



EUROPEAN-AMERICAN

This animal at the Leningrad Zoological Garden is a hybrid of European bison, or wisent, and American bison.

ZOOLOGY

Bison Blood Being Bred Out of Wisent Hybrids

EFFORTS are being made to build up a supplementary herd of wisent, or European bison, almost exterminated as a result of the World War, by an interesting technique called *Verdrängungszucht*, or "suppression breeding." Surplus wisent bulls have been bred to American bison cows. Only female calves are kept, and these are bred back to wisent sires, each generation thus getting rid of half the remaining bison blood, until finally a stock of practically pure wisent will remain. This experiment is being carried on at the reserve at Springe, in Germany, but it is expected that the herd will soon be transferred to roomier pastures in Brandenburg.

In the meantime, the stock of pure-blooded wisent is being kept carefully separated from the cross-breeds. Every effort is being made to increase the number of these interesting animals. If both breeding programs are successful, there will eventually be two distinct groups of wisent in Germany: the pure-bred European stock, and a stock of mixed ancestry with a minimum of American bison blood surviving in it.

The State of Prussia has recently purchased three pure-blood wisent cows and one pure-blooded bull from the estate of the late Count Arnim-Boitzenburg. These will be added to the herd already in possession of Prussia.

Science News Letter, December 30, 1933

ASTRONOMY

Aluminum Captures Invisible Starlight

THE usual mirrors for stars that astronomers use in their reflecting telescopes consist of glass coated with silver. While these conventional stellar looking-glasses have allowed an astounding exploration of the heavens, they are "blind" to extreme ultraviolet radiation beyond 3300 Angstrom units in the spectrum, a point that is about as far beyond the visible violet as violet is beyond the blue light of the rainbow.

With the idea of reflecting this extreme ultraviolet to as short a wavelength of light as can get to earth through the ozone of the stratosphere, there have been made at Cornell University mirror coatings of chromium and aluminum. These metals reflect the ex-

PHYSICS—PHYSIOLOGY

X-Ray Pictures Show How Opera Singer Produces Tones

X-RAY PICTURES of the throat of Madame Lucrezia Bori, famous soprano of the Metropolitan Opera Company, have given scientists new knowledge of the cause of differences in voice quality, it appears from a study conducted by G. Oscar Russell of Ohio State University and reported by the Carnegie Institution of Washington.

The X-ray photographs were made with synchronized sound record accompaniment while Mme. Bori sang an aria covering a wide range of pitches, voice qualities and vowels. She was even prevailed upon to produce one bad, strident, tight tone, so that the scientists would have a record of the way the vocal organs act in bad singing as well as in good.

The pictures were made with X-ray apparatus especially devised so as to avoid any impediment to the artist's ease and freedom in singing, thus insuring the production of her natural tones. The exposure time of the X-ray plate was reduced to 1/120 of a second, so as to make it unnecessary for the artist to sing stultified, long notes merely to get a sufficient exposure.

The study showed, among other things, that in the case of this one famous voice, at least, the soft palate

opening into the nasal passages remains closed under practically all circumstances. Nasal resonance is not made use of except for the relatively small amount of sound energy which could be transmitted through the walls themselves.

The X-rays of Mme. Bori also showed that the larynx does not necessarily always rise on all high pitches and fall on low pitches. Furthermore, the larynx does not remain constantly anchored to the spinal column by the powerful constrictor muscles but shifts its position quite constantly. The purpose of such shifts has not yet been discovered.

The study showed that the pharynx is usually distended on the vowel "i" regardless of pitch, and that the epiglottis or areas in the neighborhood of its tip regularly constrict, or in other words the back of the tongue regularly "gets into the throat" in order to produce a clear vowel "a" (ah).

When Mme. Bori produced the one bad tight tone, the pharyngeal cavity was more distended than usual but the interior larynx was obviously very constricted.

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Papier-maché can now be produced from cornstalks.

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