SCIENCE NEWS

Science Service, Washington, D. C.

A NEW CYCLE OF SUNSPOTS

THE spottedness of the sun is at a low ebb. The old cycle of sunspots has nearly run its course. Any day now Mount Wilson Observatory astronomers would not be greatly surprised to see on the sun's face the first of a new family of spots, the leader in a new cycle of spots that will last nearly eleven years.

The sun continued to be nearly inactive in July and August, with only five spots, all belonging to the waning cycle. In August the number of groups was lowest since 1923 when the last minimum in sunspots occurred. In September there was a slight increase in the number of spots, but this was due, Dr. Seth B. Nicholson, Mount Wilson astronomer, suggests, to a secondary and short-period fluctuation in the sun's spottedness, not to the beginning of another of the long cycles such as have been traced for centuries past in astronomical records and in natural phenomena such as tree rings.

Dr. Nicholson explained that the low level of solar activity may continue for several months and may even extend into 1934. The time between sunspot minima has been about 10¼ years and if the waning cycle is of that length, the exact time of minimum should be this month or next. The astronomers can not generally tell just when is the real turning point until some months after it occurs.

Sunspots are gigantic disturbances in the luminous layer or photosphere of the sun. The dark central part or umbra of spots varies in diameter from 500 miles to some 50,000 miles. The earth could be lost in the swirl of the larger spots. Sometimes the large sunspots can be seen with the unaided eyes when the sun is dimmed in setting or when a shade glass is used in viewing it.

The German astronomer, Schwabe, in 1843, first discovered that the number of spots varies greatly in different years and shows an approximately regular periodicity of about eleven years.

Dr. George E. Hale, now director emeritus of Mount Wilson Observatory, discovered that when the sunspots appear in pairs the leading spot is opposite in magnetic polarity from the following spot. The spots in the northern hemisphere of the sun are also opposite in sign from the analogous spots in the southern hemisphere. He also found that the sun is a giant magnet much like the earth in this respect.

At the beginning of a new sunspot cycle, the spots appear in high latitudes and the magnetic polarity characteristic of each hemisphere is reversed, and in this way astronomers now know that a new cycle is about to begin. Dr. Nicholson explains that the appearance of a new cycle spot will not mean that the exact time of sunspot minimum has arrived as the first spots of a new cycle often appear a month or two before the minimum.

Nearly every sort of earthly phenomena from war, birth rates and crop failures, to magnetic storms and auroras, have been linked to sunspots by scientific enthusiasts. There is good observational evidence that sunspots and changes in the magnetism of the earth are related. Astronomers report that the sunspot minimum now about due will have no real major effect on earthly conditions.

YELLOW SODIUM VAPOR LIGHT

FOR revealing the detail of small colorless objects, the yellow single-color light from sodium vapor is definitely and significantly superior to the ordinary light from incandescent tungsten filament lamps such as are used in every-day lighting.

At the recent meeting of the Optical Society of America, Drs. M. Luckiesh and Frank K. Moss, of the General Electric Company Lighting Research Laboratory at Cleveland, reported an appraisal of the visual effectiveness of the new sodium vapor light, about to come into specialized commercial use, as compared with the familiar tungsten filament light.

The advantage of one illuminant over the other depends upon the purpose for which the light is used, the investigators concluded. In addition to revealing details better, the speed of retinal impression is also higher under sodium light for objects that occupy only a very small part of the field of vision.

On the average the proportion of light reflected by a large variety of colored specimens is practically the same for both illuminants, although there is wide variation in individual colors. Sodium light enhances brightness-contrast between various pairs of colors in more cases than tungsten light does, but there are many exceptions.

The yellow sodium light often plays strange tricks upon eyes that are accustomed to white light, but measurements of nervous muscular tension as a result of reading gave in the reported experiments no indication of a difference in the behavior of the human seeing-machine under the two illuminants.

A NEW PRINCIPLE IN TELEVISION

THE iconoscope, newest advance in television, was described by its inventor, Dr. V. K. Zworykin, of the R.C.A.-Victor Company, before a recent meeting of the Franklin Institute. The device, which is the closest artificial simulation of the human eye yet devised for use in television, has no scanning disk or other moving parts. The only thing about it that moves is a thin stream of electrons, which are played back and forth across a sensitive artificial "retina" by changes in a magnetic field.

The receiving or "seeing" end of the instrument consists of a flat plate, representing the retina or sensitive inner surface of the eye. On this, as on a photographic plate, the scene to be "televised" is focused. This retinal plate contains many thousands of tiny silver globules, each made sensitive to light by chemical treatment with the element caesium. The degree to which these minute photocells will transmit an electric current is changed according to the brightness of the light or the darkness of the shadow that falls upon them.

The electric current is carried to this plate by the

stream of electrons, which has a constant electrical potential. The stream is pulled rapidly back and forth across the plate by means of a set of electro-magnets. it falls upon a bright spot, it receives a boost; if on dark one, it is cut down a little. Thus the electric rrent that leaves the retinal plate fluctuates up and wn. This fluctuating current is sent, *via* wire or radio aves, to the distant reproducing station.

At the reproducing end, the transmitting current is used to shoot out another stream of electrons, which varies in strength with the fluctuations in the current. Pulled by another set of electro-magnets, it plays rapidly back and forth across another screen, which shines when the electrons bombard it strongly, is dark when they do not. Thus the original scene is reconstructed.

BALL LIGHTNING PHENOMENA

BALL lightning, one of the least understood of the electrical phenomena of the air, seems to be connected with the clouds of dust blown before a "line squall" wind or a tornado. Such at least has been the observation of Professor J. C. Jensen, of the department of physics at Nebraska Wesleyan University, who reports in the October issue of *Physics*. One ball lightning display took place during an August thunderstorm while he was getting photographs and scientific records of ordinary lightning and the other phenomena accompanying it.

The cold air rushing ahead of the storm cloud was filled with a swirling mass of dust, he says. Brilliant lightning flashes were seen descending in rapid succession from the cloud to the earth. In the wake of one of these flashes there appeared a shapeless mass of lavender color which seemed to float slowly downwards. The mass seemed most brilliant near the ground, and gave the impression of a gigantic pyrotechnic display. Two or three glowing globular structures seemed to roll along a pair of high-voltage power lines for a hundred feet or more, then bounced down on the ground and disappeared with a loud report.

Professor Jensen's photographs showed these strange and weirdly beautiful objects plainly. Knowing the lens-angles of his cameras and the distance to the power line, he was able to calculate their size. One of them had a diameter of about 28 feet, and the other was some 42 feet across. These figures are much larger than those usually given for ball lightning.

A second ball-lightning display reported by Professor Jensen was seen during a tornado in Iowa by George Raveling, a U. S. Weather Bureau observer. As he described it: "From the sides of the boiling, dust-laden cloud a fiery stream poured out like water through a sieve, breaking into spheres of irregular shape as they descended. No streak lightning of the usual type was observed and no noise attended the fire-balls other than the usual roar of the storm."

AUTOMATIC TRAP FOR WEEVIL LARVAE

EXPLOITING an insect pest's strange taste in egg-laying places to her own undoing is the newest bit of strategy in the unending war between man and his six-legged enemies, turned to account by Dr. George N. Wolcott, of the Puerto Rico Insular Experiment Station.

One of the most numerous and troublesome of all West Indian insect pests, Dr. Wolcott says, is a large leaf-eating weevil known locally as "vaquita"—literally translated, a little cow. So common and so unpopular is the insect that Puerto Rican students have transferred the name to a much-disliked island politician.

This weevil normally lays its eggs between two leaves, or within the cleft of a split cane leaf. But entomologists who have reared "vaquita" in captivity for research purposes found that it preferred laying its eggs between two sheets of paper. Now Dr. Wolcott has made a test under field conditions, and finds that outdoors as well as in breeding cages, the beetle still prefers paper as an egg-laying place. He set up stakes bearing paired strips of paper alongside of a number of citrus seedlings, and found that the insects laid their eggs between the loose ends of these "paper flags."

The economic application of this insect's strange preference depends on the glue-like substance in which the eggs are imbedded when they are laid, which normally sticks the two sheltering leaves together.

"An exceptionally effective adhesive is required to stick together two shiny citrus leaves so that they will remain in close adherence until after the hatching of the enclosed eggs," according to Dr. Wolcott. "Such the beetles possess. It is so effective indeed that the emergence of the young grubs from hatching egg-masses is often delayed for several hours or days until a thin place in the ring of it laid around the egg-mass by the female can be found.

"When used for ovipositing between two sheets of paper, it is so much more effective than is necessary that the just-hatched grubs can not emerge, but, imprisoned within its cellophane-like ring, dry up and die. In nature, they never attempt to burrow through the leaf to escape from the egg-clusters, and under the artificial conditions of egg-clusters between paper, they do not attempt to burrow through the paper.

"Thus, once the paper flags are in place, they form an automatic trap for the eggs of the beetles, not needing to be renewed until the paper itself becomes soft and weathered. In the tropics, the traps remain effective for at least three months, using thin, tough wrapping paper."

Dr. Wolcott's studies have been reported to *The Journal of Economic Entomology*.

THE CONTROL OF WHITE PINE BLISTER RUST

PROTECTION of thousands of acres of white pine from the ravages of blister rust is one of the accomplishments of the Civilian Conservation Corps in the past few months, according to a report of the U. S. Forest Service.

With the falling of the leaves, the work for the current season is now practically ended, after extensive operations in the major white pine areas of the country.

Blister rust control was the major job of thirty-five conservation camps in northern Idaho, where vast acreages of western white pine are threatened. Seven thousand young Conservation Corps workers were dis-

tributed through the heart of the best white pine country in and adjoining the Coeur d'Alene, St. Joe and Clearwater National Forests, working on government, state and private lands.

Control work was also done in the Lake States and in the Northeast, on national, state and private forest lands, and to some extent in portions of the national forests in Pennsylvania, Virginia, West Virginia and eastern Tennessee. The work on the national forests was directed jointly by the U. S. Forest Service and the blister rust control division of the Bureau of Plant Industry.

The disease is controlled by the eradication of currant and gooseberry bushes of the genus Ribes, which form the alternate hosts for the blister rust fungus, and spread the disease to the pines. Control work was done both by hand pulling and by the use of chemicals. It was necessary to cover every foot of ground to find all the wild currant bushes.

In the northern Idaho operations each strip covered was marked by a string line and the crews working in that section this season used 40 tons of cotton twine, laying out some 56,000 miles of line. The chemical crews worked the concentrations of wild black currant in the damp stream bottoms, spraying the plants with a commercial weed killer. About 225 tons of chemical were required for the Civilian Conservation Corps forces in the northern Idaho region.

Blister rust control is hard and monotonous work. It involves constant struggling through thick brush and down timber on steep slopes in the hot sun, but, according to Forest Service officials, the crews rapidly became seasoned to the job and turned out some excellent work.

With the closing of the blister rust control work season, now that the frost will be knocking the leaves from the Ribes plants, the workers on this project are turning to tree planting, truck trail construction and other jobs on the forestry work program.

ITEMS

A NEW comet was discovered by Dr. Fred L. Whipple, of the Harvard College Observatory, shortly after midnight on Saturday, October 21. It is at present in the constellation Taurus, the Bull, a little south of the familiar compact group of stars, the Pleiades. These two constellations may be seen low in the east at about nine o'clock in the evening. The new comet is moving slowly in a southwesterly direction. Its position, in the astronomical equivalents of latitude and longitude, was right ascension three hours twenty-three minutes, declination plus nine degrees twenty-two seconds, when discovered. The new visitor to our part of the solar system is not yet visible to the naked eye.

SOUND travels fast through solid rock. How fast, Dr. L. Don Leet, of the Harvard seismograph station, has been finding out by exploding dynamite and getting the travel records on earthquake-detecting instruments at a distance. These data are of value in calculating the elasticity and compressibility of the rocks, which in turn help to make earthquake records more accurate and intelligible. Dr. Leet made his set-ups in two places, one on granite at Rockport, Massachusetts, and the other on norite, an ancient igneous rock, at Sudbury, Ontario. He found that his dynamite-engendered longitudinal earthquake waves traveled through the granite at nearly 17,000 feet a second, and through the norite at over 20,000 feet a second. This is high speed compared with approximately 1,100 feet a second, which is the velocity of sound in still air. Dr. Leet's studies are reported in the October issue of *Physics*.

THE oft-repeated and widely believed declaration that the Baltic Sea is slowly becoming a fresh-water lake is not true, Professor V. Berg, well-known oceanographer, told the Fourth Hydrological Conference of the Baltic Countries at its meeting in Leningrad. So much fresh water flows into the Baltic that if no new salt water were added, the sea would contain nothing but fresh water after 187 years, mathematical calculations have indicated. But new salt water is constantly being carried into the Baltic by the currents that sweep through its narrow entrance. The amount of salt added depends on the salinity of the North Sea, and this varies from year to year. However, even as it is, Baltic water is much less salty than the water of most large arms of the ocean. North Sea water is usually from one and one half to two times as salty as that of the Baltic. And its northern arm, the Gulf of Bothnia, lying between Sweden and Finland, with its entrance partly blocked by submarine ridges, has water even less salty than that of the Baltic.