SCIENCE NEWS

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GASTRIC ACIDITY

VERY acid condition of the stomach seems to go with youth and when found in old age is an index to a long life, it appears from a study reported by Drs. Zachary Sagal, Jerome A. Marks and John L. Kantor, of New York City, to the American Gastro-Enterological Association and published in the current issue of the *Annals of Internal Medicine.*

These physicians made 6,679 determinations of the amount of hydrochloric and other acids in the stomachs of nearly that number of patients having symptoms of digestive disorders. The patients were of all ages and came from many different walks of life. Here are some of the other interesting findings of this study, some of which confirm observations by other scientists:

There are several constitutional types with regard to gastric acidity, as well as with regard to other conditions of the body.

After constitutional predisposition, age is the dominating factor in gastric acidity. The greatest percentage of high stomach acidities was found in the fifth decade of life. This is the period when all bodily functions begin to decline, including stomach secretion. Diminishing amount of acid in the stomach may be considered one of the indications of approaching old age, such as loss of hair and teeth, diminishing activity of the glands of internal secretion and hardening of the arteries. Sex is also a factor, men having higher degree of stomach acidity at all ages than women.

Certain diseases are known to be associated with certain ranges of stomach acidity; for example, the acidity is high in duodenal ulcer, while hydrochloric acid is absent in pernicious anemia and cancer of the stomach. These acid levels seem to precede the disease, however, and Drs. Sagal, Marks and Kantor believe that the degree of acidity, which is a constitutional factor, predisposes to a certain disease, rather than that the disease produces the change in acidity. Regular determinations of the acid in a person's stomach, therefore, are recommended in order to watch for predisposing signs of disease, and also as a guide to treatment. For example, persons with a tendency to have too much acid in the stomach should avoid spicy and other foods that stimulate stomach secretion. Low acidity, on the other hand, calls for an entirely different diet.

In many cases of heartburn the New York doctors found little or even no acid in the stomach, and they point out that medicinal treatment should be guided accordingly. It would seem that baking soda, favorite home remedy for heartburn, may be all wrong in some cases. If the condition in a given case were due to too little acid, the soda, by neutralizing what acid there was in the stomach, would exaggerate the condition and aggravate rather than relieve the symptoms.

THE WHITE SPOT ON SATURN

A LARGE white spot, so immense that it could engulf an object over twice the diameter of the earth, has appeared suddenly on the equator of Saturn, the ringed planet and second largest of the solar system.

It was discovered by John E. Willis, of the U. S. Naval Observatory, at 12:18 A. M. Saturday, August 5, while he was observing a transit of Saturn as a routine operation, using the fixed six-inch telescope. Although he observed the planet for only about a minute before it left the field of view, Mr. Willis recognized the spot and called upon other astronomers at the observatory to check his discovery. Principal Astronomer H. E. Burton turned the 26-inch telescope and a smaller 12-inch telescope upon the planet and confirmed the discovery. B. P. Sharpless also made confirming observations.

Captain J. F. Hellweg, superintendent of the observatory, reported the discovery to Harvard College Observatory, whence it was bulletined to observatories throughout the world in order that they might join in the study of this unusual phenomenon.

Just what causes the white spot is unknown. Saturn is made of the lightest stuff of any planet, with a density one eighth that of the earth or seven tenths that of water. The equator of the planet, which is in line with the plane of its rings, is known to move faster in rotation than the other parts of the planet. Perhaps the white spot is a gigantic whirl in Saturn's equatorial belt.

On Saturday morning it was estimated that the spot was about a tenth the diameter of the planet, but on Saturday night Principal Astronomer Burton, with the 26-inch telescope, found that the spot was much larger. While difficult to measure because not well defined, the spot seemed to be about 20,000 miles long and 12,000 miles wide, being formed by a sort of extension in the brighter equatorial belt of the planet. It is expected that it will continue to be observable for several weeks.

Only twice before do astronomical records show that such spots have been observed on Saturn. The first was seen through the same 26-inch Naval Observatory telescope in 1876 by the late Professor Asaph Hall, Sr., just three years after the telescope was built. By using the spot as a mark of reference, Professor Hall was able to make the determination of the period of rotation of Saturn that is now quoted in astronomical tables, 10 hours, 14 minutes, 24 seconds. The 1876 Hall spot was not so large as the Willis spot now visible. Mr. Willis used the Hall determination of Saturn's period of rotation in predicting when the spot would return to visibility, and Saturday night's observations showed that the Willis spot is revolving around on the planet in about the expected time. The second spot on Saturn was discovered by the late Professor E. E. Barnard, of the Yerkes Observatory, in 1903. Unlike the Hall and Willis spots, the Barnard spot was considerably north of the planet's equator.

The spots are useful in making measurements of Saturn's rotation, but Sir William Herschel made a close determination of the planet's period of rotation in 1794, without the aid of a spot. He came within 2 minutes of the value later determined by Professor Hall.

HEAVY WATER PREVENTS SEEDS FROM SPROUTING

PROFESSOR GILBERT N. LEWIS, of the University of California, has discovered, through the first biochemical experiments made with the double-weight hydrogen isotope, that the new "heavy" water, one of science's latest discoveries, prevents the sprouting of seeds and may actually kill them.

Professor Lewis put some minute tobacco seeds in tiny test-tubes that contained ordinary water. Others he put in tubes of the special heavy water containing only double-weight hydrogen. The seeds in ordinary water sprouted. Those in the new heavy water did not.

From theoretical considerations, Professor Lewis predicted that water made with the heavy hydrogen would not support life and would be lethal to higher organisms. This was the first chance to test his theory. He will now determine whether the seeds placed in heavy water were merely inhibited or actually killed.

The heavy water used in these experiments has two atoms of hydrogen and one atom of oxygen, just as all water has. It is represented by the same familiar formula, H_2O. But all the hydrogen in the heavy water used has its heart or nucleus twice as heavy as the common hydrogen nucleus, and so the weight of the rare water is increased due to this heavier constituent, known as hydrogen isotope of mass two. Professor Lewis has made a report to the *Journal* of the American Chemical Society.

THE SUN'S TEMPERATURE

ASTRONOMERS have made many guesses at the temperature of the interior of the sun from 10,000,000 degrees Centigrade up, but the limit is less than 100,000,000 degrees Centigrade (180,000,000 degrees on the common Fahrenheit scale) if new evidence on the disintegration of light elements is correct, according to a statement made by Dr. Edwin McMillan, of the University of California, in *The Physical Review*. Astronomical evidence for this temperature is based on the heat necessary to balance the pressure of more than 9,000,000 tons to the square inch that exists at the center of the sun. Dr. McMillan has made his estimate from the relative amounts of lithium in the sun.

This terrific heat would be sufficient to transform the heavy lithium number seven into its lighter twin number six. Examination of pictures of the sun's spectrum taken by Dr. Arthur S. King, of the Mount Wilson Observatory, showed Dr. McMillan that the quantity of the light lithium in the sun is not much greater than on the earth. A temperature of 180,000,000 degrees would jostle the cores of hydrogen atoms in the sun about with a speed equivalent to that given by an accelerating electrical field of 10,000 volts and this speed has been found to be sufficient to break down the heavy lithium in the laboratory. But since there is no excess light lithium on the sun it can not have this enormous temperature unless some unknown process keeps building up the heavy twin.

THE PHOTO-ELECTRIC EYE

IN modern buildings doors will open when you approach and your questions may be satisfied by a reply: "The photoelectric valve." But questions in regard to the action of one of the newer type of cells have just been answered.

Professors J. Kunz and J. T. Tykociner, of the University of Illinois, have succeeded in explaining the mechanism of their particular kind of light-sensitive valve nine years after its discovery. The electric eye or switch looks much like a dumb-bell. It is the narrow handle between the knobs that will turn on the electricity when light shines on it. This valve differs from the ordinary photoelectric cell which was discovered early in the century and which was so beautifuly explained by Professor Albert Einstein in 1905.

The ordinary kind of cell generates a very small electric current by the action of light knocking out electrons from a sodium or potassium plate. The newer valve has a hot wire in one of the balls and the electrons given off from this filament are attracted to the other ball by an electric potential or voltage; the flow of these electrons is an electric current. When the valve is kept in the dark these electrons going through the small connecting tube are stopped by the repulsive forces of free electrons on the potassium plated inner walls. But let even the weakest candle illuminate this tube and the free guardian electrons are reduced in number, allowing the trapped electrons to rush on to their goal.

The advantage of the new valve is the large quantity of these moving electrons available from the heated filament. Larger currents are generated and do not have to be so greatly amplified to perform robot tricks.

EARLY MAN IN AMERICA

REPORTING the discovery of new evidence that America was inhabited some 15,000 years ago, Edgar B. Howard, anthropologist, who is excavating for the University of Pennsylvania Museum and the Philadelphia Academy of Natural Sciences, is of the opinion that this continent must have had human inhabitants older than the basket makers and the other types of Indians whose manner of life is known to-day.

The basket makers were the oldest Indians whose life in America is clearly pictured. They were farmers, living in caves in the Southwest during an early stage, and later building houses. Their arrival on the scene in the Southwest is generally estimated at about 1,500 B. C.

At old lake beds near Clovis, New Mexico, Mr. Howard's expedition found matted masses of bones of mammoth, and of extinct species of horse and bison, and what are believed to be camel bones. From the position of the skeletal remains, Mr. Howard reconstructs a scene where animals in a mad desire for water trampled one another into the mud. The bones of these extinct animals are near the surface. No human bones have yet been found, but numbers of stone spear points, knives and scrapers have been found in the same lake beds and near the ancient animals.

Earlier excavations by Mr. Howard in a cave near Carlsbad, New Mexico, revealed hearths buried at various levels down to a depth of over eight feet. Men who built fires in the cave had left there the bones of animals they killed and dragged into the cave for food. Musk-ox

and bison were the big game of the earlier of these hunters. Some of their stone spear points were also among the débris of the hearths.

Finding musk-ox bones in such association led Mr. Howard to set the age of these hunters at no less than 10,000 years before the Basket Maker Indians. Musk-oxen are cold weather animals, inhabiting to-day the frigid north. When the last glacial sheet moved northward, the musk-oxen and other cold weather animals that had been scattered widely over this country were forced to follow the retreating glaciers. New Mexico's last musk-oxen must have died out or departed then, it is believed.

DECREASE OF TUBERCULOSIS

ALMOST an entire year has been added to the general average duration of life by America's successful battle against tuberculosis within the decade from 1920 to 1930, according to statisticians of the Metropolitan Life Insurance Company. About another year's gain stands to the credit of the previous decade. That so much has been accomplished in increased life expectation through attack on a single disease is considered to be "very remarkable and gratifying."

According to the mortality statistics of the recent census year, 1930, the curtailment of the average length of life due to tuberculosis was just over one year for white persons of either sex. In 1920 it was a little short of two years. Still another decade further back in time it was about three years. The loss of potential years of life through a given cause depends not only on the degree of the mortality from that cause, but also on the age period at which its effect is concentrated. In this respect tuberculosis is in a particularly unfavorable position. Deaths from tuberculosis occur very largely among young persons or persons at the prime of life. As the result of this, although the death rate from tuberculosis has fortunately decreased in late years so far as to relegate this cause to the seventh rank among the principal causes of death, yet the number of years of life lost, on the average, is still a relatively important item.

Among white persons in the United States in 1930, the average length of life or the expectation of life at birth is shortened by 1.1 years through all forms of tuberculosis. Up to about the twentieth year of life the curtailment of the average remaining after-lifetime by tuberculosis remains nearly the same, irrespective of age, namely, about one year, according to the mortality as of 1930. After this age it falls rapidly. The situation is strikingly different in the case of heart disease. There the loss of years of life was nearly the same for all ages up to 52 years, and only slightly less even at the age of 62.

ITEMS

ARTISTS' crayons from agricultural wastes are a possibility as the result of recent studies at Iowa State College. By treating furfural, an oily, yellow liquid made from oat hulls, with various simple chemicals, a black material suitable for artists' crayons has been made. Tests show that crayons made from the new material are satisfactory in actual use in comparison with charcoal. By varying the chemical treatment given the furfural, crayons of varying degrees of hardness and blackness may be secured—a thing impractical with charcoal but desirable from the artists' standpoint.

BLOOD transfusions may be carried on more rapidly and conveniently than in the past, through the use of a new electrically driven "artificial heart" which is interposed between the blood donor and the receiver. The "heart," which is the invention of a Paris surgeon, consists of a small rotary pump which gives the transfused blood a "boost" with impulses simulating those of the natural pulse. Among other advantages claimed for the device is the elimination of chemicals which are frequently added to prevent clotting in the older type of transfusion operation.

FORESTS of spruce, fir, pine and larch, like those of present-day Canada, stood in central Illinois during a part of the great Pleistocene ice age. Evidence to this effect has been gathered by John Voss, of Peoria, Illinois, and is presented in the *Botanical Gazette*. Mr. Voss gathered samples of buried logs, leaves and other plant remains from thick peat deposits of known ice age date in three widely separated localities. When his material was identified in the laboratory, it proved to represent trees like those of the present forests of the North.

SWEDEN, which has the largest herds of moose in the Old World, also has the distinction of taking the best care of the animals. There are at a rough estimate 30,000 moose in Sweden, mostly in the central and southern parts of the country. The open season lasts only four days, during which any one can shoot as many moose as he can, but only on his own land. Large landowners may get a longer season by paying a special license fee, which goes into a fund for the conservation of the moose. Moose in Germany suffer unduly because the hunting season coincides with the mating season, during which it is easy to approach unnoticed within range of the excited animals. In Sweden the mating season of all game animals is closed against hunting. Word comes from Siberia that the moose there are decreasing. In the upper Lena River region the annual kill among the native tribes now averages only one animal per family, whereas it used to be as many as twenty.

SUGAR-CANE makes sugar of the relatively simple glucose type before it produces cane-sugar. The cane-sugar is manufactured in the plant through the action of an enzym or ferment known as invertase. Evidence supporting this theory has been found by Dr. Constance E. Hartt, a Honolulu plant physiologist specializing in the activities of the sugar-cane. Dr. Hartt has sent a preliminary report to *The Hawaiian Planters' Record*, and announces that fuller technical results will soon be published. Invertase, which has the power of turning the glucose type of sugars into the cane-sugar type, was always found abundantly in the parts of the cane where the manufacture and storage of sugar were going on most actively. In the older, more mature parts of the stalk the enzym was present in notably lower concentration.