SCIENCE NEWS

Science Service, Washington, D. C.

THE DIRECTION OF COSMIC RAYS

COSMIC rays smash into the earth's atmosphere more frequently from the magnetic north and the south than from the east and the west, experiments made both at the Bartol Research Foundation of the Franklin Institute, Swarthmore, Pennsylvania, and on the summit of Mount Washington, by Dr. T. H. Johnson, assistant director, and Dr. J. C. Street, seem to indicate. In a report to the American Physical Society, Drs. Johnson and Street will give their evidence for this variation of the cosmic ray intensity with azimuth.

Extensive experiments are in progress throughout the world by physicists of many nations in attempts to determine the characteristics of the cosmic rays. Early experiments by Dr. R. A. Millikan were interpreted as showing that the cosmic rays bombarded the earth with equal intensity from all directions. Dr. Millikan is now conducting further tests in various parts of the country and Canada. Dr. A. H. Compton, of the University of Chicago, who has just traveled from the Orient to the Arctic making cosmic ray observations, found that cosmic rays were stronger with increasing distance north and south of the earth's equator.

If the experiments of Drs. Johnson and Street, which are still in progress, continue to indicate this difference they will fall in line with those of Dr. Compton and support to a greater extent the theory that cosmic rays are particles capable of being deflected by a magnetic field rather than very short radiation like light, x-rays or gamma rays.

The Johnson-Street experiments measure the intensity of the cosmic rays at an angle of 30 degrees with the vertical in the magnetic north, south, east and west directions.

Three Geiger-Mueller counters are being used as a telescope and each cosmic ray has to pass through each counter in succession before it is received. At Swarthmore, where the latitude is 40 degrees north, the first measurements indicate that the cosmic rays are 5 to 10 per cent. more intense in the north and south directions than in the east and west directions. This difference lies just outside of the probable error of the measurement, which means that it is more likely than not that the effect is a real one.

Tests on the summit of Mount Washington, 6,288 feet high, are now in progress. A special portable cosmic ray laboratory was transported to the summit by auto truck and Drs. Johnson and Street are engaged in two weeks of observations.

ORIGIN OF THE PLANETS

A NEW nebular hypothesis of planetary origins is being discussed at Amsterdam as a substitute for the theory that the planets are fragments torn from the sun by the enormous tidal forces generated when another huge star passed too close to the sun.

The new evidence against the "tidal forces" theory is based on observations and calculations made and reported by H. P. Berlage, Jr., of the Meteorological Observatory in Batavia, Java. His paper was communicated to the Royal Academy of Sciences by Professor H. A. Kramers.

Berlage's theory is that the planets had their origin in a nebula surrounding the sun and having the shape of a thin, flat disk. From what is known of the way in which the present planets differ in their respective densities it follows that if there actually was such a nebula it must have had this disk shape at least as far out from the sun as Neptune. Moreover, the densities for each planet, calculated on the assumption that the new theory is correct, agree remarkably well with the actual known densities. For example, according to the theory, the greatest density should be along a circle which is nearly the same as the earth's orbit. The earth is actually the most dense of the planets.

Additional supporting evidence is found in the distances of the planets from the sun. Careful examination of the known facts about these distances reveals that the figures agree much better than has ever been believed with the positions which the planets should occupy, according to this theory, with respect to the sun.

If the planets did originate from a great disk-shaped nebula, it is easy to understand the presence of the great bulk of planetoids between Mars and Jupiter; they arose from an unstable and highly turbulent zone in the gaseous disk. Even the puzzling arrangement of these planetoids can be simply explained on the proposed basis.

If the theory is correct, there should have been another, lesser zone of turbulence, and so there should be another family of planetoids. It is considered probable that the recent discovery of Pluto brought to light the first known member of such a group of planetoids, thus giving the theory added confirmation; and it is suggested that if these planetoids are discovered, they might appropriately be called plutoids.

A FOUR-LEGGED FISH

DR. LAUGE KOCH, Danish geologist, who brought home from Greenland fossils of a "four-legged fish" that stands as a connecting link between water-dwelling and land-dwelling vertebrates, made his find as an incident in a sweepingly planned and comprehensive survey of the great mysterious frozen sub-continent that has been undertaken by the Danish Government. So important is this work deemed by its official sponsors that the bureau which has it in charge ranks almost as a separate portfolio in the cabinet, and Dr. Koch, though not actually a cabinet member, rates practically as one in Copenhagen.

The survey, which has been in progress for several years, will, when completed, tell the whole scientific story of Greenland, its geography, its climate, its geology and

mineral resources, its oceanography and fisheries, its plant, animal and human inhabitants.

The "four-legged fish," or Stegocephalians, whose fossils form a part of Dr. Koch's collections, have been known to geologists for many years. They were not really fish, but true amphibians, possessing, however, a number of fishlike characteristics. Their Greek name means "roof-headed," and refers to the complete covering of bony plates with which their heads were protected. They were among the earliest forerunners of the frog-toad-salamander family.

There are, however, genuine fish that are also genuinely "four-legged"—that is, their fore-and-aft paired fins are modified in such a way that they can crawl as well as swim with them. Such fish are found as fossils among the earliest vertebrate-bearing rock strata, and two or three species still survive in the muddy rivers of the semi-arid parts of Africa and Australia. These are the Dipnoi, or lung-fishes. The African lung-fish can get oxygen only by means of its "lung," or modified swim-bladder; if it is forcibly kept completely under water for many hours, so that it can not come to the surface to gulp air, it suffocates—literally drowns. These lung-fish form mud-crusted cocoons during the dry season, and "aestivate" just as bears or woodchucks hibernate.

There are numerous fish that are able to come ashore, and do habitually climb out of the water in search of food. They are found mostly in the tropics, and many tall tales are told about them. These fish, however, are not "four-legged"; only their forward paired fins are of use in locomotion. They are, moreover, not air breathers, but carry enough water behind their gill-covers to keep their gills moist until they are ready to return to the water.

PARROT FEVER

DR. CHARLES ARMSTRONG, surgeon of the U. S. Public Health Service, has donated some of his blood for convalescent serum to be used in treating Mrs. William E. Borah, wife of Senator Borah of Idaho, who is suffering from psittacosis or parrot fever. The serum was sent from Washington to Boise, Idaho, by airplane. Dr. Armstrong was one of the early victims of the disease on the staff of the U. S. National Institute of Health when that institution investigated the parrot fever outbreak of 1929–1930. He was sent to investigate the first cases in Annapolis, Maryland, and subsequently contracted the disease himself. He was critically ill, but after several weeks recovered and continued the federal investigation of the epidemic. Dr. Armstrong at first withheld publication of his name as the donor of serum for Mrs. Borah, just as he at first tried to prevent publication of the fact that he had nearly become a martyr to the disease he was investigating in 1930.

Psittacosis has occurred frequently in the United States ever since the outbreak in 1929–1930. Public health officials now think there is an epidemic focus of infection in the country, that is, a place where the infection always exists and from which it may spread. Their theory is that the focus exists where love birds or parakeets are raised in the United States and that the sporadic cases reported from time to time come from this focus and not from imported birds. The U. S. Public Health Service hopes to be able to obtain money for an investigation of this focus.

Psittacosis or parrot fever is often mistaken for influenza or other common diseases because of its unfamiliarity and the similarity of its symptoms to better known maladies. Older persons are more seriously affected by it than young ones. The exact manner in which the disease is spread is not known.

A RESPIRATION FERMENT

A SECOND respiration ferment, one that is not the haemin which controls the conveyance of oxygen from the lungs to the muscles and other tissues of the body, has been found by Professor Otto Warburg, Nobel Prize winner, and his associate, Dr. Walter Christian, of the Kaiser Wilhelm Institute for Biology in Berlin.

Professor Warburg's demonstration of the constitution and action of haemin was one of the significant contributions that won him the Nobel Prize in medicine and physiology in 1931. Now he describes in a preliminary report to *Die Naturwissenschaften* his discovery of this second oxygen-carrying ferment.

Professor Warburg and Dr. Christian found that when certain cells, called anaerobic because they normally can not live in the presence of oxygen, are shaken up with oxygen, a respiration or burning of carbohydrate takes place. This respiration or breathing can not be stopped by carbon monoxide or by hydrocyanic acid, poisons which stop ordinary respiration in animals by acting upon the haemin that controls the conveyance of oxygen in the body.

Juices squeezed out of many other cells behave like anaerobes. In such juices the Berlin investigators also found respiration which can not be stopped by either carbon monoxide or hydrocyanic acid. From these observations they concluded that an oxygen-carrying ferment other than haemin is to be found in nature.

The second respiration ferment appears to be present in high concentrations in anaerobic cells. It is an orange colored substance that breaks down when heated for ten minutes at a temperature of 60 degrees Centigrade. Professor Warburg and Dr. Christian described its absorption spectrum and the other physical and chemical properties which they had observed.

THE FOREST FIRE SITUATION IN CALIFORNIA

CALIFORNIA is the only National Forest area that is causing the U. S. Forest Service really acute concern over fire danger. Although the 160,000-acre brush fire that threatened a part of the vital watershed area of Southern California has been brought under control, there is a great deal of potential kindling all over the state. No rain has fallen for months, and none is in sight. For this reason National Forest Region No. 5, which is the only such region made up of a single state,

is marked as "very unfavorable" in the Forest Service's latest summary.

"Unfavorable" regions include numbers 3, 4 and 5, ranging from Washington on the north to New Mexico on the southeast. Here drought conditions are in general bad, but not as bad as they have been in California. In Regions 1 and 2, which take in the northern and central Rockies and the Plains states east to the Missouri, conditions are listed as favorable. Favorable also are conditions in Region 9, comprising the upper Mississippi and Great Lakes states. Here there have been few fires, and on the whole adequate rains.

In the East and South, Region 7, taking in all the seaboard states from Maine through Florida to Texas, is listed as "unfavorable." Through much of this territory there has been a severe late-summer drought, and hundreds of short-lived but quick-running fires have had to be fought.

There have been more than 5,000 forest fires throughout the country during the current year. Of these, approximately 40 per cent. have been caused by smokers, campers, steam-engines and other human agencies. The rest are due mainly to lightning. Man-caused fires predominate in the East, accounting for over 90 per cent. of the total. In the West, lightning is the more frequent cause of forest fires.

On the whole, 1932 has not been a bad forest fire year, with the sole exception of California. Its total was about two sevenths lower than the 1925–29 average to the same date.

ITEMS

A TINY planet, probably not over ten miles in diameter, that makes a trip in its orbit around the sun in 2.023 years, has been discovered independently by American and Russian astronomers. Of the 1,500 or more of these asteroids that revolve in the space between the orbits of Mars and Jupiter, only two encircle the sun in shorter periods, according to calculations made by Dr. A. Kahrstedt, of the staff of the Astronomisches Recheninstitut at Berlin-Dahlem. Though the first observation of the asteroid to reach the Recheninstitut was made on August 4 by Dr. G. Neujmin, at the branch of the Russian Central Observatory at Simeis, in the Crimea, it was found previously by Dr. George Van Biesbroeck, of the Yerkes Observatory in Wisconsin, who first recorded it on July 30.

ARTIFICIAL fever, which has been helpful in treating paresis, is now being turned to the treatment of another ailment, chronic asthma. Thirty cases of the disease in which relief was obtained by this means have been reported to the American Medical Association by Drs. Samuel M. Feinberg, Strafford L. Osborne and Meyer J. Steinberg, of Northwestern University Medical School, Chicago. In nineteen of these patients the relief of symptoms was complete and lasted from several days to nine and one half months. In the other eleven cases, there was improvement without complete remission of the symptoms.

CHAULMOOGRA oil, used in the treatment of leprosy, is being tried as a remedy for tuberculosis induced experimentally in guinea-pigs. Good results in checking the course of the disease are reported by the investigators, Dr. Erik Ohlsson and G. Glimstedt, of the Agricultural High School at Alnarp, Sweden. The experiments are still in progress and the authors point out that it would be unjustifiable and objectionable to try the method on human beings before the investigations on animals have been definitely concluded.

BACTERIAL wilt of corn, a disease that as a rule does not assume serious proportions, has been doing material damage during the past season, according to a report made by the U. S. Department of Agriculture. In Illinois, it has so seriously damaged fields of sweet corn planted for the canneries that many of them were plowed up and replanted to other crops while the corn was still young. It also caused serious trouble in dent corn. New England sweet corn fields were damaged, some of them to the extent of 25 or 30 per cent.

CALIFORNIA'S sugar pines, an important timber resource, are threatened with the blister rust disease that has made white pine planting a doubtfully profitable enterprise in the East, and has already invaded the natural white pine forests of the Pacific Northwest. H. G. Lachmund and J. R. Hansbrough, of the U. S. Bureau of Plant Industry, with headquarters at Portland, Oregon, have confirmed the high susceptibility of sugar pine to blister rust, in a series of experiments in which an isolated group of young trees were exposed to the disease. Their results will be reported in the forthcoming issue of *The Journal of Forestry*.

NORTHERN Norwegians have been Norwegians ever since the Stone Age, according to a statement made by Professor A. W. Brögger, Norse archeologist, in a recent lecture in London. His investigations have shown a continuous culture, with no evidence of new racial additions, from the time the first Germanic settlers went into the country on the heels of the retreating glaciers of the Ice Age. He has traced the story of his countrymen through stone, bronze and early iron ages. Throughout their long history, they have been what they are to-day: farmers on the land and sailors, especially whalers, at sea.

COLLEGE students each have on the average three colds a year. Members of families living at home, however, have only about half a cold a year, or one every two years. The figures are from a study of the incidence and time distribution of common colds just published by the U. S. Public Health Service. The study was made by Dr. Wade H. Frost, of the Johns Hopkins School of Hygiene and Public Health, and Mary Gover, associate statistician of the U. S. Public Health Service. The higher incidence of colds in college students might be due to conditions of student life, or might be due to more accurate reporting on the part of the students.