

Mayas, Aztecs, and other Indians of Mexico—were popular over so wide an area of ancient America.

The game court now excavated is an oval bowl about 100 feet long and 45 feet wide, with slightly pointed ends. The sloping sides, Dr. Colton said, must have been seven or eight feet high, and the floor was level. Entrances were in the north and south walls, and a goal made of four rocks in the floor was at the south end. The plan resembles ball courts used in prehistoric Mexico.

Still uncertain as to what kind of game the northern Arizona Indians play-

ed in their elaborate bowl centuries ago, the Museum-College expedition is excavating another game court located east of Flagstaff.

A well-known Indian ruin in this region, long believed to be an ancient reservoir, is now recognized as another of the courts. In southern Arizona, last winter, an expedition first discovered that the Mexican-type ball courts spread north into what is now the United States.

"That the courts should be found as far north as Flagstaff," said Dr. Colton, "is indeed striking."

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PHYSIOLOGY

Sex Gland Cancer Produces Female Hormone in Male Body

EVIDENCE that male human beings under certain conditions will produce large amounts of a hormone identical with that occurring in the body fluids of women during pregnancy was presented to the American College of Surgeons by Dr. Herbert M. Evans, Professor of Biology at the University of California.

Dr. Evans stated that with the collaboration of Dr. Miriam E. Simpson he has been able to demonstrate that when the male sex glands are invaded by tumor, a hormone is produced which reacts exactly the same on other animals as "prolan," the hormone produced in women during the development of the embryo. In other words, the rapidly proliferating tumor cells lead to the same result as the proliferating cells of a fetus, although one occurs in the male and the other in the female.

This determination, it was pointed out, indicates the necessity for extreme care in measuring the strength of hormone dosage. When experiments on the hormone from males with tumor of the gonad were first started it was believed that this substance was far stronger in its effects than "prolan" from pregnant women. The conclusion was that it compared in strength of effect with the sex-stimulating hormone from the anterior lobe of the pituitary gland or the hormone from pregnant mares.

Checked Measurements

However, suspicions were later aroused as to the accuracy of the unit measurements commonly used in hormone administration. Careful checks were made and these revealed that when care was taken to equate the unitage of

"prolan" and the hormone from males with tumor of the gonad, the effects were identical. With the cooperation of Drs. Horlein, Schulemann and Laqueur of the chemical laboratories of the Interessen Gemeinschaft at Elberfeld, Germany, it was shown that both hormones led to the same stimulation of the ovaries in immature rats. It was found that when immature female rats were given between 5,000 and 20,000 units of either hormone, ovaries weighing 200 or more milligrams were produced.

Tried on Pigeons

A recheck of the comparative effects of the two hormones on pigeons indicated that in this case also when the true unit value of "prolan" was determined it yielded the same gonad stimulation as the newly-obtained hormone from men suffering from the disease, *teratoma testis*. The effect of the two hormones is also the same when given to rats lacking the pituitary, both male and female.

In conclusion Dr. Evans said, "Ovarian weights will increase fairly rapidly following injections of the pregnancy hormone prolan in doses of 50 to 100 times the minimum rat unit. Very slight increases occur as the dose is increased up to 5,000 rat units. But when the dose is raised to 10,000 or 20,000 units, the ovaries increase to giant size, comparable to that achieved by administration of the male tumor hormone or ordinary doses of extracts from sheep pituitary glands. In every case the male tumor hormone shows its close relationship to the female pregnancy hormone prolan."

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GEOLOGY

Movie Compresses Millions Of Years Into Minutes

MILLIONS of years are compressed into minutes of viewing time, in a series of remarkable new scientific motion pictures that have just had their première showing in Washington, D. C. They portray, by a well-thought-out combination of pictures taken out of doors and moving animated diagrams, a number of phases of the geologic processes that have made, and are still making, the earth we live on. A running fire of explanation is "talked on" to the film, so that it delivers its own well-synchronized lecture.

Although these pictures were designed primarily for use in college geology classes, the way the first general audience who saw them "ate them up" indicated that they will find wide use elsewhere. It is already planned to show them in the C.C.C. camps.

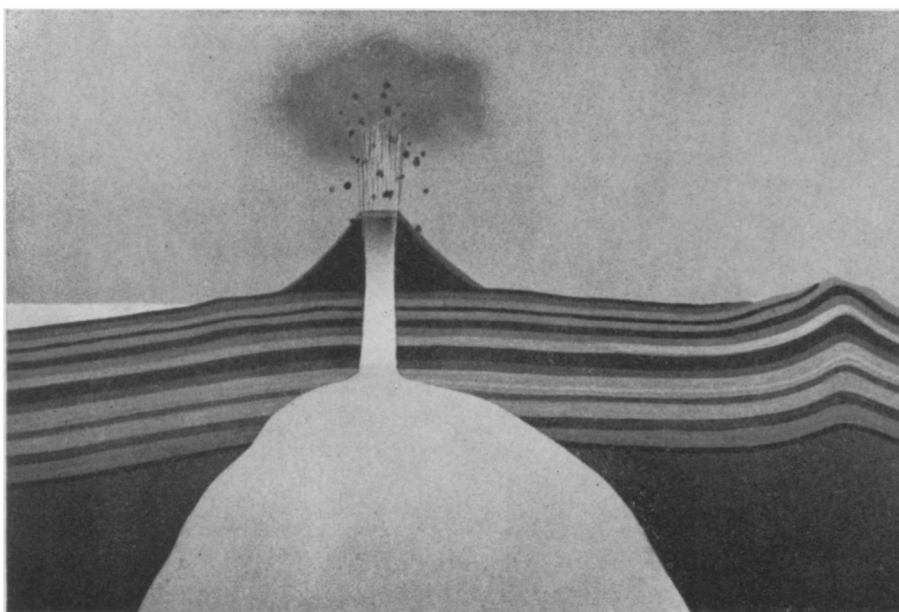
It is appropriate that the men of the C.C.C. should be among the first to see them, since some of them had a considerable part in the production. The pictures are the products of collaborative effort on the part of the U. S. National Park Service, the University of Chicago, and Erpi Picture Consultants. The Service provided the actual geology, the University developed the script, and Erpi supervised the work of the corps of C.C.C. men who made the animation drawings and developed the films.

Incessant Change

The films show dramatically and vividly the incessant change that is the real secret of the seemingly unchanging ocean, the transitoriness of the "everlasting hills." The phenomena range from the swishing fall of the rain and the incessant gnawing tooth of erosion to the slow, mighty creep of glaciers and the slower but even mightier creep of the earth's crust to form mountain ranges. Waterfalls thunder, geysers roar, volcanoes rage.

What will impress the observer most, probably, is the manifold activities of water. These films bring home anew the often-emphasized fact that the "universal solvent" long sought by the ancients is really to be found in the common water they disregarded in their search. Water is shown cutting down the earth banks of streams, wearing away the solid granite of mountains. Water insinuates itself into limestone strata and opens up tremendous awesome caverns.

Water forms wedges of ice that split



HOW A VOLCANO SPROUTS

One of the new geology films shows how a pencil of magma, working its way to the surface, develops the local supply of lava that becomes the working capital of a volcano.

rocks, slow-heaving rams of ice that pile up boulders on lake shores, massive rivers of ice that sculpture valleys like the Yosemite. Water is locked secretly in the crystals of the dry unchanging rocks, and water leaps bellowing as

volcanic steam when stones visit the sky and rock runs in cataracts of lava. The history of earth, these films demonstrate impressively, might well be called the history of water.

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PHYSICS—ASTRONOMY

Einstein's Relativity Theory To be Tested in Sun's Eclipse

THE NEXT eclipse of the sun will find Prof. Albert Einstein's theory of relativity again being tested to see whether it or its new challenger—the theory of Sir Shah Sulaiman, Indian judge and mathematician—better predicts the bending of star light grazing the sun's surface.

This new test is part of the latest phase of the scientific controversy over the new relativity theory of Sir Shah, who while chief justice of the High Court at Allahabad, India, is also an Oxford-educated mathematician.

The new stage consists of a defense, by Sir Shah, of previous criticisms of his revolutionary theory which would upset the work of Prof. Albert Einstein; and a counter-criticism of Sir Shah's defense by D. R. Hamilton, Princeton mathematician. (*Science*, Nov. 1)

Mr. Hamilton, working under the direction of Prof. H. P. Robertson, mathe-

matical physicist and associate of Prof. Einstein, presented, last March, the first critique of the Sulaiman theory which the Indian justice-mathematician now defends.

The new theory, as originally announced, sought to provide some link between the classical mechanics of Sir Isaac Newton and the modern Einstein relativistic mechanics. Using ordinary mechanics, Sir Shah has attempted and built up equations which as a first approximation reduce to those of Newton, and as a second approximation reduce to those of Einstein's relativity.

Also, as originally presented, the Sulaiman theory postulated the existence of tiny particles—gravitons—on which the pull of gravity depended.

In part, Mr. Hamilton's original criticism was based on these gravitons which, he said, was a concept originally

put forward by LeSage in 1764 and long since discarded.

Sir Shah in his new reply states, "I must remove the misapprehension that my mathematical theory is based on the assumption of gravitons." They are convenient, he adds, but not at all necessary for the theory.

Still another criticism of Sulaiman's original theory by Mr. Hamilton was the fact that on working out the calculations it turned out that the planet Mercury after 300 years would no longer be swinging about the sun in an elliptic orbit as it does but would change to a parabolic orbit and fly off into space.

"Fallacious"

Replying to this critique, Sir Shah points out that calculations like those of Mr. Hamilton, based on yearly increases on a large number of revolutions, are fallacious. Curves based on approximate solutions like those of the new theory, Sulaiman adds, are intended merely to represent only a geometrical picture of the orbit and then only to within the limits of whatever approximations are taken.

"Such a method," he points out, "does not at all profess to give the whole history of the revolutions of a planet over a long period."

He goes on to add that Einstein's equations fall down also when applied to the same test of a large number of revolutions.

"The obvious explanation," Sir Shah concludes, "is that the geometrical shape of the orbit is one thing and its whole history through its spiral path is quite another."

The next solar eclipse will furnish a final test of the relative merits of the Sulaiman and the Einstein theories for both predict by what amount the deflection of light from distant stars will bend if it passes close to the sun, declares the Indian magistrate.

"Still Found Wanting"

Mr. Hamilton, replying to Sir Shah's reply, points out that he soon will publish "a complete account of the numerical perturbations predicted by Sulaiman's formulae" and strongly implies that much is still to be found wanting in the whole new theory.

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At the Brooklyn Children's Museum, young "specialists" are encouraged to give lantern-slide lectures on their hobbies at the museum, and sometimes later at school.