# SCIENCE NEWS

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## THE BEGINNING OF WINTER

THOUGH the cold wave which has swept over the country recently has brought with it wintry temperatures, winter has not yet begun, according to the astronomer. Not until 3:18 P. M., on Thursday, December 22, does it actually start.

The event by which astronomers determine the start of winter is concerned with the sun. On the twenty-second it enters the sign of Capricornus. This is one of the ancient signs of the zodiac, the path through which the sun, moon and planets all move. Many centuries ago these signs coincided with the constellations after which they are named, but in the time since the motion of the earth called precession has moved them. Now the sun is actually in the constellation of Sagittarius, the Archer, when it enters the sign of Capricornus, the Sea-Goat. Not until January will it actually be in the constellation of the Sea-Goat.

But to the ordinary person, the feature that marks the winter solstice, as the beginning of winter is called, is not the entrance of the sun into an imaginary part of the sky. What is most obvious is that the sun is then farthest south. Each day at noon, when the sun crosses the meridian, it is as high in the heavens as it gets on that particular day. If you start in June and watch how high it is above the horizon then, you will find that it is at an altitude of 73 degrees from the middle of the United States. If it were 90 degrees, it would be overhead.

After the beginning of summer, the noon altitude of the sun gradually becomes less, until in December it is only 28 degrees above the horizon. At the winter solstice it reaches its lowest altitude and then starts to rise, continuing until next June.

Another consequence of the low altitude of the sun is that the day on which the winter solstice occurs is the shortest of the year. On the twenty-second the sun rises, along the parallel of 40 degrees north latitude, at 7:18 A. M., and sets at 4:38 P. M., so that only 9 hours and 20 minutes are provided on that day.

## CONCERNING COMETS

THOUGH only a few of the stars visible in the sky exceed in brightness the Skjellerup comet, which is now near the earth and of naked-eye visibility, the comet is really an "airy nothing." Even if it should land on the earth, as it will not, it would probably not do any particular damage. Some comets have been bright enough to be seen in full daylight, and to stretch their tails half way across the sky. But even these have not contained enough material to make a first-class asteroid, or little planet, the largest of which are not over a hundred miles in diameter. It has been estimated that Halley's comet, one of the most famous of these visitors, contained about a twentieth of the material excavated in digging the Panama Canal. It has also been said that the brightness of Halley's comet would have been what it was if it were made up only of a dozen bodies as big as small marbles in a cubic mile of comet!

Even the head of a comet is transparent enough for stars to shine through it. Probably, as it approaches the sun, it consists of a clump of tiny meteorites, which is seen, if at all, by reflected sunlight. Then it is drawn closer to the sun by the latter's gravitational attraction, the tiny cometary particles having just about enough gravitational effect to hold the swarm together. Then it gets nearer the sun, and warmer. The heat causes gases that have been carried in the meteoric material to come out, carrying with them much finer particles, or dust. These are so small, that the light from the sun exerts a pressure on them and so they travel away from the sun, to form the tail. When approaching the sun, the tail is behind the comet, but after it has passed around the sun, and moves out into distant space again, the tail comes first, the head trailing along behind. Finally, it returns to pretty much the same state as when it entered the influence of the sun, but with some of its material lost to it forever.

The brightness of the comet when near the sun is partly reflected sunlight and partly a glowing of the gases in the tail under the influence of the rays of the sun. In this respect it is something like the aurora. The sun is sending out, besides visible light, numerous electrons, or "cathode rays." These cause a luminescence of various gases, when hightly rarefied, an experiment that can be duplicated in the laboratory. The very thin gases in the comet's tail, or in the upper atmosphere in the case of the aurora, are made to glow by these rays.

After the comet has passed the sun, it may go out into space to be lost to us forever. But many of the cometary orbits are ellipses, so that the comet returns again and again, in a period varying from a few years to many millennia. Sometimes the comet may approach within a short distance of one of the large planets, especially Jupiter. The great gravitational attraction of the planet will then put a considerable kink in its orbit, so that when it returns again near the earth it may be almost unrecognizable as the same comet. But the comet, being so light, has no appreciable effect on the planet.

## INJURIES FROM CATHODE RAYS

INJURIES caused by cathode rays, streams of electrons projected from Dr. W. D. Coolidge's recently-invented tube, closely resemble burns due to overdoses of X-rays and are similarly stubborn about healing. This is indicated by experiments performed by Dr. Victor C. Jacobson and Dr. Kenneth C. Waddell, of the Albany Medical College, to be announced soon in the scientific journal, *Archives of Pathology*.

Rats were used as subjects of the experiments. The animals were wrapped in jackets of copper foil to pro-

tect them from being rayed all over, and only a spot about an inch in diameter on the upper abdomen was left exposed. They were left in front of the window of the apparatus for periods varying from one tenth of a second to six seconds daily for fourteen days, while others received only single rayings of from six seconds to a minute. Current was fed into the tube at three voltages, 100,000, 200,000 and 300,000 volts, respectively.

The first sign of effect by the cathode rays was in the change of hair color, from white to yellow. Then the skin appeared to be tender, and finally developed pronounced sores, which were very slow to heal. When the rats were chloroformed and the skin subjected to microscopic examination, the details of the damage resembled closely those of X-ray burns. The experimenters state that it now appears highly likely that X-ray burns are really due to cathode rays generated by the impact of X-rays on solid or liquid objects which they encounter.

## EXPLORATIONS IN THE BAHAMAS

IN an effort to ascertain the origin of the pure limestone strata which are found in such mountain ranges as the Alps, the Rockies and the Appalachians, Dr. Richard Montgomery Field, of Princeton University, and Carl Breuer, of Locust Valley, N. Y., a junior in the department of geology, will spend their Christmas vacations off the west coast of the island of Andros, a hitherto geologically-unexplored district. Andros Island is in the Bahama group, 125 miles east of Florida and 175 miles north of Cuba.

The Princeton geologists believe that in this great marine flat, which is 300 miles long and 60 miles wide, where the water is never more than 25 feet deep, they will find now being reproduced conditions similar to those of Paleozoic times when the limestone was being formed by a sedimentation of calcium carbonate.

If the results of this preliminary survey indicate, as the Princeton geologists hope, that further study would be of scientific value from the geological point of view, it is planned to have a combined investigation of the geological and biological phenomena of this area. It is expected that Dr. William Beebe and Dr. Charles Fish, director of the Buffalo Society of Natural Sciences, an oceanographer, will cooperate in this work.

In making the preliminary survey, Dr. Field and Mr. Breuer will make use of diving helmets and undersea cameras which they have developed for such work. During Christmas vacation last year, Breuer, then a sophomore, made a study of marine formations off the coast of Bermuda.

While studying the structure of the Appalachians in 1916, Dr. Field first began his investigations into the origin of the pure unfossiliferous limestone found in this range. He came to the conclusion that it might be possible to find conditions suitable for the formation of the limestone in the lagoons formed by coral reefs, but later decided that it would be necessary to study sedimentation over a greater area than the lagoons would afford. He believes that the conditions off the west coast of Andros are unduplicated anywhere else in the world.

## THE BRAINS OF NIKOLAI LENIN AND ANATOLE FRANCE

THE brain of Nikolai Lenin, examined by request of the Soviet Government, shows marked characteristics of genius, according to Professor Oscar Vogt, director of the Kaiser Wilhelm Institute for Brain Research. Professor Vogt found in the Russian leader's brain evidence to support the theory that certain parts of the brain govern certain specific mental functions. This theory has lately been attacked by experiments on apes, indicating that if one area of the gray matter is destroyed another may take up its work. Two hundred fields of localization were found in the brain of Lenin and definite areas of the same type have been found in examination of hundreds of brains of apes and men. The differences between these parts of the brain could be detected, he said, upon close examination. Professor Vogt also upheld the theory that there is a criminal type of brain, which can be recognized. In the brains of criminals he has found that the cells are larger than normal, and are packed so tight as a result that the nerve fibers connecting the cells can not properly develop.

The brain of Anatole France, lately deceased French literary genius, was under the weight of the normal brain and of decidedly less avoirdupois than those of such celebrities as Lord Byron and Schubert, the musical composer, according to a report just submitted to the French Academy. This merely reaffirms the often repeated medical contention that the actual weight of the brain is no measure of intelligence. The weight of the average brain is around 1,360 grams, while that of France weighed only 1,190. The brain of Cuvier, the zoologist, however, tipped the scales at 1,829 grams and Lord Byron's at 1,807. The commonly held opinion that the convolutions and wrinkles of the brain testify superior intelligence was amply confirmed, on the other hand, by the furrows on the thinking mechanism of the dean of French literature. The convolutions were separated from one another by deep and flexuous grooves, together with many secondary fissures and notches. The frontal and occipital lobes were of specially complex character.

## CALCIUM AND ALUMINIUM COMPOUNDS FOR CHICKEN SARCOMA

DR. MARGARET R. LEWIS, of the Department of Embryology of the Carnegie Institution of Washington, and Dr. Howard B. Andervont, of the Johns Hopkins University, have succeeded in establishing that the unidentified organism that causes the Rous chicken sarcoma can be rendered inactive by means of small quantities of aluminium and calcium salts.

The significance of this work lies in its possible application in the treatment of human cancer. An immense amount of research will have to be done before any such result is likely to ensue, but these recently learned facts point the way to a new direction for cancer research in other laboratories. The chemicals that have been used in the treatment of cancer in the past have been highly toxic in character with a strong tendency to injure other parts of the body as well as the cancer cells. If it is

found that calcium and aluminium compounds, either given by mouth or injected into the blood stream, will have an adverse effect on cancer in chickens, it may lead to results of great benefit in treating human cancer because these compounds are more or less inert with little capacity to harm body tissues.

"While the primary tumor of this particular type of malignant chicken cancer," explained Mrs. Lewis, "differs in some respects from those found in human beings and higher animals, the secondary tumors or metastases, as they are called, are similar to the malignant sarcoma of man. The chicken tumor behaves quite as those of other kinds of animals in that it invades the tissue, develops metastases, leads to the death of the animal and can be transferred by means of transplantation from one animal to another of the same species, though not, of course, to an animal of a different species.

"The chicken tumor also resembles certain other diseases in that it is caused by a still unidentified agent that behaves like the so-called filterable viruses responsible for smallpox, rabies and encephalitis in rabbits. Many years ago Dr. Peyton Rous and Dr. J. B. Murphy, of the Rockefeller Institute for Medical Research, found that the causative agent of chicken tumor remained active in a filtrate, a glycerine extract or in the dried material of the tumor itself. It was also established by these workers that inoculation of these agents not only produced the disease, but that if the animal recovered from the tumor it was more or less immune to further inoculation of the tumor virus."

## CHOLERA IN INDIA

INDIA has had more deaths from Asiatic cholera than all the rest of the world put together, according to reports just issued by the health section of the League of Nations. The total for 1926, the last year for which there are complete returns, showed 72,859 deaths, a figure soaring high above that of all other countries from which reports are received or can be estimated.

Press dispatches reporting an unusual prevalence of cholera in India at the present time appear to be unfounded in the light of epidemiological information received here. Some 3,700 cases are mentioned as occurring the week of November 19, but considering that there were over 5,000 cases in the province at the end of September, it would seem that rumors of a severe epidemic have been exaggerated.

It should be remembered that this highly fatal disease has existed since very early times around the mouth of the Ganges River. It was not known to the outside world until the British occupation. Since this time, however, the increasing facilities of modern travel have carried it on various occasions to different parts of the world.

The first recorded excursion of this dangerous infection beyond its native haunts took place in 1816. It traveled slowly in those days of sailing vessels but managed to extend its range to the rest of Asia and to Africa. In 1826 it broke loose again, reaching as far as Europe and America. Twenty years later it spread to the uttermost parts of the earth, killing 150,000 people in France alone. It has flared up in world-wide epidemics three times since. The last, which occurred in 1902, has its start from the gathering of some 400,000 pilgrims at Mecca.

The cholera bacillus is carried in drinking water from regions where the disease is prevalent. Infection can only take place by swallowing the germ, much as typhoid fever is transmitted. This means that Asiatic cholera can be brought under control by sanitary measures and for this reason has never gained a serious foothold in advanced countries during recent years.

## ITEMS

INSECTS made of metal, true to the originals in the last minute details of structure, are produced by a process discovered by Dr. N. D. Zelinsky, a German chemist. As a matter of fact, the insects themselves are metallized through a replacement of their original substance with the metal, just as the details of wood or leaf structure are replaced with stone in petrifactions. The process was discovered by a quasi-accident. Dr. Zelinsky had undertaken to make chemical analysis of some insects. The procedure involved covering them with finely powdered copper oxid and heating them in small platinum crucibles under an atmosphere of carbon dioxid. At the end of the treatment he found to his astonishment that he had a collection of perfect copper insects, for the outer parts of their body-shells had been penetrated by the metal and the original horny chitin, with all its fine markings, was replaced by a layer of copper. It is thought that this method may be of value in museums in the permanent preservation of rare and perishable insect specimens, and possibly plants as well.

GOOSEBERRY plants in Norway must acquire resistance to an American fungus—or die. This is the conclusion of Dr. Ivar Jorstad. The fungus in the case is the one that causes gooseberry mildew. Until a quarter of a century ago it was unknown outside of America. Then it was introduced into Europe and has now spread to most European gooseberry regions. The fungus has long been known in America, but has never done much harm to American berries. Evidently they had acquired a certain amount of resistance to this parasite. When the fungus reached Europe it found itself in a most congenial environment. The varieties of gooseberries there had never been exposed to the mildew in the whole process of evolution. Practically all of them were very susceptible. The fungus spread rapidly from farm to farm. Behind it the gooseberry plantations were ruined. The agricultural authorities of Norway prohibited further importation of gooseberry plants. They also established quarantine inside of Norway in an effort to prevent the transportation of plants from the infected to non-infected areas. In Dr. Jorstad's opinion this action was taken at least two years too late. Dr. Jorstad summarizes his observations as showing the impracticability of preventing the spread of a plant disease of this sort in the absence of some natural, geographical feature to limit its spread. He considers it only a matter of time now before mildew will be prevalent in the few regions of Norway where it has not already been found.