SCIENCE NEWS

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THE ISOLATION OF HEPARIN FROM THE LIVER

FROM the liver of dogs, Professor W. H. Howell, of the Johns Hopkins University, has prepared an anti-coagulent that will keep a sample of blood in a practically normal condition for twenty-four hours.

Clotting is nature's protection against bleeding to death, but this tendency of the vital fluid to congeal after its exposure to the air offers serious disadvantages in blood transfusions and certain types of important experimental work. This new clot-preventing substance, which has been named heparin, is of great interest, therefore, to surgeons, pathologists and other specialists who deal with blood, particularly those who make the various blood tests used in detecting disease.

Heparin was obtained and used by Professor Howell in a crude form several years ago, but recent research has yielded this purified and potent form, the action of which is very much more powerful. One milligram in 100 cubic centimeters of blood will prevent the sample from clotting. Injected into the blood of persons in the same proportions, heparin will entirely prevent coagulation for about an hour. This property is gradually eliminated in about three hours' time, when blood from such patients will clot as usual.

Dr. Alexis Carrel, of the Rockefeller Institute for Medical Research, has been using the purified form with good results in his cell cultures, while Dr. L. G. Rowntree, of the Mayo Clinic of Rochester, Minn., has used the old crude form with success in blood transfusions for several cases of anemia, according to Professor Howell.

It is expected that heparin will be of most use in the cases where large amounts of blood, over one pint, are needed. In ten transfusions cases of secondary anemia requiring this amount, where heparin was used under Professor Howell's direction, eight were entirely successful and only two had slight chills after the transfusion was completed.

The chemical analysis of heparin is not entirely complete, but it appears to be a carbohydrate. It seems to be perfectly stable, said Professor Howell, for specimens kept all summer in the Johns Hopkins laboratory remained unchanged and show no signs of deterioration either chemically or from the action of bacteria or mold. It has the additional advantage of being able to withstand sterilization and boiling without harm.

THE SINKING OF LAND AS A CAUSE FOR THE MISSISSIPPI FLOODS

THE slow sinking of the lower Mississippi Valley, closer and closer to sea level, is suggested as one of the possible causes of disastrous floods like the one now raging, in a geological essay prepared by Dr. David E. White, of the National Research Council, for the meeting in Washington, D. C., of the American Shore and Beach Preservation Association. The Gulf coast is not known to be sinking, but that may be simply because adequate studies have not yet been made of it, Dr. White stated. He pointed out the well-known fact that the Atlantic coast is sinking at the rate of about a foot a century as of importance in this connection. "Geologists do not know whether a portion of the lower Mississippi basin is now being depressed as the result of downward bending of the crust of the earth in this region of the continent," Dr. White continued, "but they do know that there has been downward movement of very late date, geologically speaking, in this part of the Gulf coast. Some geologists believe the movement to be still in progress. Further, the well-known occurrence of earthquakes in the stretch of the valley between Cairo, or New Madrid, and the Memphis region shows that movement, with probable warping or dislocation of the outer part of the crust, is going on in that part of the valley. The earthquakes are unmistakable signs of such changes, mostly out of sight, in the buried strata.

"Finally, it has long been known and has recently been confirmed that the region to the north embracing the Upper Great Lakes is now being tilted, the area on the north being in process of rising higher above tide level than the area to the south. Somewhere to the south there should hinge a line, if there is no bending, to the farther southward of which depression or sinking, probably with some warping or twisting of the crust, may now be going on with perhaps as much certainty as earthquakes happen between New Madrid and Memphis.

"If a part of the Gulf coast embracing the lower Mississippi reaches is now subsiding, the rate of sinking will be so slow as to be imperceptible except by scientific methods, and the effects may appear negligible at first thought; yet such a movement, however slow, would be of ultimate far-reaching significance, for it must gradually in the course of time cause slackening of the currents; it must slowly render it more difficult for the river to keep its lower trench clear from filling by sediments, and it must carry regions subject to flood lower down and nearer sea level, except as, on the other hand, these regions may be built up at the same time by flood contributions of sediments derived primarily from the higher lands or by organic debris, accumulating especially in the swampy areas.

"It is important that the question of the slow subsidence of any part of the lower portion of the Mississippi trench system be definitely determined by scientific and engineering observation and research. If downward movement is now in progress we must know the rate of subsidence, and if this rate is sufficiently great engineering plans, if they are to be permanently successful, should take cognizance of the fact and be adapted to counteract its effects. This is a research problem of national scope as well as importance, and should be thoroughly organized, carefully manned, and carried to con-

clusions, possibly under government auspices, with such collateral aid from state agencies of a kind fitting into a well-planned research program as may be forthcoming from the states concerned."

Of more local and immediate importance, Dr. White suggested, is the question of the silting up of the river channels. The levee system is based partly on the assumption that the streams confined therein will scour their own channels clean; but to date noboby has taken the trouble to find out whether this actually happens. If the rivers really drop their loads of silt and sand on their bottoms instead of carrying them out to sea and dumping them there, according to current engineering assumptions, eventually the bottoms of the rivers will be higher than their banks, and the game of levee-versus-river can go on upward indefinitely but always with increasing peril to the lowlands. A geological study of river-bottom deposits, Dr. White stated, can be made in a few years at relatively small expense, and he recommended that steps in that direction be taken immediately.

THE SPECTROHELIOGRAPH AND THE AMATEUR ASTRONOMER

To the radio amateur, there may soon be added the amateur solar observer, and just as the amateur radio experimenter has been responsible for many of the great advances in wireless communication, the amateur solar observer may do a great deal in the future to aid astronomers in solving the mysteries of the sun, nearest of all stars, and the one upon which our very life depends.

Already there are numerous amateur astronomers, but they are largely concerned with the study of stars which change their light more or less periodically. However, by means of the spectrohelioscope, an instrument that can be made at a cost not exceeding that of a good radio set or a cheap automobile, activities on the sun which a few years ago were invisible to astronomers may now be watched.

The spectrohelioscope has recently been developed by Dr. George Ellery Hale, honorary director of the famous Mt. Wilson Observatory at Pasadena, Calif. In the last few years he has been observing the sun regularly with it from his private observatory. In an article in the English scientific magazine, *Nature,* he tells of his latest observations, and how he has been able to see large clouds of hydrogen vapor on the sun rushing into the sun spots.

Many years ago, Dr. Hale invented a somewhat similar instrument by which it is possible to photograph the sun in the light of a single wave-length, or color. As each element, when its light is analyzed by the prisms of a spectroscope, shows characteristic colors, which belong to no other element, the device makes it possible to take pictures of the sun by the light of only one element, hydrogen, for example.

However, observations with the spectroheliograph, as the earlier device was called, were not always clear, Dr. Hale states. It was not possible to tell which way the clouds of hydrogen were flowing, whether into the spots, or out of them, but the direction could only be inferred. Though a series of pictures could be taken in rapid succession, he says, the critical moments at which the hydrogen was drawn into the spot were rare, and only good luck would permit a photograph to be made at the proper moment. Among the thousands of spectroheliograms of the sun made at the Mt. Wilson Observatory, only once, and that in 1908, has such a phenomenon been recorded.

The spectrohelioscope, however, permits the observer to watch the sun, in the light of a single wave-length, and so the ebb and flow of a single element can be watched. And then, if necessary, a photograph could be made at the proper moment. With the instrument, says Dr. Hale, he has repeatedly seen great clouds of hydrogen suddenly develop near an active sun spot, and then rise up and descend into the spot, with a speed of as much as 1,600 miles a minute.

THE EARTHQUAKE OF MAY 22

MONTHS may elapse before details of the earthquake which was felt by seismograph instruments throughout the world on Sunday, May 22, are known, even though it was one of the most severe quakes on record and thousands were undoubtedly killed. According to Commander N. H. Heck, in charge of the earthquake investigations of the U. S. Coast and Geodetic Survey, after studying reports from seismograph observatories gathered by Science Service, the quake was about 35 degrees north latitude, and 100 degrees east longitude, which places it in western China, or eastern Tibet. It occurred at 5:33 P. M., eastern standard time.

This region is one that has been visited by destructive quakes in the past, for on September 16, 1920, there occurred the Kan-Su earthquake in the same region, named after the province of China in which it occurred. At this time, though the damage was severe, and an estimated total of 100,000 persons were killed, it was three months before the outside world knew about it.

According to Commander Heck, the quake on May 22 appears to have been at least as severe as the one in 1920. In some respects this country resembles California, for the fault lines, along which the quakes occur when the two parts of the ground slip over each other, tend to run east and west. The damage that was done by the quake may have been in Tibet, as well as in the Kan-Su province of China. Much of the damage done by quakes in this region is due to landslides, caused when the loose soil is shaken. These may also bury whole villages which may never be heard from again.

The reports upon which Commander Heck's determination was based were gathered from the seismographic observatories of the U. S. Coast and Geodetic Survey at Cheltenham, Md., and Honolulu, T. H.; that of the U. S. Weather Bureau at Chicago; the University of California at Berkeley; Georgetown University, Washington; St. Louis University, St. Louis; Regis College, Denver, Colo.; the Dominion Observatory, Ottawa, Canada, and the Meteorological Observatory at Victoria, B. C.

TRANSMISSION OF PLANT DISEASES BY A LEAFHOPPER

JUST as yellow fever is due to an invisibly small germ or virus carried from person to person by an insect, so are some of the most serious and destructive illnesses of plants due to invisibly small germs carried from plant to plant by an insect.

In a report to the Engineering Foundation, Dr. L. O. Kunkel, plant pathologist at the Boyce Thompson Institute for Plant Research, Yonkers, tells how a little gray insect, the aster leafhopper, spreads the yellows disease of asters by first biting sick plants and then, after the virus has had ten days to incubate in its interior, biting healthy ones and planting the infection in their tissues.

The same leafhopper that transmits yellows to the China aster also carries it to more than fifty other species of wild and cultivated plants. Lettuce is one of the most important hosts of aster yellows. On this plant it has long been known in the Southwest as the Rio Grande disease and in New York and other eastern states as the white heart disease. In the winter, yellows lives on perennial weed hosts. During the summer, when the carrier-leafhopper is very active, it spreads rapidly to susceptible annual plants such as the China aster and lettuce.

Spread of aster yellows and its host range depend largely on the likes and dislikes of the aster leafhopper. The African marigold is quite susceptible but seldom takes the disease even when grown adjacent to yellowed aster plants. The leafhopper does not like the marigold and seldom feeds upon it when other plants are available. If confined in a cage containing only marigold plants, hunger drives it to feed upon them and they readily take the disease. It is fortunate that although wheat and other cereal crops are favorite hosts of this leafhopper, they are immune to the yellows.

The aster leafhopper is thought to have been accidentally introduced into the United States from Europe fifty or more years ago. Although it is prevalent in Europe and the Orient, where the China aster is extensively grown, the aster yellows disease is known only in America. Thus, a disease which is apparently endemic in America has been rendered much more serious through the importation of a European leafhopper, and of an Oriental plant, the China aster.

No satisfactory means is known of controlling the aster leafhopper, but the yellows which it spreads can be held in check by digging out all infected perennial weed hosts in the vicinity of the field to be protected and by destroying all diseased annuals as soon as observed. A yellowed plant is a menace to nearby healthy plants just as a malaria patient is a menace to a healthy community in a region infested with the Anopheles mosquito.

THE PREDICTION OF TRACK RECORDS

STAR athletes looking for a chance to break a world's record on the running track should tackle the 880-yard run.

This suggestion comes not from a coach or trainer, but from recent calculations made by Dr. Earle R. Hedrick, of the University of California, editor of the *Bulletin* of the American Mathematical Society. According to Dr. Hedrick's diagram of the situation, the record of 1 minute, 52 seconds, made in the 880-yard race represents the least worthy performance among the recognized world's record races from the hundred-yard dash to the two-mile run. It is reasonable on this basis to expect somebody to cut five seconds from the present record without setting a new standard of human strength and endurance. On the other hand, it is considered unlikely that anyone will lower the record of 47.4 seconds for the 440-yard curved-track race.

Adopting the rule that fatigue bears a direct mathematical relation to distance traveled, Dr. Hedrick was able to draw a smooth logarithmic curve which tells at a glance what a record performance should be in a race of any distance above 100 yards. The shorter races are not considered because of the relatively great errors due to the time of getting started. In his diagram the mathematician finds that the 220-yard, the 440-yard, two-mile and even the 100-yard record all fall nicely on an orthodox line, and are thus tentatively assumed to indicate a maximum human performance. At least no record in any other race is better. The 880-yard and mile records, however, run as much as five seconds too high. Inasmuch as the 880-yard distance is the shorter of the two, the deviation here has the most significance of any recorded. Unless there is some physical factor, still unknown, which should enter the mathematical equation, the 880-yard mark looks to be the easiest of conquest.

An important use of this athletic diagram comes in the attempt to evaluate European records based on races run with metric measurement. A 1,000- or 1,500-meter race, which calls for a degree of fatigue not corresponding exactly to any American race, is thus readily checked and appraised. The suggestion has been made that an athletic prize should be awarded to a runner not for breaking some odd record that happens to be extant, but rather for convincing the sporting mathematician that he can break over the logarithmic fatigue line that is supposed to be the border of human endurance. Under these conditions nobody would know who won a track meet until a report was handed down by the professor of analytic geometry. But the rah-rah boy, hoarsely yelling at a sprinter staggering across the finish line, probably isn't thinking in terms of logarithms!

ITEMS

STEAM in occasional hissing jets, the last breath of the once raging volcanic vent, still melts the snow among the glaciers at the top of Mt. Rainier, according to Dr. F. E. Matthes, of the U. S. Geological Survey. For this great cone-shaped mountain, which now supports one of the most magnificent single-peak glacier systems in the world, was in long past ages a volcano. As the season advances, the great rivers of ice are beginning to flow more rapidly, until during the warmest weather they will move at a rate of from 12 to 18 inches a day. This does not mean, however, that they extend their range farther down the slopes, for they melt off as fast as they flow forward, and sometimes faster. Some of the glaciers have undergone notable losses during the past thirty or forty years.