SCIENCE NEWS

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MASURIUM AND RHENIUM

USE of spectra obtained by passing a beam of X-rays through concentrated solutions of rare minerals has enabled Dr. Walter Noddack, of the University of Berlin, assisted by Otto Berg and Ida Tacke, to discover the missing chemical elements, numbers 43 and 75, in the group with manganese in the periodic table. Traces of them have been detected in the concentrated solutions of platinum ores and of the minerals gadolinite and columbite, and it is estimated that they form a billionth of the earth's crust. Dr. Noddack has named them masurium and rhenium after the territories lost by Germany as a result of the peace treaty, the Masurian region of East Prussia on the east and the Rhine provinces on the west.

The new elements, masurium and rhenium, discovered by Dr. Walter Noddack, in Berlin, were brought to light as a result of a law discovered by Henry G. J. Moseley, a young British scientist who lost his life in Gallipoli during the war. When a beam of X-rays is reflected by a crystal or powdered crystals it is spread out into a band, after the manner of a beam of light passing through a glass prism. If this band is allowed to fall on a photographic plate, a series of light and dark lines is obtained, which is called the X-ray spectrum. The X-rays have very short wave lengths and therefore come at the extreme end of the spectrum, beyond the ultra-violet waves.

After a study of the X-ray spectra of many elements, Moseley formulated a law which now bears his name, by means of which, if the atomic number of an element, or its position in the periodic table, is known, the character of its X-ray spectrum may be obtained. A few vacancies still exist in the 92 spaces of the table, but the characteristic spectra of the unknown elements can be calculated in advance, and when a substance is found to give this spectrum, there is no doubt of its identity.

Similar methods were used in 1922 by G. Hevesy and D. Coster at the Institute for Theoretical Physics at Copenhagen, to discover the missing element number 72, which was named Hafnium, after the Latin name for Copenhagen.

With the discovery of the new elements, there are only three vacant places left in the periodic system, which have the numbers 61, 85 and 87. These, like masurium and rhenium, which are numbers 43 and 75, are odd numbers, as it is a curious fact, pointed out by Professor Harkins, of the University of Chicago, that in the case of elements of high atomic weights, those of even number are more common.

Noddack was trained under Nernst, the famous physical chemist of the University of Berlin.

CRYSTALS OF VITAMIN

VITAMIN "C," the preventive of scurvy, has been obtained for the first time concentrated into crystalline form, by N. Bezssonoff, a biochemist. M. Bezssonoff obtained his product by the concentration of a large quantity of the juice of cabbages, which vegetables have long been recognized as effective in the prevention of scurvy. After the final treatment he had a quantity of colorless, needle-shaped crystals that had the same effect in the prevention and cure of the disease as is shown by fresh fruits and vegetables, even when given in the minutest amounts. Scurvy could be prevented in rats, his test animals, by daily doses as small as two milligrams, or less than one one-hundred-thousandth of an ounce. Chemical analysis of the crystals showed them to belong to the hydrocarbon group of organic substances; the compound has been given the technical name of "phenolic anthracene quinone."

Scurvy, the disease for which vitamin "C" is the preventive, used to be a terrible scourge in the old days of sailing ships, when men went on long voyages without adequate supplies of fresh vegetables. It manifested itself in general weakness and debility, distressing skin troubles and the loosening and dropping out of the teeth. Its cure was discovered before its cause was discovered, simply because its cause consisted only in the absence of its cure. Its cause, as is now well known, is the absence of a certain definite food factor, called vitamin "C," and the supplying of vegetables and fruits that contain the vitamin prevents its development and also stops it where it has started. The isolation of this vitamin in pure form as crystals in M. Bezssonoff's contribution to the triumph of science over this disease.

VEGETABLE DIET AND THE LENGTH OF LIFE

THE vegetarians' idea that meat eaters are destined for an early grave receives little support from conclusions of Professor James R. Slonaker, Stanford University physiologist. After experimenting with rats for eight years, Professor Slonaker applies his findings to humans and declares that meat is essential if the human race is to continue.

White rats, under Professor Slonaker's care, reacted very definitely to vegetable and protein diets. The restricted, or vegetable, diet, caused a shortening of the span of life—33 per cent. in the males, and 40 per cent. in the females. Soon after meat was withdrawn from their diet, males lost 35 per cent. of their weight, females from 25 to 28 per cent. By the third generation, power of reproduction was wholly lost in the non-meat-eaters.

"This indicates," said Professor Slonaker, "that there is something lacking in vegetable food which is furnished by the supplementary animal protein. This may be due to additional protein in a form more readily utilized by the animal, or the particular protein may act as a stimulus, causing all cells of the body to become more active and thus making possible a greater and more complete use of the vegetable foods consumed."

Professor Slonaker claims that if man were subjected to the same treatment accorded his rats for a lifetime, results would generally be the same.

RELATIVITY IN THE LIGHT OF EXPERIMENTS BY THE ETHER DRIFT

EXPERIMENTS performed by Dr. Dayton C. Miller, of the Case School of Applied Science, Cleveland, at the Mount Wilson Observatory, California, do not disprove the theory of relativity, as many astronomers have claimed, says Dr. A. S. Eddington, professor of astronomy at the University of Cambridge, England, in a letter to *Nature*. Referring to the article written for *Science Service* by Dr. Ludwik Silberstein, mathematical physicist of the Eastman Research Laboratory at Rochester, following Professor Miller's presentation of his results at the recent meeting of the National Academy of Sciences at Washington, Professor Eddington says, "The brief messages in regard to Professor Miller's experiment have aroused much interest and bewilderment; it is therefore of great value to have Dr. Silberstein's authoritative account."

Professor Miller's experiment was a repetition of one originally performed by Dr. Albert A. Michelson, now at the University of Chicago, and Professor Edward Morley, by which a beam of light was divided into two parts and reflected back and forth in directions at right angles to each other. They were then reunited and a series of light and dark bands resulted. From the position of these bands the physicist can tell which beam takes the longest time to return. When first performed, in the basement of the Case School, Cleveland, in 1887, no effect was obtained, but when he repeated it last summer at Mt. Wilson, Professor Miller obtained a marked effect.

Professor Eddington disagrees with Dr. Silberstein's interpretation of the new experiment as indicating that the ether, by which light is supposed to be transmitted, is gliding over the earth with a speed which varies from about zero at sea level to about six miles per second at the altitude of the Mt. Wilson Observatory. "There is thus," says the Cambridge astronomer, "a rapid rotational motion of this part of the ether."

In order to account for the astronomical facts, however, this motion must be the same at all levels. Just as a boat set to steer a straight course would be turned to one side if it entered a current of water moving at a different speed, a ray of light which is vertical at the level of Mt. Wilson would be inclined a small amount at sea level, and the direction in which it is inclined would vary according to the time of day or night. The amount of inclination would be about 7 seconds of arc, but astronomical observations capable of detecting a much smaller deflection have never revealed any such discordance of positions of stars as seen from sea level and mountain observatories.

"The Michelson-Morley experiment," Professor Eddington concludes, "was originally performed because it was thought—mistakenly, as we now realize—that it would measure absolute ether drift. In the new application, it is invading a field in which the facts have long been established by delicate observations and it is difficult to regard it as a serious competitor."

THE ASTRONOMICAL ALMANAC FOR 1927

ASTRONOMERS will now be able to make plans in detail for their activities during 1927, for the "American Ephemeris and Nautical Almanac" for that year has just been published by the Government Printing Office and the first copies have been received at the Naval Observatory. This book, containing over 800 pages, which is published annually, and is as indispensable in observatories as Dun's or Bradstreet's list of mercantile ratings in business houses, is prepared annually under the direction of Dr. W. S. Eichelberger with the assistance of sixteen other astronomers.

In it is found complete information concerning all important astronomical events scheduled to occur during the year. This includes spectacular events like eclipses, of which two of the sun are on the program for 1927, and occultations, when the moon passes before a star or planet. Matters of less popular interest, but of importance to the astronomer, such as daily positions of the sun, moon and planets, variations in the positions of stars, at different times of the year, tables for converting "sidereal," or astronomical, time to that in ordinary use, and positions of the moons of Jupiter and Saturn occupy a large part of the book.

Already, according to Dr. Eichelberger, work is well under way on the Ephemeris for 1928, which will be published next spring, while that for 1929 has been started. Not all the work is done by the American office, however. Similar publications are issued by the English, French, German, Spanish and Italian governments, and under a cooperative arrangement made in 1912 the work of each office is available to the rest. The work is divided, but the American office carefully checks that received from other countries to avoid errors.

THE EVOLUTION OF APES

THE bodies of apes and monkeys are more evolved, that is, more highly specialized physically in many respects than the human body. Man has specialized on the production of a large and useful brain, and has allowed his body to remain in a relatively primitive state. These ideas, startlingly opposed to current notions, are put forth by Dr. Adolph H. Schultz, of the Carnegie Institution, in the forthcoming issue of the *Journal* of the Washington Academy of Sciences.

In his review of the many resemblances between man and the apes, Dr. Schultz has made use of features that develop both before birth and during growth to adult stature. One of the outstanding examples of greater physical specialization in the lower animals is the disappearance of the thumb in certain species of monkeys, which goes along with the much-noticed lengthening of the arms in the direction of special adaptation for climbing. All that is left of the thumb in these monkeys is a mere stump or rudiment, though occasionally a specimen appears in which a longer thumb is evident.

Even in the matter of getting rid of a tail, certain of the apes have out-evolved man, for they have less of a rudimentary tail than man himself. And during the time before birth, man's tail is well developed externally, reaching a length nearly one fifth that of his body. Sometimes the external tail in man persists after birth. A record case of the kind is cited by Professor Schultz, who shows a picture of a twelve-year-old boy from Indo-China with a tail nine inches long.

In the position of the eyes, also, the monkeys have gone farther from the primitive animal state than man has. In the lower animals the eyes are far apart, being indeed in many forms on quite opposite sides of the head. In the pre-natal development of both man and monkeys the eyes start far apart, and become relatively closer together as growth proceeds. But in man they remain noticeably farther apart than they do in many of the simians. In the development of the outer ear, however, man occupies an intermediate position; for while the ear of the chimpanzee is enormous compared with that of man, the gorilla's ear is just about of human size, and the ear of the orang is considerably smaller.

Another little-known feature described by Professor Schultz is the so-called carpal hillock, a little fleshy projection on the wrist, crowned with a few long hairs or bristles. In some of the lower animals this is well developed and seems to serve as an organ of touch, but in most monkeys it is absent. However, in the fetuses of monkeys it is present, hairs and all, and once in a while it crops up in an adult monkey. In the human being before birth the same hillock appears and later vanishes, but it never has the hairs.

Professor Schultz sums up his paper as follows: "The outstanding conclusions from these embryological studies can be summarized by stating that the many striking resemblances between man, ape and monkey in early development, and their frequently closely corresponding growth changes can only be understood by assuming one common origin for all primates, including man, from which they inherited the tendency for the same ontogenetic processes which have become modified in many instances through a variety of later specializations. Furthermore, there exists ample evidence for the conclusion that the human body is in many points less specialized and hence has remained in some parts phylogenetically, as well as ontogenetically, more original and 'primitive' than have various other primates."

ITEMS

"A PIECE of linen sent to our research department recently from London, though 6,000 years old, was found to be as perfect structurally as the linens we are making to-day." This was the statement made by W. H. Webb, the chairman of the Irish Linen Society, recently, at Oxford, and he explained it on the grounds that germs of decay would have nothing to do with linen. Similarly, he said, the windings found in 1881 on the mummy of Rameses II, who oppressed the Israelites in the time of Moses, were still perfect. The supply of flax from Russia, he pointed out, had collapsed, but the Empire Flax Growing Association had secured samples of the world's best seeds and after four years of breeding experiments the best plants continued true to type. They would secure shortly a greatly increased length of fiber and by improved machinery in harvesting the heavy charges on linen manufacture would probably be capable of reduction.

FISH may die from a cold bath, according to a report made by Professor Frank Smith, of the department of zoology, of the University of Illinois, to the U. S. Bureau of Fisheries. Professor Smith conducted his studies at Douglas Lake, a small body of water in the northern part of Michigan. There are a number of deep places in this lake, where the water does not circulate, and in consequence it becomes much colder than the layers of water immediately above, so that the thermometer will show a drop of several degrees in two or three feet. This condition is frequently encountered in deep, quiet lakes everywhere. Fish of several species, lowered to varying depths in wire cages, remained alive if kept above the cold depths, but died if they were left in the region of low temperature. Chemical analyses of the water showed that there was much less oxygen dissolved in the cold water than in the warmer layers, and also that other chemical conditions at the lower level were unfavorable for the support of life.

A Washington ornithologist, Dr. B. H. Swales, of the U. S. National Museum, first discovered them in a large rainwater pool on a new golf links now under construction. Many bird-lovers and naturalists have since visited the camp of the feathered tourists. The birds were all waders of the shallow shore waters. One species, the white rumped sandpiper, was especially noteworthy because this bird seldom appears in the eastern United States, but makes the first stage of its 8,000 mile flight from northern Canada to Argentina down the Mississippi Valley. An even rarer species was the stilt sandpiper, which has been seen in Washington only twice since the city was founded. The farthest-flying visitor was the black-bellied plover, which stayed three or four days. The other bird species represented were the semi-palmated sandpiper, semi-palmated plover, greater and lesser yellow-legs and the least sandpiper.

ONCE numerous colonies of gulls, terns and herons on the shores of Massachusetts are in danger of being wiped out. Various influences of civilization disturbed the well-being of the colonies to begin with, and now skunks, stray cats and human marauders are threatening the remainder. Even ants are adding to the troubles of the birds, for in some cases they have been found attacking and devouring the young as soon as they were hatched from the egg. The state is unable to give sufficient protection to the birds, and the Federation of the Bird Clubs of New England is undertaking to supplement official action. They are endeavoring to raise sufficient funds to provide the needed extra wardens and other protection before the beginning of another breeding season.