SCIENCE NEWS

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HEAVY OXYGEN ATOMS USED AS TRACERS IN REACTIONS

ON a shelf in the chemistry department of Columbia University sits a small bottle, in whose contents lies much of the hope of science to produce, some day, many of the indispensable organic chemicals of the human body—like the vitamins and the hormones—which have profound effects on life. Columbia's little bottle contains no "Elixir of Life." But it does contain a special kind of heavy oxygen which is now being used as a tracer, to follow through complex organic chemical reactions. Now applied in the study of simple reactions and providing chemists with exact knowledge of how organic chemical molecules are made up, the heavy isotopic form of oxygen should, in the future, be applied to more complex molecules and aid chemistry eventually to create synthetic sources of vitamins, hormones and other growth-determining compounds.

Professor Harold C. Urey, 1934 Nobel laureate in chemistry, reported the increasing use of heavy oxygen atoms as tags or tracers in a variety of organic chemical reactions never before completely understood by chemists. In his report to the meeting of the American Chemical Society at Milwaukee, Dr. Urey, with Dr. Irving Roberts, pointed out that prior to the recent use of heavy oxygen as a means of tracing reactions, there were only about a half-dozen organic reactions completely understood, out of the hundreds which chemists can produce.

To this small stock of exact knowledge, scientists have now added five compounds whose reactions are understood. Thus in one spurt, in research that has been conducted at Columbia University, the University of Chicago and Manchester University in England, chemistry has almost doubled its stock of exact knowledge of how various atoms in simple molecules are put together.

But this, gratifying as it is, is only a beginning. When Columbia's 200 cubic centimeters of heavy oxygen has been increased, other workers can be supplied with the oxygen tracer atoms, and scores of investigators can start on other trails leading to more knowledge.

THE SYNTHESIS OF PORPHYRINS

A NEW research step on the road that may eventually lead to a synthesis of chlorophyll—the light-sensitive chemical which enables plants to convert light energy, water and soil foods into their body structure—was announced at the meeting of the American Chemical Society. Dr. Paul Rothemund, of Antioch College, and Amel Menotti, of the Ohio State University, described new advances in the creation, in the laboratory, of chemicals known as porphyrins, which are exceedingly light-sensitive. Such porphyrins can be obtained by the chemical degradation of nature's two most important color pigments—the green of plants and the red of blood—or they may be made synthetically, as in the researches of Professor Rothemund and Mr. Menotti.

If the naturally derived porphyrins are injected into the blood system of experimental animals they become extremely sensitive to light and can live normally only in darkness or dim light. The new findings, now reported, describe the preparation of derivatives on the synthetic porphyrins which have a much greater effect than the natural porphyrins in making animals light-sensitive. "It is hoped that the energetic evaluation of the experiments will contribute to a better understanding of the process of photosynthesis and assimilation of carbon, the most important chemical reaction on earth."

The experiments, in which the porphyrins were injected into animals, have interest because parallels exist in nature of this photosensitive effect. Animals eating large amounts of buckwheat become sensitive to light. Western sheep grazing on certain plants in Nevada, Utah and Idaho succumb to an acute illness, known as "big head," whose symptoms include porphyrin photosensitization.—ROBERT D. POTTER.

DISCOVERY OF A GIANT DOUBLE STAR

A TREMENDOUS double star whose two components periodically eclipse each other was added to the catalogue of the wonders of the heavens by Dr. Sergei Gaposchkin, of the Harvard Observatory, in a report to the American Astronomical Society meeting in Ann Arbor.

The star, located in the constellation Scorpio, has, of course, been known before, and while astronomers suspected its great size, it had not been proved; nor was it known to be a double star until Dr. Gaposchkin detected this fact through intensive spectrographic studies.

The star is very hot, with a temperature somewhere between 15,000 and 20,000 degrees Centigrade. It has an average brightness magnitude of about 6.5. This varies by about a half a magnitude as the two parts rotate about each other during its 12-day period. Dr. Gaposchkin has made no estimate of its size beyond the fact that it is massive and is probably among the largest stars of its type yet found. Investigation, which is still in progress, has centered about the study of more than 150 photographs of the star, going back as far as 1910. It has also been studied by Mount Wilson observers, who were among the first to suspect its size and importance.

Dr. Gaposchkin's wife, Dr. Cecelia Payne Gaposchkin, reported to the conference on the progress of an intensive study she has been conducting of bright variable stars. The investigation, covering stars as faint as the 10th magnitude, during the past half century, is expected to be very important for statistical purposes.

A NEW METHOD FOR TRACKING METEORS

VIBRATION of the motor that drives the shutter on a camera used for photographing meteors traveling through the atmosphere has led accidentally to a new method for tracing the paths of the night-time visitors, as reported to the American Astronomical Society. The method, expected to constitute a valuable check on current means of investigation, was discovered accidentally by Dr. Fred

L. Whipple, of the Harvard Observatory, during routine sky patrols. The studies were being made by the usual method of photographing the sky through a motor-driven shutter which breaks the trail of a meteor 20 times a second, to reveal clues to its angular velocity.

On one meteor trail, that of an object about 60 miles away, the photographic plate revealed a wiggle, or side-sway, of about 20 feet. This raised the question as to whether a meteor moves in a straight line or swings from side to side, and Dr. Whipple measured other trails snapped with this apparatus to answer it. He found that practically all the trails had wiggles, but not in the same pattern. Then, examining the trails of meteors snapped without the motor-driven apparatus, he found there were no wiggles at all.

The solution, he discovered, was that the motor which drives the shutters shakes the entire camera mounting. The fact that this vibration is at the rate of about 16 times a second makes it act like the shutters, and thus affords an independent means of studying the phenomena. Dr. Whipple estimates that the accuracy of the new method is to within 5 to 10 per cent. Thus it is not as precise as the shutter method, but it is far better than any other.

"SLEEPING SICKNESS" IN THE MIDDLE WEST

FARMERS in middle western states are anxiously waiting for the first fall frost in the hope that, by killing mosquitoes and flies, it will check further spread of the "sleeping sickness" epidemic which has been taking heavy toll of horses.

While existing to some degree in thirty states, the disease, technically termed "equine encephalomyelitis," has been especially prevalent in Minnesota, Wisconsin and Iowa the past summer. Lately it has been working eastward; it has appeared in northern Illinois and a few cases were recently reported in Indiana.

As described by Wayne Dinsmore, secretary of the Horse and Mule Association of Chicago, symptoms of equine sleeping sickness include "dullness, sluggishness, drowsiness and a tendency of the eyes to close." The animal is unable to control leg movements, he said. Front feet may cross each other or hind feet may not travel in the direction the animal is moving. The horse will blunder over familiar obstacles as though blind or may drag the toes of one or more feet. It often acts as though it were about to sit down, carrying most of its weight on hind legs. Some subsequently go blind or become "dummies" and are of little use thereafter.

Mr. Dinsmore stated that "the disease is seasonal; it is known to be carried by at least five species of mosquitoes and also, probably, by biting flies, but by no other means, so far as known. No one knows the origin of the trouble. It does not exist in foreign lands, but Rockefeller Institute investigators have suggested that it may possibly be brought in by birds migrating from the tropics up along the air trails over the Atlantic coast and the Mississippi River. These birds are bitten by mosquitoes which may pick up the sleeping sickness organism in the birds' blood and then transmit it to the horses. There is no cause for panic, however. Although serious, the epidemic is overrated in popular estimation. The horse and mule population of America is around 16,000,000, so the 33,000 animals lost last year are only a small proportion of the whole. With the approach of cold weather the mosquitoes will lay off and the situation will get back to normal."

FOSSIL ANTHROPOID SKULL FOUND IN SOUTH AFRICA

THE story of how four of "the most valuable teeth in the world" were carried about in a schoolboy's trouser pocket is told by Dr. Robert Broom, of the Transvaal Museum, Pretoria, South Africa, in *Nature*, in describing the discovery of remains of a previously unknown form of fossil anthropoid ape. In certain features this fossil ape is closer to man than any anthropoid ape, whether extinct or still in existence, known from any part of the world.

The discovery was made by a schoolboy, Gert Terblanche, who knocked part of a fossil skull and jaw out of an outcrop of fossil-bearing limestone deposit near the top of a hill at Kromdraai, about two miles from the Sterkfontein cave where Dr. Robert Broom made his previous discovery of a fossil anthropoid skull. The boy gave away part of the palate with one molar tooth still attached. This came into the possession of Dr. Broom, who, recognizing that it belonged to a new type of anthropoid, found the boy, with four teeth still in his possession, and with his help extracted further fragments of the skull from the deposits.

Dr. Broom now has the nearly perfect palate with most of the teeth, practically the whole of the left side of the lower part of the skull and the greater part of the right side of the lower jaw. Nearly the complete dentition is now known, as it has been possible to reconstruct missing teeth from the impressions in the matrix.

The remains are those of a large ape, larger than the male chimpanzee and nearly as large as the female gorilla; but the parts of the skull which have been found show that it resembled neither chimpanzee nor gorilla. These include part of the cheek bone, and show how the jaw was articulated to the skull. Except that they are much larger, their form and relation one to another differ from that found in the ape and are almost exactly as in man.

No fossil ape has ever been found which is so nearly in line with man. The disposition of the teeth and arch of the jaw is more like that of man than of the anthropoids; while the canine teeth, which are large in the apes, are relatively small and very human in shape. In several other details the teeth bear a remarkable resemblance to the human.

Further, from the relation of the bones of the skull one to another as compared with that found in the chimpanzee and the gorilla, Dr. Broom is able to deduce that this anthropoid walked somewhat more erectly than the living anthropoids.

From the fossilized remains of the animals found in the deposit, Dr. Broom concludes that this anthropoid, to

which he proposes to give the name *Paranthropus robustus,* to suggest its close relation to man, belongs to the period of the Middle Pleistocene, whereas the Taungs skull, *Australopithecus africanus,* discovered by Professor Raymond Dart in 1925, belongs to the earlier period of the Lower Pleistocene, and the Sterkfontein skull, discovered by Dr. Broom himself, belongs to the Upper Pleistocene.

Some further teeth and a part of the front of a young male jaw belonging to the Sterkfontein type of anthropoid have also been found recently by Dr. Broom. On this new evidence he concludes that the Sterkfontein skull is even closer in its resemblance to man than he had previously thought. He therefore proposes to alter its name accordingly to *Plesianthropus transvaalensis.*

From these three important discoveries—the Taungs skull found in 1925 by Professor Dart, the Sterkfontein skull, of which the first fragments were found by Dr. Broom in 1936, and the Kromdraai skull, of which the discovery in 1938 is now announced—it is evident that there survived in South Africa so late as Pleistocene times a number of large-brained anthropoid apes which in certain details of their structure and especially in their teeth came close to man—all of them, in fact, resembling man more closely than do either chimpanzee or gorilla.

As Sir Arthur Keith has pointed out, they are too late in time to come into the direct line of succession which leads up to man; but they indicate the lines upon which the earlier forms of anthropoid apes, from which they themselves were descended, must have been modified in the growth of the human tree.—E. N. FALLAIZE.

ITEMS

FERNS and trees of a "Lost Eden" in South America, studied by Professor Edward W. Berry, of the Johns Hopkins University, have yielded a list of 92 species hitherto unknown to science, according to a report made to the Geological Society of America. The plant remains were found buried in volcanic ash in the province of Patagonia, Argentina, where they were overwhelmed by tremendous eruptions dated by Professor Berry as during Miocene times, between 20 and 25 million years ago. Whole plants, twigs and scores of leaf specimens were carefully dug out and examined by Professor Berry. Large fern plants, closely related to the ferns of North America, were unearthed, and also twigs and leaves of the ginkgo. Coniferous trees are also represented. In general, the new-found fossil flora is strikingly American. Fourteen of the genera are known only from South America, while 26 are confined to the Western Hemisphere and are nearly all equatorial America.

THE first case of tick paralysis reported in the eastern United States, so far as is known, is described by Dr. J. Heyward Gibbes, of Columbia, S. C., in the current issue of the *Journal* of the American Medical Association. Tick paralysis is not to be confused with Rocky Mountain spotted fever, although both ailments may end fatally, both follow tick bites and both were first found in a small area in the Northwest. Tick paralysis is an ascending type of paralysis, attacking the lower part of the body first and moving upward. It sometimes results in death from involvement of nervous tissue at the base of the brain. Reports of cases from Washington, Wyoming, Montana and British Columbia have previously shown that the condition promptly disappears when the feeding tick is found and removed.

A NEW device which, by determining the direction from which an approaching airplane's radio transmitter is sending signals, enables airplane dispatchers to know the direction of approach of incoming planes even though weather conditions may make the planes invisible has been developed at the Bell Telephone Laboratories. Intended as an additional safeguard for private and commercial radio-equipped aircraft, the device locates a tiny green light speck on a frosted glass screen in accordance with the direction from which the plane is coming. The points of the compass are marked around the screen's edge. The system provides for indication on any 10 wave-lengths which may be selected remotely. As each pilot talks to the control tower at his destination, the spot of light waves moves instantly to its correct position on the screen of a cathode ray tube. A pick-up antenna of special design is employed; this may be situated at any remote point. A single telephone line connects antenna and dispatcher.

ACCORDING to *Chemical and Metallurgical Engineering,* a new building material said to have remarkable insulating qualities has been prepared from pickling liquor, the acid-containing waste material produced at the rate of 2,000 tons a day by the nation's steel mills. The process for its manufacture, invented by H. Seymour Colton, of Cleveland, is stated to be simple and the amount of capital required is small. Its importance lies in the fact that disposition of the pickling liquor, which results from treatment of steel with sulphuric acid, has been a difficult problem. A cause of stream pollution, its disposal into creeks and rivers is prohibited in several states and will be prohibited by a proposed federal law against stream pollution. It kills fish life and has also a corrosive effect on any metal in the stream. Called "ferron," the new material is largely a coprecipitated iron oxide and calcium sulphate. At one stage in its manufacture it is plastic and can be molded into any desired shape. Resembling wood in many respects, it is said to be fire-proof, termite-proof and water-proof.

A NEW voluntary standard for marking gold jewelry that provides that every quality mark shall be accompanied by a registered trade mark to fix responsibility has been issued by the National Bureau of Standards in cooperation with jewelry trade associations. Formulated at public hearings at which the tolerances of the National Stamping Act of 1906 were scored as being too "liberal" and as allowing some manufacturers to take advantage of the marking allowances of the law to sell below-grade goods, the standard goes into effect on new production on November 25. Ten-karat gold is the minimum on which a quality mark should be permitted, it was decided at the hearings.