

watering is needed, the tanks are replaced by a conveyor belt for manure, soil, snow, etc. Attached to the combine are special devices, including a soil leveler, a row marking and sowing machine, a cultivator, a machine for earthing up, a harvesting platform and a special attachment for the production of naphthalene gas to combat field pests.

The combine is propelled by a 3-kilowatt electric motor. Mechanized cultivation is claimed to raise the harvest yield in the hotbeds by 40 to 80 per cent. It takes the combine eight hours to till 2.6 hectares (6½ acres) of hotbeds and one minute to sow an area of 36 square meters (43 square yards).

Production of the new combine was started this year.

Vagan Mkrtchian got the idea of such a machine while he was engaged in hotbed farms in Armenia. It took him three years to design and develop it. At present Mkrtchian is a scientist on the staff of the Scientific Research Institute of Vegetable Gardening in Moscow.

Science News Letter, August 19, 1939

CHEMISTRY

United States Leads World In Chemistry; Germany 3rd

LEADERSHIP in chemistry throughout the world is now in possession of the United States, it is disclosed in a report submitted to the American Chemical Society by Prof. E. J. Crane of Ohio State University, editor of *Chemical Abstracts*.

Germany, which ranked first during the World War period and even a decade ago, has now dropped to third place with Great Britain second. Russia and Japan show striking gains, Prof. Crane reports.

English is predominantly the language of science, the United States and England accounting for 40 per cent of all scientific periodicals published.

The report is based on an analysis of 65,000 abstracts of chemical discoveries reported last year in *Chemical Abstracts*, Prof. Crane explained.

Chemical patents account for much of the leadership of the United States. During the last five years U. S. chemical patents have increased 15 per cent in number over the preceding five years. During this same time British chemical patents have declined 12 per cent, French chemical patents have decreased 23 per cent and German chemical patents have dwindled 30 per cent of their former number.

Science News Letter, August 19, 1939

PHYSICS

New Way To Separate Isotopes Is Quick and Effective

Combination of High Speed Centrifuge with Chemical Fractioning Column Method Reported by Virginians

A NEW way of separating isotopes quickly and effectively is suggested by Prof. J. W. Beams and Dr. C. Skarsstrom of the University of Virginia. (*Physical Review*, Aug. 1)

The new method would combine the whirling properties of high speed centrifuges with the chemical fractionating column method employed by Prof. Harold C. Urey, Columbia University Nobelist.

Isotopes are the forms of chemical elements which have chemical properties so similar that ordinary chemical methods will not separate them. Yet they have slightly different atomic weights.

Separating isotopes is one of the major tasks of physicists these days for isotopes can be employed as "tracers" in studying the physiological happenings of the human and animal body and have already contributed much to knowledge of hitherto obscure body processes.

To operate the new method would require a huge centrifuge, weighing tons, for the columns used at Columbia by Prof. Urey are two stories high. An apparatus to whirl them around in a super-centrifuge would be very large.

Search for Neutrino

In the same issue, Drs. H. R. Crane and J. Halpern of the University of Michigan describe their latest search for the elusive and never-found atomic particle, the neutrino, which is believed to have the mass of an electron, without electrical charge.

By bombarding chlorine with deuteron particles from the huge Michigan cyclotron, the scientists have made it emit electrons, or beta rays. Studying the pictures of these beta rays in a Wilson cloud chamber has shown that the ordinary, every-day laws of classical momentum are not observed unless one assumes that another particle (the neutrino) is liberated in the process.

Because of the neutrino's neutral character actual pictures of its tracks have not been obtained, and probably they will never be found. But the scientists

have found relationships showing definite directions in space in which the change of momentum occurs. This they interpret as the line of direction of the neutrino.

Split Uranium Atoms

NEW attacks on the secrets of uranium splitting—potential source of atomic power if scientists can ever find out how to create it efficiently and then control it after they have it—were described.

Nobelist Prof. Enrico Fermi and Drs. H. L. Anderson and Leo Szilard, of Columbia University, reported that by bombarding uranium with slow neutrons they obtain a 20% gain in the number of neutrons emitted. This is evidence—slight but probably real—that the splitting of uranium, with its enormous release of atomic power, is probably accompanied by a chain reaction that creates more neutrons to produce more uranium fissions, and so on. The whole question of atomic power is still in the balance for the experiments have yet to give a conclusive answer. The Columbia results are more conservative than reports which have come from French scientists studying this same matter.

Another new finding in uranium's splitting is the study by Drs. J. C. Mou-

BOOKS

SCIENCE NEWS LETTER will obtain for you any American book or magazine in print. Send check or money order to cover regular retail price and we will pay postage in the United States. If price is unknown, send \$5 and the change will be returned. When publications are free, send 10c for handling. Address:

Book Department
SCIENCE NEWS LETTER
2101 Constitution Ave.
Washington, D. C.

zon and R. D. Park of Duke University on the delayed emission of piercing gamma rays from uranium excited by neutrons. Taking Wilson cloud chamber photographs of the bombardment, the Duke scientists obtained, out of a great number, one highly interesting picture which may be the first evidence yet

found of a multiple fission of uranium. Previously it has been shown that uranium can be split into two parts by neutron bombardment. The new Duke pictures may reveal a splitting into three or more different products instead of the usual two. More work will be needed to clear this important point.

Science News Letter, August 19, 1939

GEOLOGY

Earthquake Records Show Mountains Have a "Keel"

Geological Society Also Learns of Submerged Falls And Glassy Layers Under Surface of the Earth

INTENSIVE studies of records of many California earthquakes have revealed the "keel" of the southern Sierra Nevada mountain range, Prof. Perry Byerly of the University of California told the Geological Society of America meeting at Berkeley, Calif.

One theory of geology, Prof. Byerly recalled, is that mountain ranges are masses of heavy rock "floating" in weak rock not unlike ships floating on the ocean. The new discoveries indicate that the mountain ranges have a keel.

Actually the keel seems to be a root of gigantic rock penetrating much deeper into the weak rock under the range than does the range itself. Bottom of the Sierra Nevada range appears to be at a depth of 20 miles. The keel goes down still farther.

Glassy Beneath Surface

FIFTY miles below the surface of the earth the ordinary crystalline structure of rocks gives way to a glassy condition, Profs. B. Gutenberg and C. F. Richter of California Institute of Technology told the geologists' meeting. Studies of

the records of earthquake vibrations have revealed this new knowledge.

Highly important to geology is the discovery for it has long been suggested that the earth consists of many concentric shells of different materials packed, one around another, like the layers in an onion.

"From all the evidence," Prof. Gutenberg said, "it may be calculated that certain physical properties change at a depth of about 50 miles. From other clues we conclude that this depth is probably that at which the crystalline structure of the rocks is replaced by a glassy condition."

Submerged Waterfalls Exist

GREAT mud-laden "waterfalls" deep down in the ocean are pouring the sediment of California rivers into ocean bottom basins, Prof. F. P. Shepard of the University of Illinois told the meeting.

About 150 miles west of San Diego and far under water is a submerged 10,000-foot mountain whose slopes have been found to be absolutely bare of the sediments which one might expect to

● RADIO ●

Capt. N. H. Heck, U. S. Coast and Geodetic Survey, will be the guest scientist on "Adventures in Science" with Watson Davis, director of Science Service, over the coast to coast network of the Columbia Broadcasting System, Monday, August 28, 5:45 EDST, 4:45 EST, 3:45 CST, 2:45 MST, 1:45 PST. Listen in on your local station. Listen in each Monday.

find, Prof. Shepard said. Bare, too, are submarine canyons off the California coast out to depths of 5,000 feet. This raises the point of what happens to the tons upon tons of sediments borne to sea by California rivers.

According to Prof. Shepard: "A large amount of the sand poured in by rivers is brought back by the waves which distribute it on the beaches while the bottom currents carry the mud out over the (continental) sheaf into the deeper troughs and basins outside. The submarine canyons are kept clear of sediment largely by means of the great mud flows although currents are partly responsible."

Mountains Bring Sage-Brush

THE WIDE-SPREAD sage-brush of the Great Basin area of the far west probably got its start because the Sierra Nevada-Cascade mountain range rose up and blocked off moisture-bringing winds from the Pacific, Dr. Daniel I. Axelrod of the University of California told the geologists.

By a study of fossil plants he has been able to learn what plant life was like in the Late Pliocene era about 1,000,000 years ago.

About this time, Dr. Axelrod reported, a great change in the weather occurred in the west. On the northwest coast, over what is now Oregon and Washington, rainfall dropped from 25 inches yearly to the 13 inches it is today. And in south-eastern California it fell from 12 inches yearly to the three inches of rain which now falls on the land.

The slow rise of the Sierra Nevada-Cascade mountains probably was the basic cause of this, Dr. Axelrod indicated. As they rose these ranges gradually intercepted more and more of the rain-bearing Pacific winds. Plants able to live in the increasingly drier climate prevailed. Sage-brush became king. A few of the Pliocene trees managed to survive—the pinyon pine, juniper, cottonwood and antelope brush—in Nevada. But generally they have continued to exist only in the mountains and on a few favorable sites bordering deserts.

Science News Letter, August 19, 1939

SCIENCE NEWS

LETTER SUBSCRIPTION COUPON

To Science News Letter, 2101 Constitution Avenue, Washington, D. C.

Start my subscription to SCIENCE NEWS LETTER for 1 year, \$5
 Renew 2 years, \$7

Name _____

Street Address _____

City and State _____

(No extra postage to anywhere in the world)