SCIENCE NEWS

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DISCOVERIES OF THE HAMBURG OBSERVATORY

DISCOVERY by the same two astronomers of a nova, or "new" star, and a new comet, within three days, is a new astronomical record which was made last week at the Hamburg Observatory at Bergedorff, Germany. According to cables just received at the Harvard College Observatory, which acts as the American clearing house for announcements of astronomical discoveries, Dr. A. Schwassman and Dr. Wachmann, his associate, set this record.

The astronomers found a new comet in the constellation of Pisces, the Fishes, on November 15. This star group is in the southern sky now in the late evening, east of the so-called "Great Square of Pegasus." But as the comet was only of the fourteenth magnitude when found, it can only be seen with a large telescope. It was moving towards the southwest, its exact position, in the astronomical coordinates, being 1 hour, 32 minutes and 12 seconds right ascension, and 20 degrees and 53 minutes north declination.

The nova was found on November 18. Then it was of the tenth magnitude, also too faint to be seen except with powerful telescopic aid. Its position is 5 hours, 15 minutes and 12 seconds right ascension, and 16 degrees and 38 minutes north declination. This is in the constellation of Orion, the familiar star group, which is now seen low in the southeastern evening sky.

Upon receiving the report of the nova, Professor Harlow Shapley, director of the Harvard College Observatory, made an inspection of the photographs of the sky that are taken regularly at Harvard and found that since September the new star had been unknowingly photographed twenty times. Special photographs made immediately upon receipt of the news from Germany show the object to be a true nova. From the photographic record of the star's career, it was determined that on October 1 it reached its maximum brightness of near seventh magnitude, not quite visible to the naked eye. This is evidence that the new star is now on the wane.

A nova is not really a "new" star, but a previously faint one that suddenly becomes bright. This continues only temporarily, however, for it soon begins to return to its former obscurity. Just what causes the outburst, which is really an explosion, is not known. One theory that has been held is that it is due to two stars colliding, but now it is supposed that such collisions are much too rare to account for the frequency of such outbursts. The principal belief now is that the explosion is due to some sudden atomic change. During the summer another German astronomer, Dr. Max Wolf, of the Heidelberg University Observatory, found a nova, which was then found to have been photographed at the Harvard College Observatory several months previously, in June.

HELIUM FROM AIR

AIRSHIP makers take courage. Helium, the valuable safety gas so much in demand for filling balloons, may be obtained in unlimited quantities from ordinary air. This optimisitc suggestion comes from Dr. Frederick G. Cottrell, of the Fixed Nitrogen Laboratory, one of the country's foremost experts in the chemistry of the atmosphere.

Unfortunately, there is but one part of helium in 180,000 of common air. On the other hand, there is a lot of air. Dr. Cottrell's hopes are based on the prospect of separation of air into its component gases in a large industrial way, whereby the oxygen in particular is to be more efficiently used in combustion. When this sort of wholesale air analysis is undertaken, the helium content of the atmosphere will unquestionably get attention.

It is estimated that some fifty million cubic feet of helium per year go through the blast furnaces of America, along with the enormous volume of air feeding the fires. If it could be salvaged, this quantity of helium alone would revolutionize the airship industry.

Scientists prone to fancy have wished that one might pump down the thin air from the outside of the earth's atmosphere. At many miles' distance above the earth's surface it is supposed that the atmosphere is largely hydrogen and helium, the two lightest gases known. From the standpoint of present-day engineering, however, the installation of a stand-pipe to tap these lighter zephyrs would present serious difficulties.

CALIFORNIA STEAM WELLS

STEAM wells, where the earth is tapped for natural heat as it is elsewhere for natural gas or oil, promise to deliver power in paying quantities and at the same time to yield data of value in the study of the ancient riddle of geysers, hot springs and fumaroles.

The first development of this kind in America, at "The Geysers" in California, has been given a thorough scientific examination by Dr. E. T. Allen and Dr. Arthur L. Day, of the Carnegie Institution of Washington, and their report has just been made public.

The steam well region is in a little valley in the Coast Range, near San Francisco. There is abundant evidence that the region saw much volcanic activity in the past, and the steam rising through the earth, causing fumaroles and hot springs, is probably the product of deeply buried lava that has not yet cooled. The name "The Geysers," however, the Washington scientists state, is a misnomer, for there are no active geysers in the valley and no signs that there ever were any. Even the natural steam and hot water escapes are less marked than they are in many other similar regions.

Nevertheless, there seems to be abundant steam at high temperatures and pressures when the borings are sunk.

Eight wells have been put down so far, to depths of between 200 and 650 feet. These develop steam pressures between 60 and 275 pounds per square inch. Quantitative measurements of the output of four of the wells indicate a power equivalent to 4,500 kilowatts, or over 1,000 kilowatts per well.

In spite of the borings, no diminution of steam flow at the natural fumaroles in the valley has been noted. Neither do the wells seem to diminish each other's activity, although two of them are within 50 feet of each other. In fact, all the wells have shown an increase in both the pressure and temperature of their steam for a certain period after they were first opened.

A similar enterprise on a larger scale has been conducted at Larderello, Italy, where the commercial production of power has already been realized. The California development has one advantage over the Italian wells, in that the Larderello steam contains corrosive acids, which necessitates more or less elaborate purifying processes before it can be used, whereas the California wells yield a steam whose acidity is so low that it can be used in its natural state.

THE NESTING OF BIRDS

AN elaborate electrical device on the order of a potentiometer has enabled S. Prentiss Baldwin, director of the Baldwin Bird Research Laboratory near Cleveland, Ohio, to tell exactly how much time the mother wren spends on the nest incubating her eggs and how much time she takes off.

Thirteen minutes appear to be about the average length of the time she can stick on the job, but she seldom stays off longer than six minutes. Almost always she broods her eggs all night during the nesting period, though Mr. Baldwin has a record of one flighty female wren that went out for the evening at 8:50 P. M. and did not return until 1:04 A. M. During the last three days of the incubation period the absences are much less frequent, but of about the same duration.

The wrenograph, as Mr. Baldwin has christened the instrument, is a thermoelectrical apparatus connected with the electric light circuit that registers the temperature of the nest each time bird goes on and off the eggs. A tiny wire is stretched across the eggs. It looks about like a strand of straw from the nest lining. This wire is connected with a self-recording instrument in the laboratory that registers on a chart the temperature accurate to within one degree Fahrenheit. It is probably the first time that such apparatus has been used to obtain accurate information about the life history of birds.

Two other instruments based on the same principle, but not self-recording, give more accurate nest and egg temperatures as well as the temperature of the atmosphere near the nest. This enables the bird research workers to note the temperature adjustments in the nest to the warm and cold "spells" outside during the incubation period.

Mr. Baldwin, assisted by two young ornithologists, has been engaged in making an intensive study of house wrens at his laboratory at Gates Mills. Hundreds of pairs of these vociferous songsters nest in the vicinity in specially constructed and numbered bird-houses. By banding the young wrens shortly after they are hatched, a daily record is kept of the life of the wren inhabitants of the bird boxes over a range of a hundred acres. From the data he has compiled in this new field of research, Mr. Baldwin expects to write a monograph on the life history of the house wren.

METHODS FOR CONTROLLING INSECT PESTS

THE warfare now being waged against forest insects in many parts of the world by means of airplanes that swoop over the trees scattering clouds of poison dust in their wake received a dramatic justification in Czecho-Slovakia recently, according to Dr. L. O. Howard, of the U. S. Department of Agriculture.

During his recent European tour Dr. Howard was shown a tract of spruce woods in Czecho-Slovakia. This forest was divided into three parts, one of which was owned by the government, one by a wealthy nobleman and the third by a neighboring city. When it was proposed to dust the forest from an airplane, to check the ravages of the destructive nun moth, the government and the owner of the private estate agreed to assume their share of the cost, but the municipality refused to spend the money. The aviator, therefore, dusted the portions of the forest for which protection had been provided, and left the municipal forest untreated.

During the past season the results of the divergent policies became apparent. The government and private parts of the forest were in thriving and healthy condition, whereas the municipal forest fell a victim to the false economy of the city fathers, and is now practically ruined by the moths. It will have to be cut down and sold for paper-pulp at a fraction of its value.

A new style of chemical warfare against insect pests of forest and orchard trees, which may partly or wholly replace the time-honored but expensive methods of spraying and dusting, is described by Dr. L. O. Howard, chief of the bureau of entomology of the U. S. Department of Agriculture. He saw it being tried out during his stay in Europe this summer.

The method was developed by chemical warfare technicians, who wished to turn their military talents to use in the arts of peace. The materials used resemble somewhat the "smoke candles" used to generate a smoke screen in war time, except that the fumes given off by these peace-time chemical smudges contain arsenic, the favorite poison for use against chewing insects.

In some places the arsenic smokes are set on the ground at intervals, and in others they are carried through the grove or orchard on long poles by a rank of men. In either case they fill the air with a white fog, which takes about an hour to settle. At the end of that time an examination of the leaves shows that they are covered with a thin deposit of arsenical residue. Results are not all in from the first experiments, but if the new method is effective against the insects its cheapness and quickness of operation will be strong arguments in favor of its general adoption.

THE DETERMINATION OF SEX IN INSECTS

A NEW angle in the already complicated puzzle of the cause of sex in animals has been uncovered by the researches of three workers in the U. S. Department of Agriculture, Dr. N. A. Cobb, Dr. G. Steiner and Dr. J. R. Christie. Stated roughly, they have found that crowded quarters, possibly complicated by short rations, tend to produce males, while more room and better living conditions generally tend to produce females, in certain parasitic hairworms that infest the bodies of insects.

Their discovery was the result of an effort to play the old game of the fighting entomologist, turning one small creature against another in man's unending warfare on the devouring hosts that threaten his crops. In the present instance they were trying to find how many eggs of the hairworms a grasshopper would have to eat on his natural diet of leaves, to become so heavily infested that he would die without descendants. An average of less than fifty was required. A few less and the hopper lived, but could produce no offspring.

This in itself was an interesting discovery in the physiology of sex, but a more startling fact was learned about the sex reactions of the worms themselves.

To begin with it was found that unmated female hairworms laid eggs which hatched in perfectly normal fashion, but that all the young from these fatherless eggs were females.

But when these unfertilized eggs were fed to grasshoppers in excessive numbers, the worms that hatched from them were all males. When only a few eggs were administered to the victim hoppers, they hatched out females. Intermediate numbers turned out mixed batches of males and females, the proportion of males bearing a fairly constant relation to the number of eggs swallowed by the luckless grasshoppers.

Results similar to those observed on grasshoppers were obtained both in the laboratory and in the field with ants, midgets, tea-bugs and other insects and their special genera of hairworms.

Dr. Cobb and his associates suggest that inasmuch as grasshoppers are very abundant and their hairworm parasites even more so, good opportunities for further research into the causes and possible control of sex are offered by this material.

BARRO COLORADO ISLAND

DR. FRANK CHAPMAN, of the American Museum of Natural History, said recently in reporting the activities of the station for the study of wild life at Barro Colorado Island in Gatun Lake, that it is the only place within the jurisdiction of the United States where the continental flora and fauna characteristic of the American continents in the tropics can be studied within the jurisdiction of the United States. Since all the rest of our tropical possessions are islands, having their own characteristic types of animals, Barro Colorado presents special advantages to scientists interested in the tropical wild life of the continent.

The island, which is really a headland of the mainland cut off by the backing up of waters reserved for the locks of the canal, is teeming with birds and animals of the most diverse forms. "On a single morning," said Dr. Chapman, "I observed passing before my door any number of coati (a small animal about the size of a raccoon), a little flock of peccaries, a procession of howling monkeys and the Duke and Duchess of York."

As a result of his observations on the island, Dr. Chapman has reached the conclusion that the turkey buzzard's unerring instinct for locating carrion is due to a phenomenally keen sense of smell as much as to the sense of sight.

Careful observations of a colony in the treetops revealed the fact that the female Baltimore orioles build the long pendulous nests quite unassisted and vie with each other for the favors of the polygamous males. Only seven of the latter were counted in a colony of 42 females.

A tiny humming bird, nesting in the same neighborhood with the orioles, was discovered to be dominating the whole tree.

ITEMS

CLIMBING Africa's highest mountain was all in the day's work to two explorers of the Bureau of Plant Industry, U. S. Department of Agriculture, according to reports received outlining the achievements of L. W. Kephart, associate agronomist, and R. L. Piemeisel, associate physiologist of the bureau. Although equipped only for collecting plants, seeds and soil samples, the explorers last month conquered Mount Kilimanjaro's more than 19,000 feet in the time usually required by expert mountain climbers fully equipped for the purpose. The mountain is a huge volcanic cone. It has two peaks, called Mawenzi and Kibo, Mawenzi being the older of the two and Kibo the higher by over 2,000 feet. Ice-capped Kibo is shaped like a huge dome, is covered with glaciers and has a crater in the center of its top. In ascending Kibo, the explorers were in considerable danger, particularly during the last three quarters of a mile of the climb which was over treacherously loose sand and gravel. After reaching Gilman Point, which is usually considered the top of Kibo, but which is about 100 feet below the actual summit of the ice-cap, known as Kaiser Wilhelm Spitze, the men returned to Moshi, Africa, with a large number of plant specimens and photographs.

A NEW royal burial chamber, from the Bronze Age, has been found by Swedish archeologists at Dendra, in Greece, where last year sensational discoveries were made. A report by Professor Axel W. Persson says that the new excavations have revealed a house carved out of the rock, over 30 feet long, 15 feet wide, with a peaked roof. Articles so far recovered from the royal tomb include a lamp 18 inches high, and two smaller lamps of a kind of stone found in Crete, showing early trade relations between Greece and that island. Three large alabaster vases and several carved placques evidently used on a sacrificial altar were also removed from the chamber. A depression in the floor was found filled with bronze objects, including seven goblets, four lamps, a drinking horn, two razors, a sword with ivory hilt, and four mirrors.