SCIENCE NEWS

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ACCURACY AND ASTRONOMY

ASTRONOMY, pictured generally as that science which almost believes in accuracy for accuracy's sake, has now been painted as one more science in which minute exactness is not always the most necessary thing. Astronomy has made giant strides on the basis of approximations and many relatively crude observations by ancient star-gazers are still useful, according to Dr. Henry Norris Russell, retiring president of the American Astronomical Association, in his presidential address delivered at the meeting of the association in Bloomington, Ind. Dr. Russell, who is research professor of astronomy at Princeton University, pointed out that in certain cases, wholesale observations whose accuracy is such that many an astronomer would call them crude are nearly as valuable as much more precise measurements. The stellar magnitudes of Hipparchus still provide our best observational evidence that the stars by and large do not change their brightness perceptibly in a mere couple of millennia. The old estimates, though of low precision, nevertheless gave us real scientific information.

Professor Russell discussed the problem of accuracy from the astronomer's point of view, indicating also that another important factor entering into the question is the extent to which the director of an observatory with limited means wishes to spend money and energy in securing more and more accurate observations. He indicated that spending effort and funds for accuracy is justified to the extent that the problem under study requires accurate measurements for its solution.

THE PROTEIN BASIS OF LIVING MATTER

DR. MAX BERGMANN, of the Rockefeller Institute for Medical Research, New York City, reported at the Richmond meeting of the American Chemical Society that the chemical bonding of vital protein, basis of all living matter, is bound up with the number 288. Not only is 288 a number intimately connected with life itself in the higher animals, but it is a number closely related with heredity and the ability of parents to transmit physical characteristics to their offspring.

It was formerly though, said Dr. Bergmann, that an almost infinite variety of proteins could exist. Dr. Emil Fischer had advanced such a theory whose implications pictured a protein for the hair of man, a different one for the hair of a dog, another for sheep hair and so on for each species of animal. And then the whole process was repeated for proteins in any other part of the body, again throughout the whole animal and plant kingdoms. By varying the combinations of only 30 amino acids, for example, it was possible to postulate the existence of 1,280,000,000,000,000,000,000,000,000 different proteins.

Analysis in Dr. Bergmann's laboratory, however, has brought new order out of this apparently jumbled picture. The only protein combinations permitted to exist in nature consists of those containing 288 amino units, or some simple whole number multiple of 288. Out of his work Dr. Bergmann has been able to fashion what might be called a mathematical rule for life. Says Dr. Bergmann: "Proteins appear to contain $2^m \times 3^n$ units per molecule, where m and n are whole positive numbers."

The first step in the new knowledge was the creation of relatively simple peptide-like substances serving as simple protein models with which could be studied the action of the various enzymes. It was by the study of these synthetic protein models that the amazing regularity of 288 and multiples of 288 appeared. Gradually it became apparent that enzymes had specific duties to perform and that, in fact, each kind of protein is created by the action of its specific enzyme. This fact, said Dr. Bergmann, is a new understanding of body chemistry, for it had previously been supposed that the action of the enzymes was to break down complex proteins into those the body could use. Now enzymes take on the new rôle of permitting, indeed determining, the building up of body proteins.

The mechanism of creating the complex proteins now appears to be a sequence of many reactions wherein a simple protein is turned, by its specific enzyme, into a more complex protein. This protein, in turn, has a specific enzyme that builds it into a still more complex protein, and so on. The whole chain of reactions therefore goes on until finally a protein is created which does not have present the specific enzyme that can build it higher, and there the chain stops.

"Thus the specificity of an individual enzyme predetermines the molecular pattern of the protein synthesized by this enzyme. The numerical rules governing a protein molecule have their basis in the specificity of the enzyme involved," according to Dr. Bergmann. "Here we arrive, for the first time, at a physico-chemical concept of the predetermination which is an inherent attribute of many phenomena of life. The question has frequently been discussed whether hereditary phenomena are connected with, and explained by, a transmission of individual proteins and, in particular, whether the chromosomes are proteins. On the basis of the conclusion which we have reached I think you will agree that the essential substances transmitted from one generation of cells to the next, from parents to children, must be enzymes and that they have to be enzymes with the capability of synthesizing individual proteins by predetermined sequences of specific reactions."—ROBERT D. POTTER.

MICROCHEMISTRY

THE newest tools of chemistry were displayed at the meeting of the American Chemical Society in Richmond. No contrast between the old and the new in chemistry is quite so marked as that between the old apparatus and the equipment used in the science of microchemistry which finds, in a single drop of material, a whole world of exploration. And nowhere in chemistry is the significance of the difference between the old and the new way of studying nature's secrets so clear. The equipment makes

it possible for chemists to save 99 per cent. of the material they formerly needed in making an analysis. And even more important, the apparatus saves 50 per cent. of the chemist's time.

These tools of modern chemistry are triumphs of the glass blower's art. And in addition to their almost toy-like appearance they never fail to excite the admiration of those who use them. If they drop they are more apt to bounce than break. While glass, in larger units, can rightly be considered a fragile material it is also a material which has considerable strength. Some of the beakers are so small that they rebound, without breaking, like a glass marble which a small boy drops and bounces on the sidewalk.

What advantage does chemistry find in this new apparatus? (1) A vast saving in materials used, and time consumed in an analysis. For common materials the saving is not so important, but there is a whole host of extremely rare materials in the chemical world which have been studied only enough to know that they exist. By research with micro-apparatus new and unknown uses of these materials may be developed. If applications come then chemistry is confident it can find ways of producing these "rare" materials on a large-scale, commercial basis. That has been the past history of this science. But first the chemists must know the possibilities of the material with which they are working. (2) Better and more rapid analysis in chemistry applied to medicine. Again the ability to use small samples is a step toward the saving of lives. Micro-methods in chemistry, in fact, owe much of their pioneer development to the medical chemists. (3) Better chemistry training. The use of small samples permits even the poorer schools to supply their chemistry students with rare and interesting materials with which to work. Moreover, the tiny equipment looks so delicate that students handle it with greater care and, hence, do better work. Finally if reactions go wrong and explosions occur they are only small affairs that do no great damage.

"Microchemistry has ceased to be the tool belonging only to the highly-trained specialist," said Professor A. H. Corwin, of the Johns Hopkins University, who arranged the symposium on microchemistry at the meeting. "It is now available even to freshmen in the 'greencap' stage." Professor Corwin was referring to the trial courses being offered at Hopkins and a few other universities on the technique of teaching chemistry by micro-methods.—ROBERT D. POTTER.

WINTER TEMPERATURES AND THE BLOSSOMING OF PLANTS

PROFESSOR HERMAN KURZ, of the Florida State College for Women, has demonstrated, in experiments with 20 kinds of northern wildflowers, that their rootstocks or other underground parts must be held at a temperature near or below freezing for several weeks if normal growth and flowering is to take place in the spring. His report will be published in the *Proceedings* of the Florida Academy of Sciences.

Professor Kurz tried growing northern wildflowers in his garden. The ones he had sent him, left out through the mild winter of northern Florida, didn't do at all well. Professor Kurz knew, of course, the traditional belief of gardeners that certain plants had to be nearly frozen every winter to make them grow well. He knew also of earlier experiments showing the beneficial effects of chilling on woody plants and on seeds, especially the research of the late Dr. F. V. Coville.

He therefore decided to make tests with non-woody plants. He obtained 20 different kinds of wildflowers from the north. He set rootstocks or bulbs of each kind in twin pots. One pot of each pair he left outdoors, the other pot he put into near-freezing temperature in a cold storage plant.

In the spring he set the pairs of pots together again. The great majority of his species showed good growth and early flowering in the pots that had been chilled, little or no growth and late or no flowering in the unchilled pots. A few species of plants, that grow in Florida as well as in the north, showed no clean-cut differences between chilling and non-chilling.

One group of four species, May apple, bloodroot, wild phlox and Turk's-cap lily, showed very peculiar behavior. Plants that came from New England had to be chilled. Plants of the identical species that grow in Florida would grow without being chilled.

Professor Kurz makes the suggestion that by long custom the northern forms have come to require freezing and by the same token the southern forms have developed an indifference to or no requirement for freezing. Such forms may be termed physiological or ecological species, he says.

Professor Kurz points out, in conclusion, that just as there are many southern flowers and other plants that find northern winters too severe, so also there appear to be numerous wildflowers of the north that can not establish themselves in the south because the winters there are not severe enough to stimulate them to normal growth and reproduction.—FRANK THONE.

INFANTILE PARALYSIS

LOSS of the sense of smell after the nose has been sprayed with zinc sulfate is a sign that the spraying has been done thoroughly enough to protect the child or adult against infantile paralysis, Dr. E. W. Schultz, of Stanford University pointed out at the Washington meeting of the Society of American Bacteriologists. Dr. Schultz is the leader of one of the research groups that have found zinc sulfate nasal sprays effective in protecting monkeys against infantile paralysis. The same material has been sprayed into the noses of many children and young adults during recent epidemics. The results of this spraying were disappointing. Dr. Schultz believes that the reason for the failure of the spray to give children as much protection as it does monkeys is because the spraying was not done thoroughly enough. The virus which causes infantile paralysis gets into the body through the tiny hair-like endings of the nerve of smell. When these nerve endings are destroyed by chemicals, the virus apparently can not get through. Destruction of the nerve endings can be detected by testing the sense of smell. When it is lost

Dr. Schultz believes it is a sign that the child is protected against this disease. The loss is only temporary, as the nerve endings regenerate. In children the loss of sense of smell following chemical spraying may only last 3 or 4 days, and in adults it may be lost for a few months. When the sense of smell returns, it is time to spray again, if infantile paralysis is still prevalent in the neighborhood. Vaccination will not protect against infantile paralysis, Dr. Schultz reported, because vaccination is only effective against germs that get into the blood. The infantile paralysis virus which travels nerve routes rather than the blood route must be fought by chemicals that will strengthen nerve resistance. So far, no way of doing this other than by chemical blockade of the nerve endings with a spray is known.

Those attending the meetings of the Society of American Bacteriologists selected the most needed researches for fighting infantile paralysis. It is believed these studies will receive financial support from the new National Foundation for Infantile Paralysis, although official announcement to this effect has not yet been made. One item on the program will be use of zinc sulfate nasal spray on tens of thousands of children under careful supervision to learn its value in protecting against the crippling childhood malady. A second item is renewed search for possible vaccines or serums for preventing the disease. A third item is investigation of lack of vitamin C as a contributing cause of the disease and the possibility of preventing or treating the disease with vitamin C, the scurvy-preventing vitamin of citrus fruits. The fourth needed study is to determine whether more than one strain of infantile paralysis-causing virus exists and if so, whether an attack of the disease caused by one virus strain will confer immunity to any of the other strains of the viruses.

THE BUREAU OF CHEMISTRY AND SOILS

RESEARCH in a wide variety of fields seeking to find wider industrial uses for farm products are listed in the annual report of Dr. Henry G. Knight, chief of the Bureau of Chemistry and Soils, of the U. S. Department of Agriculture.

During the past year, Dr. Knight reported, 420,000 pounds of sweet potato starch were produced commercially at a plant at Laurel, Miss., by a process worked out by the bureau. Use of the new process will result in substantial savings in the 300,000,000 pounds of starch now imported each year.

New methods of sorgo and sugarcane sirup making were also worked out. A technical bulletin published during the year reported that waste hemlock bark was a source of tannin, used in treating leather. Studies proved that sodium chlorate, chemical weed-killer now sold to farmers at 9 cents a pound in small lots or 6.25 cents a pound in carload lots can be produced at slightly less than 5 cents a pound. This figure, however, although it makes allowance for a five per cent. return on the investment, does not include promotional and distribution expenses.

Another achievement during the past year is a method for determining amino acids in food without first isolating the proteins. Previously proteins had to be isolated before the amino acid content could be determined, but that made difficult determination of the amount of amino acid in the food as a whole. The problem is important both to human and animal nutrition. Experiments in a number of other fields were also successfully carried out.

ITEMS

THE sloth is almost a cold-blooded animal, like reptiles, Professor Sydney W. Britton, of the Medical School of the University of Virginia, has discovered. Dr. Britton made extensive investigations of the physiology of the sloth both on Barro Colorado Island in Panama and in his laboratory. The sloth, he has found, has only about half as much muscle tissue as other animals of the same size and weight. It does not show the changes in body temperature common to other animals. Injections of hormones will jolt it out of its lethargy and speed up its activity considerably. Dr. Britton is now preparing for another trip to Panama to continue his studies, under a fellowship grant from the Guggenheim Foundation.

ALASKA'S new platinum mines, at Goodnews Bay, not far from the Arctic Circle, will produce more than 5,000 ounces of the white metal this year, according to information brought back by Dr. J. B. Mertie, Jr., of the U. S. Geological Survey. Discovered in 1926 by Charles Thorsen, "sourdough" prospector, the platinum deposits resemble geologically the famous placers of the Ural Mountains of Russia, producers of the world's supply of platinum for many years. Worked by crude methods last year, the mines produced 5,000 ounces of platinum metals. This year, in mid-November, a Diesel-powered dredge was put into operation, using fuel oil that costs, at the mines, 19 cents a gallon. Next year, if the ponds don't freeze too soon, the dredge will scrape up almost 20,000 ounces of platinum metals from the bed of Platinum Creek. Like the Russian deposits, the source rock contains too little platinum to be profitably worked, but the stream beds, which have been collecting the platinum freed from the source rock by millions of years of erosion, can be dredged for platinum profitably.

EIGHT dummy tubes in a 14-tube radio receiver make it look big, but they do not improve its operation, Dr. Orestes H. Caldwell, former radio commissioner, reports in *Radio To-day*. Purchasing one of these 14-tube receivers, which resembles a popular make of radio, Dr. Caldwell's staff analyzed it, and found its performance to be about one eighth as good as a legitimate 14-tube set, and not quite as good as that of a standard five-tube receiver. Eight of the tubes, each consisting of a filament in a glass bulb, were connected in series across the line, serving no good purpose in the receiver and wasting power. Lamp bulbs would be just as useful in the same locations. The popular belief that the number of tubes in a radio receiver is a measure of the radio's performance is responsible for the success of this fraud, which can only be guarded against by purchasing standard types of equipment from reputable dealers.