SCIENCE NEWS

Science Service, Washington, D. C.

LUMINOUS NIGHT SKIES

AT times there is a strange luminosity in the sky at night. More or less extended areas glow faintly or stretch in bands across the sky. Such bands have been observed simultaneously at widely separated points, such as in Middle-Europe and in Scotland. Although occurring prevailingly in the northern sky, and often mistaken for some form of auroral effect, these bright areas are evidently not of this nature, because the light is steady, the streaks run prevailingly from east to west, and the phenomenon is not accompanied with marked magnetic disturbances as is the case with the aurora.

A thirteen-year study of this phenomenon has been reported by Dr. C. Hoffmeister of the Sonneberg Observatory near Berlin. He finds that it occurs more often when shooting stars are numerous, as at the time of a meteor shower.

A rough connection of the sort had been observed before, and was explained by Dr. Nagaoka, of Japan, as due to dust produced by the disintegration of the meteors. But the careful observations of Dr. Hoffmeister showed that the luminosity sometimes precedes, sometimes follows, a meteoric shower, and sometimes is absent altogether.

The meteors that strike into our atmosphere in April, called the Lyrids, do not produce this luminescence. The Perseids that arrive in August and are very numerous produce relatively little of it. On the other hand, the Leonids, the Geminids, and other lesser showers produce considerable effects. For these reasons Dr. Hoffmeister believes that the dust that causes the luminosity is of cosmic origin and is brought into our atmosphere along with the meteors, instead of being produced after they arrive.

He points out that all these meteor streams that the earth periodically encounters have been produced by the breaking up of comets. This must have produced not only the larger particles that appear in our atmosphere as meteors, but also smaller particles and dust. The latter, encountering no resistance in empty space, travel along with the larger particles, and like the latter become eventually distributed throughout the whole orbit. The Lyrids and the Perseids, he further points out, are derived from two rather old comets that broke up in 1861 and 1862. Their dust has been nearly all swept up.

The sudden injection of cosmic dust into the atmosphere also affects radio reception. The dust particles neutralize the electrified particles that compose the "ionosphere," that reflecting layer that causes radio waves to hug the surface of the earth instead of shooting out into space.

This connection between radio waves and shooting stars had already been independently discovered by Dr. Zanneck of Munich. The investigations of Dr. Hoffmeister now show the cause of that connection, and make it possible, he believes, to predict with greater assurance than before when radio reception will be good and when it will be bad.

DEUTERIUM IN CHEMICAL REACTIONS

THE technique of substituting atoms of deuterium, the "heavy" kind of hydrogen, for the ordinary hydrogen atoms in a substance has disclosed why ammonia breaks up under the action of ultra-violet light.

Professor Hugh S. Taylor, of Princeton University, and Dr. Joseph C. Jungers, exchange research fellow from Louvain University, Belgium, have just described how they solved the breaking down of ammonia by light through the use of heavy hydrogen atoms as "tracers."

When ultra-violet light shines on ammonia, which consists of one atom of nitrogen and three atoms of hydrogen, it breaks up into two things: a free atom of hydrogen and a substance consisting of one nitrogen and two hydrogen atoms in combination.

Ammonia and deuterium gas was mixed in a quartz vessel. This quartz vessel was exposed to ultra-violet light. By passing other light through the vessel and measuring its absorption with a spectrograph, Professor Taylor and Dr. Jungers were able to trace the driving out of the ordinary hydrogen by the deuterium.

First they obtained absorption spectra in which one atom of deuterium had replaced one hydrogen atom. Next they found two atoms of deuterium had worked their way into the mixture. Finally the third deuterium atom replaced the last hydrogen atom in each molecule and they had a substance containing one nitrogen atom and three deuterium atoms. Each step in the process was traced through with the spectrograph. The experiment is described in the current issue of the *Journal of Chemical Physics.*

NEW ELEMENT 93 MAY BE AN ISOTOPE OF NUMBER 91

THE element 93, discovered by Dr. Enrico Fermi of the University of Rome, may not be a new element after all but merely a different form of element 91, already known. This is the conclusion of Drs. A. V. Grosse and M. Agruss of the department of chemistry of the University of Chicago, who report that Fermi's super-heavy element 93 may very well be an isotope of element 91 and not, therefore, a completely new element as supposed. A letter to the editor of the *Physical Review*, reports that by using the chemical tests which Dr. Fermi employed to prove the nature of his element 93, the same set of reactions was obtained by working with element 91. They found, for example, that element 91 is precipitated by the use of manganese from acid solution.

The similar results raise the natural question about the reality of Dr. Fermi's element 93 Drs. Grosse and Agruss write: "We are forced to conclude (unless evidence to the contrary is provided) that the product of uranium with a half period of 13 minutes (referring to Fermi's element) is an isotope of element 91."

It had been supposed that when Dr. Fermi shot neutrons at uranium (element 92) some of them stuck in the nucleus and created element 93. Drs. Grosse and

Agruss believe, however, that the uranium was broken up from element 92 into element 91. The atomic change was a breaking down instead of a building up process.

CHEMICAL ANALYSIS BY X-RAYS

BY holding a piece of metal up to a beam of x-rays it is now possible to tell quickly what are its chemical constituents. This is the seemingly magical method of analyzing metallic substances announced by Dr. L. V. Hamos of Stockholm.

Dr. Hamos has already built metallic "sandwiches" consisting of paper-like strips of metal piled one on top of the other. By shining x-rays at the laminated edge of the metal "sandwich" he has been able to tell what kind of metal was used for each layer. In some cases the edge of the metal strips was only 1/250 of an inch thick.

Reporting his new method of chemical analysis to *Nature,* Dr. Hamos explains that when the initial beam of x-rays (all of the same wave length) strikes the laminated edge it produces secondary x-rays, which come off from each of the various kinds of metal illuminated by the primary beam. These secondary x-rays are characteristic for each different kind of metal known, so that if the "fingerprint rays" could be sorted out in some fashion a chemical identification is possible.

The apparatus for analyzing the tell-tale secondary x-rays consists of a crystal of pure salt shaped into the form of a cylinder. This cylinder does for the mixed-up secondary x-rays what an ordinary prism of glass or a spectrum grating does for white light—it breaks it up into its colors, or wave lengths. As the x-rays come from the salt crystal they strike a photographic plate at different places and leave marks which distinguish each metal present in the original sample of metal.

Dr. Hamos is carrying out his research in the Rikmuseets Mineralogiska Avdelning. His method is adapted for the rapid analysis of metals and metallic ores where the physical appearance of the sample must not be changed. At present he can identify two metals when they are only 1/250 of an inch apart in the samples.

RACIAL CONNECTIONS TOLD BY FINGERPRINT READINGS

A NEW method of reading a man's race or nationality from his fingerprints, was demonstrated in London before the meeting of the International Congress of Anthropological and Ethnological Sciences.

The method was worked out by Dr. Heinrich Poll, the displaced director of the Anatomical Institute at Hamburg, Germany. Dr. Poll, who spent twenty-seven years of research on this task, was followed on the program by Dr. Harold Cummins, professor of anatomy at Tulane University Medical School, who endorsed his conclusions.

Dr. Poll's method is based on certain numerical correlations between a person's fingerprint patterns and his race, his physiological makeup, even his tendencies toward contracting certain diseases. He has developed a shorthand system of expressing these racial fingerprint patterns. Thus, the "formula" for average English fingerprints is 1–07, for Scandinavians it is 1–17, for Italians 1–72, for Spaniards 1–74. Moorish fingerprints have a formula of 1–83, while that of Jews is 2–17. Average fingerprints of American Indians give a reading of 2–26, Chinese prints read 2–49, and Eskimos 2–74. Lesser degrees of difference can be found between tribes or sub-races.

Dr. Poll has also found correlations between certain types of fingerprint patterns and a tendency to develop schizophrenia, or "split personality," and also a similar correlation between fingerprint pattern and a tendency to poliomyelitis, or infantile paralysis.

TEETH OF SAUROPODS

QUESTION MARK QUARRY near Billings, Mont., now being "mined" for dinosaur fossils by the American Museum-Sinclair Dinosaur Expedition under the leadership of Dr. Barnum Brown, may at last be on the eve of yielding a skull, to "head up" at least one of the hitherto quite skull-less dozen saurian skeletons found piled together as in a titanic charnel-house. Dr. Brown describes the find in a statement given to Science Service:

"The first trace of the whereabouts of any of the skulls of the twelve sauropods in the fossil deposits on which we are working, is a group of eight teeth lying parallel and evidently in normal position close to and partly beneath a large vertebra. The roots of the teeth, which are about two inches long but very narrow, extend into thin bone which I believe to be part of the skull.

"The finding of this skull is a matter of vast relief as all other parts of a skeleton have been discovered and naturally headless sauropods would not make a complete exhibit. An important angle of the finding of the teeth is that they give the first indication of the type of sauropod we are dealing with. Such casual study as I have given them indicate that the creature to which they belonged may have been a hitherto undescribed type of Barosaurus, of which no skull has ever been found.

"It goes without saying that we are going ahead with the greatest possible vigilance so that not a bone fragment will escape us."

If Dr. Brown's conjecture that the teeth and possible skull fragment belong to a Barosaur, the find will be of outstanding importance, for though skeletons of this type of dinosaur have been found in the past, none of them has ever had a skull with it. The Barosaurs resembled the Diplodocus type of dinosaur—enormous potbellied creatures that walked on all fours, with tremendously long necks and even longer tapering tails. Diplodocus heads were ridiculously small, in comparison to their huge size; it is not improbable that Barosaur heads resembled them. Dr. Brown's new find may help to throw light on this point.

TYPHOID FOLLOWING THE DROUGHT

UNDUE alarm need not be felt over the recent increase in numbers of typhoid cases reported, although the situation in a few states is admittedly serious and calls for careful watching. This summarizes the opinion of U. S. Public Health Service officials, who have been checking up on figures received from the health authorities of the various states. Even in the states showing the largest increases, the outbreaks can not be properly characterized as epidemics.

The area most carefully studied comprises the "drought belt" states of Indiana, Illinois, Missouri, the Dakotas, Nebraska, Kansas, Oklahoma and Texas. Some communities in these states, particularly the smaller towns, have had to resort to secondary and often unsuitable water supplies because of the exhaustion of normal stocks, and here, it is felt, the danger of contamination and disease has been greatest.

However, in only three of the states has there been a really spectacular jump in the number of typhoid cases. For the week ending July 28, the latest period for which complete figures are available, Missouri showed 66 cases of typhoid, an increase of 43 over the corresponding week in July, 1933. Illinois reported 61 cases, an increase of 37, and Kansas showed a jump of 23 cases over the previous year's record for that week—from 6 in 1933 to 29 in 1934. On the other hand, Oklahoma showed a decrease of 6 cases, from 39 in 1933 to 33 this year. Texas showed an even larger decline of 15 cases, from 103 for the week in 1933 to 86 for the corresponding week of 1934. The other states in the list show a very low incidence—only one or two cases apiece for the whole week.

Considerable fluctuations occur from week to week in the development of typhoid cases. Thus, for the week preceding, ending July 21, Illinois showed an increase of only 13 cases over the corresponding week in 1933, in place of the 37-case increase reported on the last Friday in July. Similarly, the increase for Kansas during the week ending July 21 was only four cases, as against 23 for the following week.

Surgeon-General Hugh S. Cumming, of the U. S. Public Health Service, holds to his previously expressed view, that the typhoid situation can be handled adequately by local health authorities, even though they have in some localities been handicapped by drastic reduction in working funds. Individuals in typhoid-threatened communities can do much for their own protection, too, he says, by boiling milk and drinking water, and by exercising caution in the preparation and use of uncooked foods.

ITEMS

DROUGHT-RESISTANT grass species, to be used in rebuilding the depleted rangelands of the West, are to be sought in central Asia by an expedition being sent out by the U. S. Department of Agriculture. On the edge of the Gobi Desert there are great natural grasslands, which have been pastured for thousands of years by nomad tribes, without any sign of exhaustion. In this region the temperature ranges from 100 degrees Fahrenheit in the summer to 40 degrees below zero in the winter, and severe droughts are frequent. Yet the grasses survive, and the herds of livestock and game thrive on them. The leader of the expedition will be Professor Nicholas Roerich, veteran explorer of interior Asia, from Kashmir to the Altai mountains. With him will be his son, George Roerich, an expert in Central Asiatic languages, and two U. S. Department of Agriculture specialists in grasses, H. G. MacMillan and J. L. Stephens.

THE skull of a unique species of extinct rhinoceros has been discovered by a party of investigators from the California Institute of Technology, working in the fossil-rich John Day Beds in Oregon. The specimen, which is the most complete rhinoceros skull found in this region for many years, shows by its outline that the animal had an extended proboscis, instead of the bluntly rounded nose of modern rhino species. The skull found while Dr. Chester A. Stock, paleontologist, and Eustace L. Furlong, curator, were scouting for new beds to explore, contains a full upper set of teeth, including the front teeth that form the "schnozzle." The lower jaw was in fragments, most of which had disappeared. The fossil was removed from Miocene geologic strata, giving the animal an age of at least 10,000,000 years.

A SMALL "electric village" is about to be opened in Germany to demonstrate to farmers the uses of electric power. The purpose of this project, according to a report from the U. S. Department of Commerce, is to create an outlet for a local power plant as well as to demonstrate that electricity is not too expensive a source of light, power and heat. The appliances to be installed in the farmers' homes will be supplied free by the power company. The only cost that the farmer bears is that of the current consumed. The village of Saulwitz in Prussia is to be the scene of this experiment.

A NEW type of watch studied by R. E. Gould, of the National Bureau of Standards, has its critical parts, hair-spring and balance wheel, fabricated of non-magnetic metal. "Elinvar," a nickel-steel alloy, is used for the hair-spring because it does not become sluggish after being exposed to small electric currents. The use of elinvar further simplifies the construction of a watch because it also automatically compensates the effects of heat and cold and eliminates the intricate construction normally necessary to prevent changes in size of the balance wheel with temperature. In carefully conducted tests covering nearly all conditions forty different watches were compared. Those with non-magnetic hair-springs were more accurate.

SLIME-PRODUCING micro-organisms that are a harmful factor in the pulp and paper industry have been turned to practical account by Dr. J. R. Sanborn, of the International Paper Company. These organisms, Dr. Sanborn reported to the Society of American Bacteriologists, will form, under special methods of cultivation, doughy or rubbery slime clots. The clots are converted by agitation in water into a cellulose-like suspension. This is deposited in a thin layer and the water is withdrawn. The slime particles merge or coalesce, forming a continuous membrane. The completed sheet is semi-transparent and parchment-like.

MORE radium exists in the mud of the sea than in the ordinary rocks of dry land, according to Dr. Robley D. Evans, of the University of California. His tests show that radium is being deposited constantly by the oceanic waters. There is no hope of mining sea mud for radioactivity. Dr. Evans made his experiments merely to test his new method of detecting extremely minute amounts of radium and radon gas emitted by radium. Each ounce of mud contains three trillionths of an ounce of radium.