



AQUEDUCT

This new aqueduct, the world's longest, is a 993-mile job, to carry spring water from the Apennines to 3,000,000 people who live along the heel of the Italian boot. Double pipelines of the main artery, shown above, are almost six feet across and can take a flow of 222 cubic feet per second. The network of the Puglia Aqueduct, as it is called, is expected to promote development of five of Italy's provinces which have been handicapped by water shortages and by such maladies as typhoid.

lands with channels between the present peaks. How these beautiful and variegated land shells have served as geologic historians was related by Dr. Carlos de la Torre of the University of Havana and Dr. Paul Bartsch of the U. S. National Museum.

Cuba is the home of what is perhaps the largest snail family in the world, comprising 355 species and 702 subspecies, Dr. de la Torre explained. Yet there is no doubt that all these originally evolved from a single ancestral form. As the island alternately rose and subsided, the limestone areas that are the homes of these snails were alternately united and separated. During the periods of separation, since inter-breeding was impossible, the many distinct forms of today came into existence.

Science News Letter, May 25, 1940

Both Scales and Hair

ASOUTH AMERICAN animal that is a "non-missing link" between mammals and their reptilian ancestors was described to the meeting by Dr. Glover M. Allen of Harvard University.

It is a primitive member of the rodent group, known as the paca.

In several orders of mammals, scales are present on tails and backs of feet, Dr. Allen said. This is true of rodents, marsupials and ant-eaters. However, in

the paca the scales are found on the body as well, with the hairs coming out between them. Dr. Allen described this arrangement as "probably present in early mammals."

Science News Letter, May 25, 1940

GEOGRAPHY—METEOROLOGY

Advocates Rubber Cultivation In the American Tropics

Growth of Rubber in Its Native Warm Lands of the New World Would Be Good for Land and for People

RETURN of rubber production to its native home, the tropical lowlands of the Americas, was advocated before the Eighth American Scientific Congress by Loren G. Polhamus of the U. S. Department of Agriculture. Not only would the development of rubber growing in the warm lands of the New World render this hemisphere more nearly independent industrially of the remote and war-threatened East Indies, but it would be good for the land itself and the people who live thereon, the speaker declared.

Regions suitable for the cultivation of rubber have heavy rainfall, which endangers the land through erosion if the forests are cleared away and large-scale field crops introduced. To protect the soil, and at the same time to get something commercially valuable out of it, the best things to cultivate are tree crops.

Rubber cultivation does not necessarily have to be conducted on huge holdings by the factory-like methods of the great East Indian plantations, Mr. Polhamus pointed out:

"Many factors favor production of rubber by small holders who are able to take advantage of the use of intercrops which do not interfere with the growth of the rubber tree but which may help to produce a subsistence for the grower. Large expenditures for equipment are not necessary and the small holder need not have the labor difficulties faced by large corporations. The labor of his own family can be used before noon for tapping rubber and after noon for production of food crops."

The Hevea rubber tree now grown almost exclusively on Dutch and British plantations in the East Indies is a native of tropical America, so that there is no question of its adaptability to New World conditions. It is exposed to plant diseases here, but resistant varieties have been

originated and further improvements, both in disease resistance and latex yield, are now being worked on by plant breeders.

The Hevea rubber tree need not be the sole dependence of American planters, either, Mr. Polhamus continued. There is another species, the Castilla rubber tree, that thrives better in the drier, cooler uplands, and it might prove to be the foundation of a rubber-growing industry for the Central American plateau country.

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Water Important in Peru

ALAND where conservation means just one thing—water conservation—was described in an address by Harold Conkling, deputy state engineer of California. The land is coastal Peru, where there is no rain to erode soil, no forests to preserve, no range problem. The one

Why Smash Atoms?

By ARTHUR K. SOLOMON

ATOM-SMASHING is today one of the most important activities of scientists. Dr. Solomon here explains the work of one type of atom-smasher, the cyclotron, and describes the transforming effects of atom-smashing on the sciences of physics and chemistry, as well as in medicine. He makes clear to the layman the nature, purpose, and results thus far of these epoch-making advances. Fully illustrated.

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big job is to find water where there is arable land, and then get the water on the land.

Ironically, the four largest rivers that cross Peru's narrow coastal plain must forever waste their water into the ocean, for there is no land worth irrigating near them. Also, it is impracticable to build storage reservoirs in the mountains, because the Andes rise too suddenly and steeply.

Reservoirs are natural ones, consisting of great masses of loose soil and gravel in the valleys, which get filled up with water, sponge-fashion, every year. The water is brought up by pumping from wells between 50 and 200 feet deep. A promising new project, fostered by the Peruvian government, has in view the diversion of flood waters, now almost entirely wasted.

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Sunspots Affect Weather

HEVY sunspot outbreaks are followed by rain in southeastern Brazil, Dr. J. de Sampaio Ferraz, formerly director of the Brazilian Meteorological Service, told fellow-scientists at the Scientific Congress. A close statistical study of records covering 60 years of observations indicated that when sunspots are exceptionally large and numerous, the

tropical interior of the country is heated up more than usual, and this is followed by rain-bearing storms migrating down to the warm-temperate state of Sao Paulo, where the observations were made.

This situation in Brazil is quite similar to that obtaining for North America, as studied for many years by Dr. Charles G. Abbot, secretary of the Smithsonian Institution. On this continent, Dr. Abbot has stated, heating effects over the inter-

ior plains are followed by storms migrating in an easterly direction.

Dr. Ferraz also found increases in rainfall without any preceding increase in sunspot activity. However, it appears that at times the output of solar energy increases steeply without any sunspot manifestations. The spots, after all, are symptoms, not causes of increased solar activity.

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GENETICS

Colchicine Treatment Produces Striking New Flower Varieties

See Front Cover

MARIGOLDS half a foot across, snapdragons with blossoms of deeper color and sturdier stems, spearmint of a different flavor are among the newest accomplishments in plant breeding made possible by colchicine. These and other plants have been developed at the New York State Agricultural Experiment Station (Geneva) by a husband-and-wife team of scientists, Drs. Bernhard R. Nebel and Mabel Ruttle Nebel.

The marigolds are perhaps the most spectacular, for their sheer size and brightness of yellow and orange colors. Original breeding stock was the familiar African marigold species. Young seedlings of this species, after treatment with colchicine solution grew up and produced offspring with double the usual number of heredity-bearing chromosomes. Technically such plants are known as tetraploids. Results have varied somewhat from variety to variety.

Another line of marigold breeding has been the production of a fertile strain out of the hitherto sterile hybrid between African and French dwarf marigolds, by doubling its chromosome number. This plant also bears flowers larger than those of either the untreated hybrid or the French Dwarf parent.

The new African tetraploid has also been crossed with French dwarf varieties, with results of horticultural promise.

Ten new tetraploid snapdragon varieties have been obtained. These show considerable variability in form, size, and fertility, depending on the variety from which they were derived. The flowers are larger than those of the parent and deeper in color; the corollas are more wavy; the plants are sturdier and more erect; the leaves are a deeper green.

The new tetraploid spearmint was produced by treating the underground shoots or runners of commercial spearmint plants with colchicine. Ordinary spearmint is a hybrid of unknown ancestry, and is sterile. The new tetraploid is fertile and has an odor unlike that of its parent.

Partly tetraploid apple stem tissue has been produced by treating buds with colchicine. If further growth produces entirely tetraploid shoots, new varieties and important material for further breeding work will be at hand.

Discovery of the great value of colchicine in plant breeding work was no lucky accident, the Nebels emphasize. It developed in the manner that can be considered normal for any major scientific advance: the step-by-step accumulation of knowledge about the properties and effects of the material in hand, contributed to by many workers, and the final application to a new problem when the time was ripe.

In the case of colchicine, the effects of

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