

## SCIENCE NEWS

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## THE SEA LEVEL

SEA level isn't level in the equatorial region of the Pacific Ocean. It is two feet higher on the Australasian than it is on the American side, according to a statement made by Dr. H. U. Sverdrup, director of the Scripps Institution of Oceanography, in his address as president of the Pacific division of the American Association for the Advancement of Science.

As a result of this difference in elevation, there is a narrow, relatively swift, current flowing eastward along the equator. If it were not for the friction of water against water, it would move at a rate of about seven knots. Its actual rate is one or two knots. This, however, is as rapid as the current in a great many inland rivers.

The pile-up of water against the Pacific's western shore results from the action of the trade winds, the speaker stated. Steady winds blowing across the water from the northeast in the northern hemisphere's lower latitudes and corresponding winds from the southeast in the southern hemisphere keep two great currents moving steadily westward in the tropical Pacific. Separating them, in the equatorial belt of calms, is the narrow return current, flowing like a river.

This narrow west-to-east equatorial current, however, accounts for only a small part of the water returned across the Pacific. Much larger streams flow away from the equator, to make the return trip at higher latitudes. In the northern hemisphere, the principal returning mass is borne in the Kuroshio or Japan current, which sweeps along the Aleutian chain and turns southward along the North American coast. It is estimated that this current carries more than 5,000 times as much water as the Mississippi.

As described by Dr. Sverdrup, the Pacific is a cold monster with a relatively thin, warm skin. Surface temperatures are quite high, reaching as much as 75 degrees Fahrenheit. But this warm surface layer extends downward only a few hundred feet at most. The great bulk of Pacific Ocean water, in the depths, is always cold, most of it only a few degrees above freezing-point.

## A NEW SYSTEM FOR MOTION PICTURE PHOTOGRAPHY

DISTANT and near-by objects or actors may be photographed equally sharply at the same time in motion pictures or television with a new method. The invention has been granted U. S. Patents 2,244,687 and 2,244,688, assigned to I-R System, Inc., of New York City.

Photographers know that when a camera lens is focused on a subject close to the camera, objects far away are out of focus. If the distant object is made sharp, the near ones are blurred. By making the diaphragm opening of the lens small, "depth of focus" may be increased, but this requires considerably more light.

The new system, invented by Dr. Alfred N. Goldsmith, television and sound motion picture engineer, Harry R. Menefee, William Mayer and Fritz Kastlan, achieves the

same effect with any kind of lens, working at full opening. It can be used, the patent states, in motion picture photography or television wherever lighting conditions are subject to control. It is not suitable for out-of-door photography.

The set is illuminated by several groups of lights. One, for instance, may light the foreground, another the middle distance and another the background. These are flashed on and off consecutively, so only one section receives light at any particular instant. During exposure of each frame of motion picture film, however, the set is completely lighted.

Ordinary focusing is accomplished by moving the lens in and out. Near the film, distant objects are focused, and to make near-by objects sharp, it has to be pulled out. While the lights are flashing, the lens might move in step with them. It could be arranged to focus the foreground when that part was lighted, then the middle distance when the light was shining there, and then the background. The patent suggests such a movement of the lens in synchronism with the lights as a possibility, though it has disadvantages. Sound films are taken at 24 pictures a second. Therefore, if the set had three sections, the lens, moved three times for each picture, would have to be started and stopped 72 times each second.

It is also possible to change the focus of a fixed lens by inserting flat pieces of glass of different thicknesses behind it. The patent refers to such a device as a differential focuser, or a "diffo." Diffos of different thicknesses are mounted on a disk, which turns in the path between the lens and film, thus changing the focus without any vibrating movement. This disk is turned by a synchronous motor, which also controls the changes of illumination. Other kinds of diffos can be used, it is said, based on differences in color, or on the polarization of light.

In the Orson Welles feature picture, "Citizen Kane," many scenes show near-by and distant characters in focus, an effect which has been used very dramatically and has caused much favorable comment. This, however, was not done with the new method, but by the use of short focus lenses, very small diaphragm openings and extremely bright lighting.—JAMES STOKLEY.

## OLD PHOTOGRAPHS SHOWING RATE OF TREE GROWTH

OLD photographs can be of value to botanists and foresters in studying the rate of new growth that heals up old scars left in the forests by fires long ago. Such a series, taken at intervals from 1872 to the present time, has been studied by Ronald L. Ives, of Fort Worth, Kansas, as a by-product of several geological field trips into the high country of Colorado. One particular area was burned over during the Indian troubles of 1862-63. In a few places the soil itself was burned away, down to bedrock.

In 1872 came the pioneer photographer, William H. Jackson, accompanying the Hayden geological expedition

as official picture-maker. His photographs, still extant, show the dead trees bare and barkless, with grass growing among their trunks.

The next series of photographs was taken in 1878. The grass was then being crowded out by a dense growth of mixed shrubs. After that there was a lapse of 20 years during which there is no existing photographic record. For the decade 1898-1908, however, there are abundant photographic records, which show the shrubs yielding place to the next stage in succession, an aspen forest. Maximum density of the aspen was reached in 1915.

As early as 1900 new conifer growth was showing itself here and there, and by 1920 the evergreens were beginning to overtop the aspens in many locations. Photographs taken about 1920 show the evergreens beginning to assert dominance. In some locations they covered 40 per cent. of the area. By 1935, the evergreen percentage had risen to 65, and in 1940 dominance was complete, with only scattered patches of aspen here and there, where growing conditions had not been favorable for the conifers.

Mr. Ives figures a replacement schedule for the region as follows: Maximum brush growth, 25 years; maximum aspen, 40 years; aspen largely eliminated, 65 years; complete elimination of fire scar, 300 years or more.

### DIET OF FOXES AND FISH

ALLOWED to over-indulge in a diet of raw fish, both foxes and fish were observed to develop spontaneously a disease identical with the alcoholic disease caused in man by lack of thiamin (vitamin  $B_1$ ), was reported at the meeting of the American Neurological Association at Atlantic City. Dr. Leo Alexander, of Boston, and his associates, Drs. Robert G. Green, C. A. Evans and Louis E. Wolf, stated that both the foxes and the fish can be cured of their trouble by the vitamin.

The human disease, known as Wernicke's disease, has been produced experimentally in animals by Dr. Alexander and other colleagues when they fed them a diet deficient in vitamin  $B_1$ , but over-abundant in other vitamins, particularly riboflavin, nicotinic acid or vitamins A and D. The excess of the other vitamins, they concluded, had so raised the vitamin  $B_1$  needs that the resulting deficiency was greater than it would have been otherwise.

What happens to the blood chemistry in thiamin deficiency or Wernicke's disease, was described to the meeting by another group: Drs. Herman Wortis, Norman Jolliffe, Martin H. Stein and Ernest Bueding. In both these conditions, the blood's pyruvic acid is invariably increased.

When normal individuals are fed glucose, the blood pyruvate is increased, but returns to normal within three hours. In Wernicke's disease this increase is very high and the return to normal is delayed. Feeding thiamin to the patient brings the blood chemistry back toward normal. Although Wernicke's disease is always associated with lack of thiamin, these observations indicate that it is also due to lack of other nutritive essentials.—MARJORIE VAN DE WATER.

### THE INTRODUCTION OF FOREIGN PLANTS

FLORIDA is trying its hand at growing some of the foreign specialty imports that war conditions have cut off.

Crops which the State Experiment Station at Gainesville, Fla., advises as "worthy of trial plantings," though not yet established certainly enough for extensive production, include these:

French endive, formerly imported from France and Belgium. The Everglades area is trying this vegetable. It is believed likely to be successful.

Tomato paste, formerly imported in quantity from Italy, and made from special, small varieties of tomatoes. "Paste" types of tomatoes are being investigated by several Florida growers.

Sage for seasoning, formerly brought in quantity from Greece. Various sections of Florida are trying this.

Paprika from various Balkan countries. Planted in trials at the Experiment Station farm, paprika gave excellent results. Florida had not yet produced this plant commercially, but Louisiana, South Carolina and California have.

Spinach seed from Holland and Denmark. One seed grower in Florida is already raising 100 acres of spinach seed.

Mustard and turnip seed from Japan. These, it is believed, can be grown in Florida.

Teasel burrs from France. Considered especially good for combing wool in American mills, the French type of teasel is to be planted on the Experiment Station Farm at Gainesville for trial.

### FARM WEALTH IN WEEDS AND WILD PLANTS

FARMERS of the future may win wealth from wild plants that are now regarded only as weeds, was suggested by Wheeler McMillen, president of the National Farm Chemurgic Conference, in an address at Nashville, Tenn., before the first annual Southern Chemurgic Conference.

Reminding his hearers that there are about 250,000 known species of plants in the world, of which approximately 15,000 are native to the United States, the speaker called attention to the fact that the ones under cultivation number only a few scores, and those are mainly the same as our prehistoric ancestors chose because they could be used just as nature produced them. In modern times great changes have been made in cultivated plants by scientific breeding, yet we have not thought to pick up hitherto uncultivated plants and develop their good qualities in the same way. He urged the appropriation of funds for research in this direction, to be conducted at state experiment stations.

Mr. McMillen also called for a renewed drive toward greater national self-sufficiency, in the interests of defense. Introducing new crops with this in view will also benefit the farmer, he pointed out, because it will then be possible to decrease the acreage now devoted to production of burdensome surpluses.

"By producing fewer of the things of which we have too much, and more of the things of which we have not

enough, a more stable economy can be obtained," he said. "A stable economy with a high rate of productivity makes for domestic prosperity."

### UNFARMABLE LAND

FELLING forests to create new farms, traditional practice in America since earliest time, isn't always the right thing to do, according to Dr. J. Alfred Hall, of the U. S. Forest Service, speaking at the Chemurgic Conference. Rather, the process should be reversed on much land which is now being unprofitably plowed year after year, with the farmers only sinking themselves and their families deeper and deeper into poverty.

Dr. Hall took the states of Tennessee and Kentucky as examples for his thesis. When the first settlers came, both states were practically continuous forest. The newcomers ravaged the woods with fire and ax, with no thought for the timber values but only for the soil they could plow and plant after the trees had been cleared.

The result, he said, is that in both states the cut of high-grade lumber is diminishing, with the proportion of lower grade lumber increasing. Men who used to have jobs in sawmills and other wood-using industries have been thrown out of work. Where oak, hickory, chestnut and gumwood used to be a source of pride as well as revenue, there is now a shortage so severe that hardwood lumber is even having to be brought in from the outside.

Dr. Hall demanded action, and action now: "Lands that ought not be farmed, and on which the forest has been so degraded that private capital will not carry the load of investment necessary to their regeneration, ought to be in public ownership. Federal, state, county or municipal—why quibble? Get it done. Protect and preserve the forests in order that people may work and produce goods. These things are not undemocratic. They are the essence of democracy: the applied will of the people that they may live happy, prosperous, dignified lives on a stable resource base. Dictatorships grow and thrive on ruined lands and ruined people; democracies live where people have jobs and enough to eat. We can run this country so that democracy need never be threatened, but sometimes I wonder if we have done so. The people themselves must will to do the job."

### ITEMS

RESULTS obtained with a new type of instrument for observing the fiery clouds of prominences in the sun's atmosphere were announced recently by Dr. Edison Pettit, of the Mount Wilson Observatory, at a meeting of the Astronomical Society of the Pacific. When attached to a motion picture camera prominences have been photographed moving with velocities exceeding 180,000 miles per hour. Prominences are visible to the naked eye only for a few minutes during a total eclipse of the sun. Otherwise they are visible only with expensive apparatus or simpler devices used at high altitudes. The new instrument, which makes use of polaroid and has no moving parts, can be used with a small telescope at any elevation. Dr. Pettit stated that "with the new instrument scarlet flames stood out in the atmosphere of the sun with remarkable sharpness, resembling a prairie fire."

THERE need be no fear of lightning when riding in an automobile with a modern steel body and top. Proof of this was given at the Westinghouse high voltage laboratory at Trafford, Pa., when Dr. Gilbert D. McCann sat in such a car while being bombarded with 3,000,000 volts of artificial lightning. "Although the laboratory lightning stroke hit the car just six inches above my head," said Dr. McCann, "I was safe from injury because modern steel car bodies are effective shields against lightning." Even the rubber tires produce no difficulty, for the lightning jumps over them from the metal wheel to the ground. In an actual storm, with the road and tires wet, the conduction of the current from the car in this way would be aided. Dr. McCann said also that the gasoline tank presents no serious hazard. The protected position of the tank is one that lightning can hardly reach. It seeks its nearest target, usually the top of the car.

A NEW disease of cherry trees, which causes a loss of green color along the leaf veins and a general mottling of leaf surfaces, has been detected by S. M. Zeller and A. W. Evans, of the Oregon Agricultural Experiment Station at Corvallis. They report their findings in the current issue of *Phytopathology*. Prunes as well as cherries, both important commercial crops in the Pacific Northwest, are attacked. The disease has also been found on ornamental flowering cherry trees, on Italian prunes and on several species of wild cherry. The cause has been identified as a virus, which can be transmitted along with grafts from diseased stocks.

RESEARCHES on bacteria that will enable more accurate classification into species have been reported by Dr. N. R. Smith, of the U. S. Department of Agriculture. Bacteria are exceedingly difficult to classify by the ordinary methods applied to other living organisms, because they are so exceedingly small and look so much alike. Dr. Smith and his associates are making use of hitherto neglected aspects of bacterial behavior and physiology in determining differences between seemingly similar forms. By culturing them under unfavorable conditions, they obtain abnormal growths, and they have found that sometimes abnormalities will disclose specific relationships when normal growth does not. Bacteriophages have also been found useful in this work of classification, for some strains are resistant to a given bacteriophage that readily kills other, similar-appearing bacteria.

IOANA, a wilt-resistant golden hybrid sweet corn, developed by E. S. Haber, research horticulturist at Iowa State College, has consistently outyielded ordinary Golden Bantam from 60 to 80 per cent., often actually doubling the weight of ears per acre. In the last three years it has set similar yield records as far east as Maryland. The hybrid is resistant to bacterial wilt, a disease which often causes great damage to Golden Bantam and other susceptible varieties. It is also resistant to smut. The new variety can be grown from coast to coast in the northern part of the United States, and has been grown successfully in Texas, Louisiana and some of the other southern states.