tremely short ultraviolet radiation, which is beyond the limit of reflectivity of silver. At the suggestion of Prof. S. L. Boothroyd of Cornell, two graduate students in physics, Robley Williams and George Sabine developed a German method of depositing metal film on glass and applied it to the coating of astronomical mirrors.

Last year a 10-inch mirror was chromium coated and used at Cornell's Fuertes Observatory to photograph the star Vega's spectrum in the extreme ultraviolet, in which region silver just allows the radiation to pass through without reflecting it.

This year Lowell Observatory loaned a 15-inch mirror and a 4-inch secondary which were coated with aluminum and a Cornell party used them and other aluminum-coated mirrors and quartz spectrographs at Lowell Observatory, Flagstaff, Ariz., to photograph nearly 200 extreme ultraviolet spectra of over 80 typical stars. The Cornell party, which consisted of Prof. and Mrs. S. L. Boothroyd, Mr. and Mrs. H. C. Ketcham, R. W. Shaw, Robley C. Williams and George B. Sabine, worked during September and October at Lowell Observatory's mountain station at 11,500 feet altitude as well as at Lowell Observatory, at 7,350 feet altitude.

Analysis of the spectrograms obtained, now in progress, is expected to give new information about the temperature and condition of the star.

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GEOLOGY

Crack in Earth Indicated By Radioactive Water

RADIOACTIVE water, captured by geologists in wells dug by farmers in Michigan, disclosed the existence of a fault, or crack in the earth's deepest rocks, although it was masked by a thick overlying layer of earth. At the meeting of the American Association for the Advancement of Science, Prof. Alfred C. Lane and Dr. W. R. Bennett, of Tufts College, told how it was done.

Water samples, collected and rushed to Purdue University for analysis, showed varying degrees of radioactivity; the closer to the fault the wells, the more active the waters. This was because radioactive substances from deeper within the earth's crust were rising through the crack and charging the water.

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MECHANICS

Scientists and Housewives Test Bottle-Top Unscrewing

EVER TRY to screw off a bottle top that refused to be unscrewed?

If so, you will sympathize heartily with a piece of research at the Pittsburgh Testing Laboratories. Calling on housewives with varying degrees of muscle to aid in the test, the laboratory has gone very thoroughly into the question of just how much strength manufacturers can expect the customers to exert on a bottle top.

"The twisting effort that a woman can exert in unscrewing a cap is strictly limited," reports the laboratory director, M. L. Carr, in the trade journal *Food Industries.*

The weakest-armed woman exerted a twisting force of only 11.6 inch-pounds, while the strong arm of the strongest woman twisted with a force of 29.6. The average housewife naturally came well between these extremes with a power of 18.5 inch-pounds.

One jar of sandwich spread which proved immovable—even when the housewife gave up twisting it and took to hitting, prying, and heating the bottle—was given a laboratory test. Screwing it off required 102 inch-pounds of twisting effort.

The actual test consisted of taking ten different unopened bottles and jars of grocery goods into the housewife's own kitchen and asking her to open each by unscrewing the lid. If she failed, she was told to go ahead and open it any way she liked, and the laboratory found this meant anything from banging the bottle on the floor to calling in a husband. Incidentally, some jars baffled even the husband. The experiment was repeated in fifty kitchens, with 500 bottles and jars altogether put to the kitchen test.

Out of the test emerges the information that the way in which a cap is applied to a bottle in the factory may be one important factor in the opening process. Some caps are "rolled on." That is, the threads are rolled into the cap over the threads of the container. Other caps are "preformed." These caps have their screw threads formed separately from the container, but designed to fit the container threads.

Of the 96 bottles and jars that proved unscrewable in the hands of the housewives, 56 were removed by some rough-and-ready device, and the remaining 40 defied all efforts. Of these 40 only two were rolled-on screw caps, says Mr. Carr's report, whereas the other 38 were preformed caps.

The plight of the weakest women who have to tackle the bottle cap problem is pronounced indeed sad. About half of the bottle caps are beyond their strength. But when even the powerful Katrinkas give up the struggle with a bottle, manufacturers may well pause to take thought on the bottle-top question.

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MEDICINE

Immunity to Disease Measured in Tissue

WHEN an animal is given immunity to disease germs, its skin and other tissues acquire protective properties as well as the blood, in the opinion of Prof. Reuben L. Kahn of the University of Michigan.

At the meeting of the American Association for the Advancement of Science Prof. Kahn reported a method of measuring the degree of immunity acquired by the different tissues of the body. He pointed out that if it is possible in this way to learn the extent of immunity of all the tissues of an animal, medical scientists will be able to fight germ diseases more successfully than at present.

Prof. Kahn's studies showed that when an animal is immunized its body tissues acquire a new property; namely, the capacity to detect and to anchor or combine with the immunizing substance whenever they come in contact with it.

The protective nature of this tissue change is evident, since by combining with the substance against which the animal is immune, the tissues prevent its diffusion or spread throughout the body. In the case of infections, this capacity of the tissues may determine whether the germs will spread throughout the body and produce widespread

injury or will be localized in the tissue wherein they have gained entrance.

The skin, Prof. Kahn found, possesses a combining power for the immunizing substance more than ten times greater than muscle tissue, brain tissue or blood. Since this combining power is a defensive response, it must be assumed that the degree of immunity of the skin is far greater than that of the other tissues studied.

This is perhaps to be expected, Prof. Kahn observed, since the skin, throughout the ages, has been the most exposed to attack by bacteria, making a particularly strong defensive mechanism necessary.

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CHEMISTRY

"Diplogen" Suggested As Heavy Hydrogen Name

AMERICAN and British scientists do not agree as to what to name science's new baby, the double-weight hydrogen atom, discovered in America.

Lord Rutherford, in a Royal Society discussion upon heavy hydrogen, urged the adoption of "diplogen" as the name of the double weight hydrogen atom and "diplon" as the name of the nucleus or kernel of heavy hydrogen.

Prof. H. C. Urey of Columbia University, one of the group of American scientists who discovered heavy hydrogen, had already christened the atom "deuterium," and at the University of California the nucleus had been labeled "deuton."

The principal objection to the American terms lies in the phonetic similarity between deuton and neutron. Neutron is the uncharged or neutral particle of nearly the same weight as a proton or ordinary hydrogen nucleus.

If the scientists discussing these atomic particles have colds or do not speak distinctly, deuton and neutron are easily confused in speech, Lord Rutherford said.

Dr. Frederick Soddy, the Oxford chemistry Nobelist, who pioneered in investigations on varieties of elements and coined the word "isotope" protested against the idea that ordinary mass one hydrogen and the heavy weight hydrogen of mass two are really isotopes. He considers hydrogen and deuterium (diplogen) homologues like oxygen and ozone rather than true isotopes.

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ARCHAEOLOGY

Hidden Temple Found Within Mayan "Castle"

A BEAUTIFUL temple hidden within a temple has just been discovered by Mexican government archaeologists at the old Mayan city of Chichen Itza. The hidden temple is in the lofty Castillo or so-called "Castle", a temple to the Feathered Serpent god, perched on the highest pyramid base in the city.

Aware of the ancient Indian trick of building new structures over old, to honor the gods or to mark the passing of periods of time, no one knows exactly why, the excavators began a year ago to probe into the interior of the gigantic substructure of the Castle.

At first they encountered only walls of a smaller inner pyramid. Later they found a human sepulcher. The burial was accompanied by funeral offerings of turquoise mosaics, thousands of turquois beads, and exquisitely carved fine jades.

This year they followed the sloping walls of the hidden pyramid upwards, and came upon a stone shrine on the flat summit. The building thus discovered is almost perfectly preserved. The early pyramid and temple had not been destroyed, but merely heaped over with earth and rock to form a larger base for the present shrine of the Feathered Serpent. The roof of the buried temple is flush with the flat summit of the present temple, and forms the floor of the adoratory.

While the theme of designs of the exterior temple consists of plumed serpents and warriors, the most important decorations of the older shrine are tigers. The tigers are sculptured in stone on the frieze above the door. The facade also has bands of geometrical designs, ornamental shields, and flower-like rosettes sculptured into the stone. These decorations are entirely different in style from those of the present outer temple.

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PHYSICS

Raman Effect Found Different in Heavy Water

HEAVY water takes light of one color and changes it to light of slightly different color in a way not the same as this Raman effect in ordinary water, Dr. R. W. Wood of Johns Hopkins University has demonstrated.

In communications to *Nature* and *Science,* Dr. Wood reports that water containing the recently discovered hydrogen isotope of mass two, when lighted with ultraviolet light of 2536 Angstrom units from a mercury vacuum tube, changes part of it to longer wavelengths that average 2711 Angstrom units.

This is a new proof of the optical effect discovered in 1928 by Sir Chandrasekhara Venkata Raman, Hindu scientist who was awarded the Nobel prize in physics for 1930. Dr. Wood was the first to verify the Raman effect outside of Raman's own laboratory.

The new Raman band discovered by Dr. Wood agrees within 4 per cent. with the expected value derived from theoretical calculations. The band observed is due to water molecules that have one atom of heavy hydrogen and