

ful mosaic pictures of Christian art in the church.

Prof. Vasiliev will examine the mosaics so far uncovered, and will search the manuscripts stored in old crypts and vaults of the building, for light on the little-known Empire of Trebizond. On the history of this Empire, Prof. Vasiliev is a leading authority, although Arabic and Byzantine manuscripts have yielded him only a smattering of information.

Exploring the riches of the St. Sophia documents, Prof. Vasiliev expects to use no less than a dozen languages in his effort to re-establish in history an almost forgotten empire.

*Science News Letter, March 10, 1934*

## METEOROLOGY

## Winter Tornadoes Rare But Causes Are "Orthodox"

**W**INTER tornadoes, such as the storms that took two score lives in the South on Sunday afternoon, Feb. 25, are unusual only in the season of their occurrence, scientists of the U. S. Weather Bureau told Science Service. The basic physical causes that bring tornadoes into existence are the same, whatever the season.

The state of great atmospheric instability that can start these intense twisting air-whirls is set up most commonly by the inflow of a cold air mass at a relatively high level—6,000 to 15,000 feet—riding over a mass of warm air that hugs the ground. Such an extensive "temperature inversion" is an invitation to the two air masses to mix and overturn—and if the overturning is rapid enough, swirls of tornadic force are the result.

*Science News Letter, March 10, 1934*

## **R** FOLLOWING DARWIN'S TRAIL IN SOUTH AMERICA

an address by

**A** Dr. W. H. Osgood

**D** Curator of Zoology, Field Museum of Natural History

**I** Wednesday, March 14, at 4:30 p. m., Eastern Standard Time, over Stations of the Columbia Broadcasting System. Each week a prominent scientist speaks over the Columbia System under the auspices of Science Service.

## PHYSIOLOGY

# Baby Rabbits Born. Normally After Fertilizing in Glass

## Harvard Physiologists Succeed with "Ectofertilization" And Development of Ova by Foster Mother

**B**ABY RABBITS, developed from eggs that were fertilized outside the mother's body and brought to birth in the body of a second mother rabbit, have been produced in the Harvard University laboratory of general physiology by Prof. Gregory Pincus and E. V. Enzmann. These little rabbits, "fathered" in a glass flask by sperm extracted from a male rabbit, may be looked upon as the first actual approach to "ectogenesis," or "babies born in a bottle," about which scientists with a romantic bent, like J. B. S. Haldane, have been dreaming for years—though it is admittedly still a long way from realization for human beings.

Each of the two litters of "ectofertilized" rabbits which Prof. Pincus and Mr. Enzmann have succeeded in obtaining may in a sense be said to have had three fathers and two mothers, for in each case three male and two female rabbits were required for the process. In the strict biological sense, of course, the real mothers were the females that supplied the ova and the real fathers were the males that supplied the sperm; the others would rate more as auxiliary or foster parents.

To produce their "ectofertilized" rabbits, the Harvard scientists first mated a female rabbit with a male which had been rendered incapable of producing sex cells by a simple surgical operation. The mating act stimulated the first steps in the development of the ova, or female sex cells, which however, still remained unfertilized.

Then the ova were removed from the mother rabbit's body and placed in a suitable fluid in a glass vessel. Sperm from a normal male rabbit was added, and allowed to remain with the ova until each one had received the fertilizing male cell. Certain changes observable under the microscope indicated to the watchers that this process had taken place.

In the meantime, the "foster-mother" rabbit had been prepared for her role by being mated with another male in-

capable of producing functional sex cells. Into her maternal tissues, thus stimulated to activity, the ova of the other rabbit, fertilized in a glass vessel with the sperm of a male she had never seen, were introduced. They developed, and in due time the young rabbits were brought forth.

In order to have a check on the correctness of their technique and to make sure that the second mother rabbit's own ova were not chance-fertilized by stray sperm-cells, rabbits of different breeds were used throughout, so that the coat color of the young ones would indicate their actual parentage. This was in both cases indubitably traceable to the ova and sperm cells in the glass vessel. *(Turn Page)*

## ANTHROPOLOGY

## South Sea Wood May Reveal Life of Ancients

**A** NEW way of tracing the origin and early activities of Polynesian peoples is to be tried by Yale scientists.

The new attack on the problem will be an investigation of over 2,500 wood specimens from remote islands of the South Seas. By studying these samples of wood, and comparing them with old wooden implements used by Polynesians, the Yale School of Forestry hopes to learn more about where the islanders came from, and with what regions they had contact.

The collection of South Sea woods has been given to the School of Forestry by the Bernice P. Bishop Museum of Honolulu, and is intended for use in the systematic study of woods of the entire world now being sponsored by Yale in cooperation with the International Association of Wood Anatomists.

The Bishop Museum specimens are pronounced of exceptional value because nearly all were obtained by scientists on expeditions to remote localities in the Pacific.

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In reporting their biological triumph to the National Academy of Sciences, Prof. Pincus and Mr. Enzmann comment, "We believe, therefore, that this is the first certain demonstration that mammalian eggs can be fertilized in vitro."

The way for the experiments of the two Harvard physiologists was prepared by the work of earlier research men, to whom their communication gives due credit. That fertilized egg cells could be transplanted from the body of the mother animal into the body of another female, where they would then go through normal development, had been demonstrated as early as 1905 by an English physiologist, W. Heape, and his results had been confirmed in 1922 by a German group, A. H. Biedl, H. Peters and R. Hofstätler. Prof. Pincus had obtained similar results in 1930, but his effort to carry the process one step further had not then succeeded.

Babies born in glass flasks in the laboratory, instead of being brought forth by human mothers in the age-old painful way, have been a dream of modern biological romancers, just as the "homunculus," or synthetic little human being, was one of the dreams of old-time alchemists. In a little book called "Daedalus, or Science and the Future," published ten years ago, J. B. S. Haldane prophesied the "birth" of the first ectogenetic baby in 1951. But even with the success of Prof. Pincus and Mr. Enzmann before them, scientists hardly expect, in so near a future, that particular type of "blessed event."

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## SEISMOLOGY

## Chilean Mountains Shaken by Earthquake

**T**HE MOUNTAINOUS region northeast of Valdivia, Chile, was the scene of a fairly severe earthquake on Thursday afternoon, March 1, seismologists of the U. S. Coast and Geodetic Survey decided after examining instrumental data obtained from five observatories by Science Service.

The epicenter was located in 39.5 degrees south latitude, 72.5 degrees west longitude, and the time of origin was 4:45.4 p. m., E.S.T.

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A plant under construction at Regensburg, Germany, will produce alcohol and saccharose products from wood.

## SEISMOLOGY

# Observing Ground Tilt May Aid Earthquake Prediction

**P**REDICTION of earthquakes a few hours before they occur may be possible in the future as a result of studies that have been made in Japan, Capt. N. H. Heck, chief of the U. S. Coast and Geodetic Survey's division of terrestrial magnetism and seismology, declared before the Brooklyn Academy of Arts and Sciences.

In a number of earthquakes there was perceptible tilt of the ground several hours before the earthquake, Capt. Heck said. In one case the villagers observing the tilt, feared a tidal wave and took to the hills. The tidal wave and earthquake came later.

A new machine for measuring tilt of the ground has been invented by George E. Merritt, formerly of the U. S. Bureau

of Standards, and installed in California through the cooperation of the U. S. Coast and Geodetic Survey and the University of California. This apparatus is expected to throw new light on California's earthquake problems. Tilt on a large scale and the creep of the earth's crust, known to be a factor in earthquake production, can be detected through triangulation and leveling, such as is being undertaken by the Coast and Geodetic Survey.

Prediction of earthquakes, however, lies in the future, Capt. Heck emphasized. We now have, he said, no possibility of prediction beyond indicating whether or not a certain region is likely to have an earthquake in the not too distant future.

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## ECOLOGY

# Buttresses Formed on Cypresses By Action of Air and Water

**C**YPRESS buttresses, those curious wide outgrowths that develop around the bases of these water-dwelling trees, are formed only when air and water have a chance to act together on the wood-forming tissues. Cypress trees growing on permanently dry land, or with their roots permanently covered with deep water, are alike in not forming buttresses.

So state Prof. Herman Kurz of Florida State College for Women, and Dr. Delzie Demaree of Stanford University, in the current issue of *Ecology*. Prof. Kurz has had unusual opportunity for observing cypresses in the vast swamplands of northern Florida, and Dr. Demaree has made a special study of the trees of the Reelfoot Lake region in northwestern Tennessee, where great areas of already existing forest were partly submerged by the great New Madrid earthquake of over a hundred years ago.

Everywhere the story is the same. Where there is no standing water the cypresses form no buttresses. Where

the water level is shallow and constant, the buttresses are low but very wide. Where the water level fluctuates considerably, buttresses of a more or less conical shape develop. An interesting variant of this latter condition was discovered by Prof. Kurz in some moderately deep cypress lakes that went suddenly dry and then re-filled, a season or two ago. Here the tree-trunks had buttresses twelve feet or more high, with "waists" in them, so that they resemble the bottles in which a familiar soft drink is sold.

The form and magnitude of the buttresses are directly proportional to the total time that the various buttress horizons are in contact with air and water. This relation is so clearly revealed by the buttress forms that their profiles may be used to interpret water depth and water level fluctuations of lakes in which cypresses grow.

Dr. Demaree found convincing evidence that buttresses are not necessarily formed around roots, when the water level of Reelfoot Lake sank far below