SCIENCE NEWS

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THEORIES OF THE UNIVERSE

WORLDS are, because parts of the universe collapsed. This, in a sentence shorter than a telegram, sums up a theory of the genesis of the spiral nebulae, the vast islands of suns that swim at vaster distances apart in the depths of space, as presented by the Abbé Georges Lemaître, of the University of Louvain, before the Washington Academy of Sciences.

The Abbé Lemaître, who is at present a visiting professor at the Catholic University of America, developed this theory as a part of his larger theory of an expanding universe, which started with all matter (or energy) concentrated at a point, and which has been rushing asunder with explosive speed ever since.

The universe, the lecturer reminded his hearers, is exceedingly empty. The masses of the stars, and of their aggregations into galaxies, are impressive; but when all matter is averaged out into all the space through which it is distributed, it comes to about one atom to a cubic yard of space. How could so thin a population of particles ever become aggregated into whole galaxies of suns?

For answer, the Abbé postulated regional irregularities in his expanding universe—regions where the rate of expansion was slowed down to a certain critical low velocity. In some of these regions, the velocity of expansion failed to accelerate again; there were "collapses," permitting the aggregation of particles, and their condensation into the spiral nebulae or galaxies.

Abbé Lemaître suggests that such a moment of critically low velocity of expansion, with resultant collapse and formation of aggregates of matter, occurred for the odd millions of light-years of space with which we are familiar about a billion years ago. This billion years is much less time than is called for by the theory of the passing of all stars through the same stages of development, from giant globes of unimaginably hot gases to aged "dwarf" stars of relatively feeble temperature energy. The Abbé does not think it necessary to postulate this uniform evolutionary course for all stars; his theory admits of the simultaneous and very rapid formation of stars of all classes. His contacts with American astronomers on his present visit to this country, he said, have supplied him with data which appear to support his present theory.

A VERSATILE SOLVENT

ONE dream of the ancient alchemists, the "universal solvent," has been brought nearer to realization than ever before by the discovery that acetamide, a compound made from acetic acid and ammonia, has a wider range of solvent power than any other known substance. This discovery has just been announced by Professor O. F. Stafford, of the department of chemistry at the University of Oregon.

Because all life processes occur in solution, and because many important industries are dependent upon solubility relationships, Professor Stafford's discovery is regarded by his colleagues as an outstanding contribution to the science of chemistry, both in its pure and applied aspects.

The best common solvents hitherto known have been ammonia and ordinary water; acetamide is declared to be superior to both. To test his discovery, Professor Stafford ascertained the approximate solubilities of some 400 organic and 200 inorganic substances. Working on the theory that a substance is most soluble in another substance chemically related to it, he found that acetamide has such chemical kinships to an unusually wide range of other substances. That is, each of the atom-groups in its make-up reaches out, like a hand, toward similar atom-groups in many other compounds. It is this fact which gives it its extraordinary solvent powers.

Acetamide contains a methyl group that gives it solvent powers for hydrocarbons; its carbonyl group relates it to ketones, esters and acids; its tautomeric hydroxyl group gives it kinship to water and the alcohols; its amino group brings it into line with ammonia and its derivatives, while the ease with which it yields nitrile suggests a relationship to cyanogen compounds.

Acetamide has long been known to chemists, though its extraordinary solvent powers have only just been discovered. It is a solid at ordinary temperatures, but it melts at about 80 degrees Centigrade (176 degrees Fahrenheit) to form a mobile liquid. It is easily and cheaply manufactured from acetic acid (the stuff that makes vinegar sour) and ammonia. Its ability to dissolve many things, at present nearly or quite insoluble, is expected to lead to important industrial applications.

Professor Stafford is already well known in his field, especially for the invention of a process of wood carbonization, which is in large-scale use at an industrial plant at Iron Mountain, Michigan.

THE RESISTANCE OF REGENERATED CELLS

A NEW theory of how certain cells of the body develop resistance to injury was described by Dr. William deB. MacNider, of the University of North Carolina, at the meeting of the Southern Medical Association. For the scientific studies leading to the development of this new theory, Dr. MacNider was awarded the research medal of the association.

The new theory may explain what happens to some patients suffering from chronic Bright's disease and to mothers who develop kidney trouble just before the birth of a child.

Certain cells of the kidneys and liver, known as fixed tissue cells, can be injured by such poisons as bichloride of mercury, uranium and chloroform. Dr. MacNider investigated the results of such injuries in animals and found two types of reaction.

In one type the injured cells may regenerate or "come back" in a form similar to their original cell form. These cells, he found, had no resistance to future injury

by the same chemicals. On the other hand, the cells may regenerate or come back in a changed form which is not the normal type of cell, but which is capable of doing some work. This type of cell is resistant to many times the amount of the same injurious chemical that produced the change.

Dr. MacNider observed dogs that developed acute Bright's disease from bichloride of mercury or uranium poisoning. When the animals were slightly ill and then recovered, with no change in the type of cells in the kidneys, they had no resistance to further poisoning with the chemicals. But when animals became very ill and recovered, their kidneys having been repaired with an abnormal type of fixed cells, they developed a very great deal of resistance to the chemicals.

From these studies, Dr. MacNider concluded that the mother who is very ill of kidney disease before her child is born, but who recovers, can generally have more children without any further trouble, because the cells in her kidneys have come back in this abnormal, highly resistant form. On the other hand, the patient who is only slightly ill will probably have trouble before the birth of subsequent children.

THE OVER-PRODUCTION OF INSULIN

A CONDITION which appears to be epilepsy, but is really due to the increased production of insulin and consequent greatly decreased amount of sugar in the blood was described by Dr. W. McKim Marriott, of the Washington University School of Medicine, St. Louis, to the Southern Medical Association.

One case occurred in a year-old infant who had repeated convulsions, like those of epilepsy, and whose mental development was retarded. His blood had about half the normal amount of sugar. Tumor of the pancreas, the organ which contains insulin-producing tissue, was suspected, but not found. Finally a St. Louis surgeon, Dr. Evarts Graham, operated and removed nearly seven eighths of the pancreas.

This is said to be the first time so large a portion of the pancreas has ever been removed as a curative measure. After the operation an enormous amount of sugar appeared in the blood. At the end of a week, however, the amount had returned to normal and remained so, and the convulsions stopped.

This condition of over-production of insulin is just the opposite of diabetes. Sometimes it occurs in diabetic patients who get an overdose of insulin. The patient has an "all gone" feeling, and there may be numbness, mental confusion and incoherent speech. The patient may appear to be drunk. Dr. Seale Harris, of Birmingham, Alabama, was one of the first to report this condition and to suggest that it was due to over-production of insulin.

Dr. Marriott said that a tendency to this condition is especially common in infants and young children. In infancy the symptoms are irritability, colic and continuous crying; in older children, emotional excitement, undue sensitiveness, fatigue and often periodic attacks of vomiting.

When the epilepsy-like convulsions occur, it is generally in the early morning, when there has been the longest period of time without food. Injecting sugar into the veins greatly relieved the symptoms, and in some cases feeding sugar at midnight was especially helpful. In a number of cases, however, operation to remove a tumor of the pancreas or a portion of the organ itself was necessary.

Dr. Marriott described other ailments which occur as a result of disturbance of the chemical composition of the blood and told the assembled physicians that in practising medicine, "it often pays to be chemically minded."

FURTHER STUDY OF PALESTINE CAVE DWELLERS

AT the Royal College of Surgeons, London, eminent investigators have started examination of twelve important skeletons, representing adults and children who lived in caves of Palestine more than 50,000 years ago.

The bones of these early inhabitants of the earth were discovered by Dr. Theodore McCown, of Berkeley, California, who excavated caves of Palestine with a joint expedition from the American School of Prehistoric Studies and the British School of Archeology in Jerusalem.

Removing the skeletons from the solid blocks of limestone and breccia, in which they have been shipped complete to London, is expected to require two years. The bones will have to be drilled out with delicate pneumatically operated chisels.

Sir Arthur Keith, the well-known British anthropologist, is supervising the project, and Dr. McCown is taking direct charge of the task.

One of the skeletons will, by requirement, be returned to Palestine to the custody of the antiquities department of the government there. Of the remainder, half will be sent to America and the rest will remain at the College of Surgeons.

When discovered, the skeletons from Palestine attracted wide scientific notice, because they appeared different from the type of men previously known to exist in the Mousterian period of the Old Stone Age. The Neandertal type that lived in Europe then was a slouching person with beetling brows, low forehead, and no chin to speak of. The new discoveries indicate that most of the Palestine cave men had well-developed chins and higher foreheads. Sir Arthur Keith called the Palestine men a new race, and suggested the name *Paleoanthropus palestinus*, or the Old Man of Palestine.

It has been suggested, however, that when the skulls are removed from their stony matrix they may turn out to have chins more receding than appears in their partly obscured condition. Hence, the examination of the skeletons is awaited to show whether or not science has discovered a new ancient race of man.

A FOUR-DIRECTIONAL RADIO BEACON

THE chances for an air pilot to keep on his course or to reorient himself if he should become lost are now

greatly increased, thanks to the innovations brought about in the present type of radio range-beacon by F. W. Dunmore, of the Bureau of Standards.

The system makes possible the sending of four different signals in four directions, namely, one dot in a westerly direction, two dots east, three dots north and four dots south. By noting which signal is the loudest the pilot may determine his general direction.

With the radio beacon now in general use the determination of absolute direction or position on airways is difficult because the same signal is sent to four points of the compass. When the aircraft is near the radio beacon a pilot may pass from one course to another without knowing it. If lost it may take him an hour to reorient himself and the danger in case of shortage of fuel or the importance of time lost when on an errand of mercy will be apparent. It is believed by the inventor that the present scheme obviates these difficulties admirably.

The method consists of changing the so-called figure-of-eight transmission for the courses to the unidirectional cardioid transmission by changing the point of coupling into suitable phasing sections in the transmission line feeding the antenna, or, by superimposing on a figure-of-eight radiation through a suitable hybrid coil circular radiation in phase with the figure-of-eight direction.

The method has been tried out extensively at the bureau's experimental field at College Park, Maryland, and has been found altogether satisfactory. No additional equipment is required for receiving the signals on aircraft.

ITEMS

THE uncanny power of ultra-violet rays, to detect what is hidden from ordinary eyes, is now turned on the farmers' seed. Tests at Queens University, Belfast, show that ultra-violet light reveals differences in the grade of seed that are not shown up in ordinary light. The experiments were conducted by P. A. Lineham and S. Mercer. Rye-grass seed used in the tests were found to be fluorescent when inferior in grade. The type which is superior for farming uses was found to be non-fluorescent. The two kinds of seed are usually mixed or hybridized in stocks of rye grass when it is planted for pasture. The same test has also been applied to distinguish varieties of wheat and barley and to find the relative vitality of seed potatoes.

A NEW highway, recently completed, from Tower Falls to Mammoth Hot Springs in Yellowstone National Park brought to light in a rock cut two petrified tree stumps. Both are upright, standing in the position in which they grew millions of years ago. In the process of road building they have been nicely halved and left embedded in the solid rock, rock which was probably volcanic dust at the time petrification was taking place back in the Miocene. Their root systems may even be traced with a little patience and a great deal of care. It is not known what kind of trees these were—they may have been chestnuts, sycamores, sequoias, pines or cypress, for all grew here at one time or another during the centuries fossilization was in progress.