SCIENCE NEWS

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GREEN LEAVES AND SUNSHINE

WE all live on sunlight—men and beasts and all living things in the world. To be sure, it is served up to us as bread and potatoes and cucumbers and onions and other things to eat, but these are mere carriers for the energy of the insubstantial shining rays that were captured and locked up in sugar and starch molecules by the strange green stuff called chlorophyll in the leaves of plants. In a lecture at the Manhattan Trade School Dr. C. Stuart Gager, director of the Brooklyn Botanic Garden, explained the magic of the chemical laboratories in the leaves, which on every sunny summer day take a small fraction of the gases in the air and weave them with water to form food.

The effort of the fabulous philosophers in "Gulliver's Travels" to extract sunshine from cucumbers, Dr. Gager remarked in passing, does not now appear so foolish as it did when Swift wrote his famous satires; there really is sunshine in cucumbers. The cucumber leaves have put it there.

No part of a plant touches human life at so many points, nor so vitally concerns our daily activities as leaves, Dr. Gager remarked. For the food that we eat, whether vegetable or animal; for the clothing we wear, whether cotton, woolen, or silk; for the frame dwellings in which some of us live; and for the wood, coal, gas and electricity by which our buildings are heated and lighted, we are dependent, either directly or indirectly, upon certain vital processes that take place, almost exclusively, within the tissues of green leaves. Sometimes we eat leaves directly, such as lettuce and cabbage, or spinach and other greens; or indirectly, as in the form of bread and potatoes and other vegetables. As every one knows, most of the meat that we eat, as well as our butter and milk, are derived from animals that live wholly or largely on leaves. Every particle of wood and of coal in the world was formerly inside of a green leaf; and the heat and light that give comfort and cheer to our homes represent the sunlight and sun's heat of a previous geological age, captured by green leaves of trees and stored up in their now fossil trunks in our coal mines.

THE COMPOSITION OF MILK

THE ancestral strain that unites all the higher animals has been demonstrated through their milk no less than through their blood chemistry. Researches on the lowest of the mammals, just finished at the University of Adelaide by Professor H. R. Marston, have completed the data available on the composition of milk throughout the range of animals that nurse their young on this fluid.

The two chemical compounds most characteristic of all kinds of milk are milk sugar, or lactose, and casein, the latter the proteid substance that forms the basis of cheese. Both these compounds are unique, being found nowhere else in the animal or vegetable kingdoms. Other proteins of milk are likewise distinct but they are not so profoundly different from the proteins of other sources as is casein.

Here is striking evidence of a father and son—or perhaps better, a mother and daughter—relationship among all the hosts of mammals. This is the one thing in common possessed by all the higher animals. As we pass down from man through the apes, dog, tiger, cow, whale, bat, rat and armadillo to the duck-bill, we arrive at an animal that is obviously closely related to the reptiles, for it hatches its young from eggs and has reptile-like jaws.

"The Echidna," says Professor Marston, "transfers the egg to its ventral pouch, which in the breeding season becomes a functional incubatorium, where it very soon hatches, and the embryo obtains its nourishment by nuzzling the milk secreted from the many openings of the mammary ducts, which are scattered over the surface of the breast in the region of the pouch. There is no development of a definite teat."

Professor Marston found the milk of the Echidna exceptionally high in fat, 19.6 per cent. being present. Among milks known at present this is equalled only by that of the reindeer and the whale. The monotreme milk had three times the protein content of cow's milk.

Thus from the simplest mammal to the most exalted we find milk; and this milk always contains lactose and casein, and lactose and casein are found nowhere else. They constitute a continuous thread running up and down through the mammalian world. And they are a strong part of the evidence that mammals evolved one from the other. In the evolving process milk persisted because it proved to be a most desirable means of rearing the young. It needed no improvement, therefore it persisted, even through all the branches and twigs of the great mammalian tree, as it grew and developed from the primitive seedling.

GRASSHOPPERS' PLAGUES

TOASTED grasshoppers! Will this delicacy become of necessity the main part of the daily menu of people from southern Argentina to northern Mexico?

For the past four years, tropical migratory grasshoppers have descended in tremendous hordes upon this region, bearing destruction with them to all vegetation in places where they alight. They do their work as thoroughly as enemy invaders that burn the fields behind them. A horde of these grasshoppers will consume practically everything edible in sight in ten minutes. They come in such swarms that they actually obscure the sun for seconds at a time. In addition to their devastating work upon vegetation they often prevent transportation, making the rails dangerously slippery with their body fat.

So serious have been the recent plagues that archeologists are beginning to realize that here lies a possible explanation of the migrations of ancient American civi-

lizations. Grasshopper plagues like the recent ones might easily have caused the abandonment of magnificent Mayan cities for new places unmolested by these food-consuming pests. Or perhaps the Mayas ate the grasshoppers, as it is known that inhabitants of certain parts of Africa and Asia do.

But before the culinary art of modern peoples of the infested regions is required to include the making of tasty dishes of grasshoppers, it is hoped that some method will be devised to prevent the return of such plagues.

The state of Vera Cruz in Mexico has enlisted the services of Dr. Carlos C. Hoffman to discover the source of these dangerous grasshopper migrations. He believes that they probably originate in the zone about Lake Peten in Guatemala. Cooperation of neighboring republics in further investigation of this region would, Dr. Hoffman feels, be of great benefit. Once the breeding places of these grasshoppers are discovered, the pest could, perhaps, be stopped at its source.

The increase of natural enemies of these grasshoppers is another hopeful sign, says W. R. Walton, of the U. S. Bureau of Entomology. There is a parasitic swift-flying two-winged fly which overtakes the grasshoppers in flight and deposits maggots on their backs. The maggots at once begin eating into the bodies of the grasshoppers. Due to the increase of these parasitic flies a waning in the severity of grasshopper plagues can be expected soon, Mr. Walton says. Another natural check of the pest is found in some beetles native to the infested region which lay their eggs in the grasshopper egg nests. The parasites hatch first and feed upon the grasshopper eggs.

INSECTS IN FIGHT ON CACTUS PEST

Insects are being used, apparently with great success, to save the great livestock ranges of Australia from the ravages of the prickly pear. A report of the sixth year of investigation has recently reached this country and indicates that this extraordinary experiment is about to be crowned with complete success, according to Dr. L. O. Howard, chief of the U. S. Bureau of Entomology.

The beneficial insects are a cochineal or mealy bug, a red spider, a moth larva from South America and another from Texas, and a sucking bug. In many cases the insects have succeeded in reducing the spiny plants to a state of utter collapse.

The fly in the ointment is the presence of a native ladybird beetle, the natural enemy of the cochineal insect. The danger from the ladybird beetle is at this time slight, however, according to E. Mortensen, an American assistant to the Australian Government. The ladybird beetle is feeding upon grass-eating mealy bugs and as yet has shown no interest in the mealy bugs that are being used against the prickly pear. By the time the ladybird beetle turns its attention to these helpful mealy bugs, it is hoped that the danger from the prickly pear will be over.

This is only the second experiment of the kind ever tried. The first one was carried on in Hawaii against the Lantana weed. It was not a complete success, since one of the insects introduced to attack the Lantana weed has recently attacked a valuable related plant. The prickly pear experiment is safe, Dr. Howard said, because there is no cultivated plant related to this cactus that would be endangered by introduced insects.

IMPROVEMENTS IN TREE CROPS

Improved breeds of trees, to do for American forests what improved breeds of wheat and corn and potatoes have done for American farms, are the objects of search by Professor O. L. Inman, of the department of biology of Antioch College. He has laid out a program of research for a number of important tree species that includes the following points:

For oaks he wants, besides resistance to disease, a rapidly growing oak with wood of as good quality as the white oak, an increase in the yield of acorns and the elimination of much of the tannin from the acorns of some otherwise good species, long trunks without side branches or forking branches even though the oak tree is grown in an open wood lot.

For walnuts the desired improvements are a rapidly walnut with lumber qualities like our common northern black walnut, together with rapidly growing black walnut with lumber qualities like our common northern black walnut and nuts with shells approaching those of the English walnut.

For aspens, poplar and spruces, Professor Inman chiefly desires rapidly growing trees, since the chief object is to obtain paper pulp from these. The means by which he hopes to obtain these improvements are, first, selection of the best seed from the best individual trees of a species, to be followed by the selection of the seedlings grown from this stock, and second, crossing varieties or species or individuals of a variety which show one or more of the desired improvements to a greater degree than their relatives.

ORIGIN OF THE MAYA CALENDAR

The simple method by which ancient wise men of tropical America observed the sun and were able to tell their people when to plant crops has been discovered by Mrs. Zelia Nuttall, a well-known authority on Mexican archeology. Mrs. Nuttall, who has spent over thirty years studying the antiquities and early history of ancient Mexico, is now in this city, where she explained her theory to the American Anthropological Association. On their arrival in the New World the Spaniards were surprised to find that the natives had an accurate knowledge of the length of the solar year. This remarkable fact has hitherto been explained as an indication that early astronomer priests, even in primitive communities, must have made careful observations of the sun and must have gradually worked out a system of calculating and recording the average number of days between the longest and shortest days in the year. Mrs. Nuttall found that such difficult, complicated and sustained mental efforts were not necessary nor probable.

"All the centers of ancient American culture," she explains, "are situated within the tropics. In this zone the sun passes twice a year through the zenith,

the result being that twice a year at noon there occurred the momentary striking phenomenon of all vertical objects casting no shadow.

"Archeological and documentary evidence establish beyond doubt that the Mexican, Maya, Peruvians, Ecuadorians and others inhabiting the tropical zone observed the periodical strange and momentary disappearance of shadows and interpreted it as 'a descent of the Sun-God.'

"This 'descent of the god' was of outstanding importance to the primitive farmers, because it was always accompanied by rains, caused by the heat of the vertical solar rays. The priests or wise men who observed the 'descent of the god' could thus safely assure the people that the time was ready for them to sow the seeds of maize and other food plants."

The first means by which the solar phenomenon could have been noted were plain vertical posts or upright stones. But later, Mrs. Nuttall believes, the people began to feel that more worthy places of rest should be provided for the descending Sun-God. Sun-pillars, stelae, stone seats, altars, towers, and even shrines and temples were set up to celebrate this great and mysterious phenomenon, and in time an elaborate ceremonial was developed, which included the offering of blood and sacrifice of human victims.

In the light of this discovery, ancient American religions, art and calendars take on new aspects. The Sun-God, who is so widely depicted in the Mexican Codices and bas-reliefs and on Maya temples with his heels in the air and his head far below them, has generally been termed "the diving god." According to Mrs. Nuttall's interpretation of these figures, the god is descending through the air and the feather-like decorations on his arms are symbolical like the wings with which angels are represented in Christian art. Many of the carved and painted representations of the Sun-God in the form of a human being, bird or jaguar, show him accompanied by plumed serpents which symbolize the rains from heaven associated with him.

HEALTH SURVEYS BY THE MILBANK MEMORIAL FUND

THE directors of the Milbank Memorial Fund of New York have set out deliberately to increase the life span of the residents in three typical districts of New York state. They have determined to enlist the cooperation of the best professional experts and to make demonstrations of what can now be done to reduce sickness and to extend the period of healthy life in the average American community.

Work has been under way for more than three years in Cattaraugus County and in Syracuse, two of the centers selected for the New York health demonstration. One of these districts is typically rural; the other a medium-sized city.

Inauguration of the third enterprise in the Bellevue and Yorkville neighborhoods of New York City was announced about a year ago. This district is bounded by Fourteenth and Sixty-fourth Streets, the East River and Fourth Avenue. From Forty-second to Fifty-ninth Streets it extends as far west as Sixth Avenue. This means that it has within it the large slice of fashionable New York that centers around Park Avenue and the fifties, as well as some very poor districts, and some that are peopled by the merely comfortable social groups. Its population is 214,000.

Each of the experiments is conducted under the auspices of the local health officers, and in accordance with the laws and rules and regulations of the New York State Health Department, and of each locality. What the fund does is to afford expert consultants, and temporarily to provide the money for services which would otherwise not be obtainable in the locality.

That American citizens will themselves pay bills shown necessary to maintain improved public health standards has already been demonstrated, in part, in Cattaraugus County and in Syracuse. In the latter city, the Board of Estimate just recently voted to take over $51,970.00 for additional health services set up and temporarily provided through these demonstrations. In the former locality, Cattaraugus County, the Board of Supervisors agreed to take over $56,000 of such expenditures for public health work, increasing by 250 per cent. any previous appropriation of public funds for this purpose.

The results of this longer life campaign in these three typical districts will be watched with interest by members of medical and lay professions alike.

ITEMS

AN earthquake that shook the Pacific Ocean near the Kurile Islands at 8:35 p. m. Eastern Standard Time, on Tuesday, February 15, was entirely separate from the devastating shocks that wrought so much damage in the Balkans, said Commander N. H. Heck in charge of the earthquake investigations of the U. S. Coast and Geodetic Survey here. After studying reports from seismograph stations gathered by Science Service, he stated that the location of the epicenter, or point of greatest motion of the quake, was at latitude 46 degrees North and longitude 154 degrees East, at a point in a great ocean trough about 200 miles south of Kamchatka. "This earthquake and the ones in the Balkans afford an interesting comparison. The one on the Pacific Ocean was felt throughout the world on seismographs yet did no damage, while the Balkan quakes were not severe enough to give more than a faint record on American seismographs. The Balkan earthquakes were very localized, yet they happened to coincide with a well-settled region, and so much damage was done."

EVIDENCE that protection of birds has progressed much further in the United States than in Japan is furnished by a report recently received at Washington, D. C., which states in the latter country commercial hunters are butchering song birds wholesale to offer in the food markets. Because of their almost direct north-and-south distribution, the islands of the Japanese archipelago form a favorite migration route for thousands of small birds, and the traveling flocks have been waylaid with lures and nets.