugged and simple to operate.

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ENTOMOLOGY

HET Kills Insects Resistant to DDT

► MEET HET, newest terror to bugs. U. S. Department of Agriculture entomologists state that it seems well suited for combating red spider and red mites, two plant-damaging pests that survive DDT attacks and increase enormously when DDT wipes out competing insects. Combination of the two looks good for clean-up purposes. University of Wisconsin tests show that HET is also effective against aphids on cabbage and potato crops.

HET, which is hexaethyl tetraphosphate when spelled out, is a German chemical invention, which does not have the persistent, long-lasting protective effect that DDT gives. Further tests are planned for the coming crop season, but it will not be available for general use this year.

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CE FIELDS

PHYSICS

Nature's Snow Is Less Pure than Man-Made Snow

► THE "DRIVEN SNOW," whose purity is so often mentioned, contains more impurities than the artificial snow made in General Electric laboratories by Vincent J. Schaefer.

Natural snowflakes contain microscopic foreign particles as nuclei; the artificial snowflake has a microscopic speck of ice instead. Natural snow gathers additional impurities as it falls through the atmosphere; the artificial stuff remains in its container and can gather no dust. However, natural snow is relatively pure; impurities in an average snowflake, according to Mr. Schaefer, amount to less than one billionth part of the flake under most conditions. (See *SNL*, Nov. 23, 1946.)

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GEOPHYSICS

Doodlebug Goes to Antarctic To Reveal Mineral Deposits

► THE FAMED airborne magnetometer, or doodlebug, that located submerged enemy U-boats during the war, has now gone to the Antarctic to help reveal the mineral secrets of the South Polar region, the American Institute of Electrical Engineers was told.

Improved instruments of this type will be flown over Antarctic ice-covered areas by flying explorers of the Navy's expedition under the technical direction of Rear Adm. Richard E. Byrd. The instruments are in charge of J. R. Balsley, Jr., of the U. S. Geological Survey, who will conduct the aerial magnetic survey in an attempt to locate oil and other needed minerals.

This super-sensitive geophysical exploration device was demonstrated by engineers of the Naval Ordnance Laboratory and Bell Telephone Laboratories. The same type of instrument has already been used in making magnetic surveys in parts of the United States and in Alaska. The instrument measures variations in the magnetic field of the earth as the detector is flown over it.

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ENGINEERING

Current-Collector Removes Blue Sparks from Power Line

► NO VISIBLE blue sparks will follow the contact between power line and locomotive trolley on electrified railroads with a new current-collector described to the American Institute of Electrical Engineers by B. F. Langer of Westinghouse Electric Corporation. The practical value of the device is that with it higher speeds are possible than with the present contact shoe.

These shoes, which ride along the electrified overhead wire on a diamond-shaped framework above the engine to pick up the current, now cause considerable trouble at speeds above 70 miles an hour. They act like miniature airplane wings, Mr. Langer stated. They flutter against the wire, thus threatening to break the circuit momentarily and creating the familiar blue light flashes.

The new shoes reduce this difficulty by means of slots cut in them, and by means of redesigned springs, practically frictionless, that keep the shoe in constant contact with the wire. The material used is thicker, but no heavier than present materials, thus giving greater wearing depth and longer life.

In actual tests on the road, there is no evidence of shoe-flutter at speeds up to the highest commonly used, and no visible arcing except at switches and cross-overs.

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AGRONOMY

Radioactive Phosphorus Aids Study of Soil Needs

► RADIOACTIVE phosphorus is now being produced at Oak Ridge in sufficient quantities to permit relatively large-scale use in field tests on the fertilizer need of plants. Such tests are already under way, supported by funds supplied by more than a score of fertilizer manufacturers, Maurice H. Lockwood, president of the National Fertilizer Association, stated.

The radioactive material is thoroughly blended into ordinary superphosphate fertilizer, which is then applied to the soil in experimental field plots and in greenhouses. Where the fertilizer goes, and how fast it gets there, can be determined by using Geiger counters on the growing plants.

One of the chief objectives of the re-

search is to find out, if possible, why so much phosphate gets lost. On an average, only about one-fourth of the phosphate put on the soil as fertilizer is taken up by the plants; the rest is dissipated in various ways. The scientists hope eventually to raise the efficiency of phosphorus utilization.

The work is being done under the general direction of Dr. Ralph W. Cummings of the North Carolina Agricultural Experiment Station at Raleigh. Tests are also being conducted at the New York State Experiment Station at Ithaca and at the great proving-ground of the U. S. Department of Agriculture at Beltsville, Md.

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MEDICINE

Bone Graft, Steel Plate Bridge Gap Between Breaks

► A BONE GRAFT and a stainless steel plate are used to bridge the gap between bone fragments in one of the newest methods of healing breaks of long bones of the body that fail to unite, Drs. G. Mosser Taylor and Malcolm B. Downs of Los Angeles reported at the meeting of the American Academy of Orthopaedic Surgeons.

The bone graft is placed on one side and the steel plate on the other. They are held together by stainless steel screws so that the fragments are clamped as in a vise.

This allows for a high degree of stability or fixity in all planes and the holding power is well maintained for the time required for new bone to be formed.

"When bone is detached from its blood supply it becomes inert or lifeless," Dr. Taylor stated. "The minerals—calcium and phosphorus—are not in motion as in living bone in which blood and lymph are circulating through it. It thus maintains its normal density while living injured bone around it wastes away due to the lack of use. Screws passed through the plate and the fragments of the ununited bone and anchored into this transplanted bone graft are able to hold longer than if anchored from the graft into the soft bones of fragments themselves.

"This method has been used in non-unions, some of many years' standing, in all the long bones and at different levels. It has proven very successful. Relatively few complications or failures have resulted."

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