SCIENCE NEWS

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THE MILKY WAY

EARLIER indications that a tremendous, low-density globe of scattered stars surrounds our own disk-shaped galaxy, the Milky Way, are being confirmed at Harvard Observatory, according to a report given by Dr. Harlow Shapley to the meeting of the International Astronomical Union in Stockholm.

According to preliminary calculations, this great globe has a diameter of the order of 80,000 light years, stretching out 40,000 light years both above and below the Milky Way disk. The diameter of this disk, which contains nearly all the stars of the system, is of the order of 100,000 light years.

The astronomical yard-stick used for these investigations, Dr. Shapley explained, was the magnitude, or brightness, of more than 2,000 cluster-type Cepheid variable stars which have been studied in all parts of the Milky Way. Since all stars of this type have the same candlepower—about 200 times that of the sun—their brightness as seen from the earth is an excellent measure of their distance. Harvard astronomers have found measurable numbers of these flickering stars as far out as 40,000 light years from the earth, Dr. Shapley said. These are apparently close to the outer edge of the Milky Way globe. The spatial distribution of the stars, he added, is such that there is no doubt that these distant stars are members of the Milky Way system. Most of the 2,000 stars studied in the research were discovered for the first time on Harvard plates during the course of the investigation.

Announcement of this new cosmic information was made by Dr. Shapley during a report before the Astronomical Union on Harvard's work in investigating the distribution of galaxies and the adsorption of light in the Milky Way. He also outlined one of the observatory's current projects—an attempt to determine the dimensions of the Milky Way system by comparative studies of variable stars and external galaxies seen through the "window" in the southern Milky Way. Already 400 new variable stars have been found in this area, and a concurrent study has been made of the distribution and brightness of some 700 external galaxies in the same field.

THE INTERNATIONAL CONGRESS OF ANTHROPOLOGICAL AND ETHNOLOGICAL SCIENCES

To the International Congress of Anthropological and Ethnological Sciences, in session at Copenhagen, man is a creature that has been struggling with civilizaton for something like a million years. They can't even say whether the first million years will prove the hardest. Most investigators would say that present civilization is an improvement over rude discomforts and ignorance of the Old Stone Age.

Topics chosen for discussion at the congress include:

1. How civilization is influencing character. This is a psychological question of obvious future significance.

2. What anthropologists mean by that little word "race," which has attained life and death importance to many people.

3. What relationship the scattered fossil bones that represent early man have, one specimen to another. Our early ancestors are still the world's biggest detective mystery.

4. Newest theories regarding the beginnings of farm crops and taming of domestic animals. These events, which went unrecorded in their time, have a bearing on agricultural science.

Americans contributing to the congress include Dr. Frans Blom, of Tulane University; Henry B. Collins, of the U. S. National Museum; Dr. Henry Field, of the Field Museum, and Dr. S. K. Lothrop, of Peabody Museum of Harvard University.

PLANT ROOTS AND PLANT TOPS

ROOTS have been recognized as the supporters of plants since time immemorial. What the tops of plants do toward the support of their roots is now beginning to be made manifest.

Dr. William J. Robbins, of the New York Botanical Garden, and Dr. Mary Bartley Schmidt, of the University of Missouri, in a joint research reported in the *Botanical Gazette*, have cultivated roots of tomato plants without any tops attached. By juggling the ingredients of the culture fluid in which the roots grow, it is possible to learn something of their basic requirements—the things which the tops must supply in return for the services of the roots.

The culture fluid is one devised by Dr. Philip R. White, of the Rockefeller Institute, who first grew roots indefinitely without any tops attached. Three essential ingredient-groups are included: several mineral salts, cane sugar and yeast extract. Omit any one of the three, and the roots refuse to grow.

Drs. Robbins and Schmidt have found that they can substitute vitamin B_1 for the yeast extract and still obtain root growth. They can even substitute an organic fraction of the vitamin, known as thiazole, and get the roots to grow. This makes it apparent that the green top of a plant must supply vitamin B_1, or at least its vital ingredients, to the roots.

The mineral salts in the solution are essentially those found in a normally balanced soil solution and absorbed directly by the roots. Root-and-top relationships therefore do not come into the picture here.

Sugar must be supplied to the isolated roots in the cultures, and since the green tops are par excellence producers of sugar the necessity of this line of supply is easily seen; though the mechanism of the transfer in the living plant may not be so easily understood.

Dr. White has always used chemically pure cane sugar in his culture fluid. Drs. Robbins and Schmidt followed this practice in most of their experiments, though they did find that roots could use other sugars, such as dextrose and levulose, and that an "impure" brown sugar gave better growth results than the highly purified cane sugar.

PLANT HORMONES IN AGRICULTURE

HORMONE dust promises to speed agriculture in field and garden, as the result of investigations of the Canadian National Research Council. Synthetic chemicals that grow roots on seeds and slips of plants many days before they otherwise would sprout are now ground into talc and other inert dusts for easier and more effective application.

Experiments of Dr. N. H. Grace are being extended this year to large field trials of actual grain production in various parts of Canada.

The use of chemical stimulants, plant hormones, is not new. For the past few years scientists and gardeners have been using naphthylacetic acid, indolylacetic acid and indolylbutyric acid, all synthetically made from coal-tar and other substances, for getting roots started faster and more vigorously. Roots can even be made to grow where they would not normally appear.

The Canadian improvement is in the manner of application. Instead of putting the hormone chemicals in water and applying them that way, they are distributed in fine dust. It is easier to roll the seeds in the dust and stick the cuttings in fine powder. Wheat on the western plains may be able to get its roots in the soil faster and more securely if the seed wheat is dusted with hormones. In some cases this may mean the difference between getting a crop and not getting it. Winds are likely to blow the young sprouting seeds out of the ground if the roots do not anchor them speedily. Since the treatment causes the roots to "dig in" promptly, wheat so treated may withstand wind and drought at an earlier time after seeding.

Farmers already dust their seed with poison to kill fungus, and it is only necessary to add the hormone to the dust previously used. Demand is reducing the cost of these synthetic chemicals, and naphthylacetic acid costs about $10 per pound. Seed for several thousand acres can be treated with a pound. Thus the treatment costs only about a half cent an acre.

Pioneers in plant hormone research were Drs. P. W. Zimmerman and A. E. Hitchcock, of the Boyce Thompson Institute for Plant Research, Yonkers, N. Y., who in 1935 showed that some 16 new chemical substances would grow root "whiskers" upon plants, even in the most fantastic places, such as upon the flowers. They applied their chemicals as solutions in water or as salves.

Extraordinarily small amounts of the chemicals are needed. For instance, naphthylacetic acid is effective in a water solution containing one part per hundred million, and a single pound of it would make ten train loads, with each train of 100 tank cars, and every car containing 12,500 American gallons.

WATSON DAVIS

LEPROSY

LEPERS as a rule don't die of leprosy. What do they die of? The National Leprosarium in Carville, Louisiana, this past year has lost 36 patients, and only 11 died of the disease that brought then inside hospital walls. The rest were taken off by tuberculosis, pneumonia and other maladies.

The forthcoming annual report of the U. S. Public Health Service medical officer in charge of the hospital contains other facts that most people would not know about leprosy: Men are much more susceptible to leprosy than women: one of the unsolved mysteries of the disease. Patients' outgoing mail is sterilized. Practically all patients—there are 349 of them—take some kind of treatment. Most of them get chaulmoogra oil. Every patient is photographed on admission and later when indicated. The skin and features of lepers are so often affected that pictures are valuable case records. Every patient is examined each month for the characteristic germ of the disease. A patient must have a negative record for a year before he can be paroled from the hospital. Disease of the liver has been found after death in almost every autopsy at the hospital. Yet leprosy patients generally seldom complain of liver trouble. This may be a clue to some mysterious feature of leprosy. It may link with changes in the lipoid content of the blood found in lepers, possibly the cause of allergic skin conditions in these patients.

Blindness is frequent among lepers. Orderlies in the hospital are patients well enough to help others. Golf, baseball and tennis are among the sports enjoyed by more active patients. A new line of treatment to restore lost sensation and motion to fingers and toes of patients is reported very promising. Described as a "positive and negative pressure apparatus," the device is helping patients whose circulation does not respond to other treatment.

THE NEW AERONAUTICS AUTHORITY

MEMBERS of the new Civil Aeronautics Authority, which on August 23 takes over the regulation of America's airways and the planes that fly them, were sworn in on August 8. For a few weeks now the Bureau of Air Commerce has been marking time pending formal transfer of its jurisdiction to the first single agency formed to deal with aviation.

A multitude of problems, including that of selling itself to some sections of the aviation industry that have turned critical eyes toward the new five-man commission and the three-man safety board because some of the appointees are suspected of having won their places on political grounds, confront the authority.

Among the general problems the new authority will have to be on the alert to protect the industry from its rivals—other forms of transportation, for example. It will also have a battle on its hands defending aviation's vital radio needs from the demands of powerful interests that have always been after more radio space. A sharp struggle appears inevitable when aviation radio range broadcasting's expected change to the ultra high frequencies is due, for television also needs the ultra high frequencies and lots of them.

A major function of the new authority will be the building of public confidence. The fact remains that the immense majority of Americans who can afford to fly do not. They have not yet accepted the fact that the commercial airlines are nearly as safe as the automobile. A major job will be safety promotion. The greatest spur to safety in the air thus far has been, in fact, the general unwillingness of people to take the same chance in the

air that they do on the ground. Lamentable as this attitude may appear to the air-minded, it has nevertheless served a useful purpose in spurring airlines and manufacturers to even more intense safety work. The new safety board and its staff of investigators can do aviation and the public a service by thinking twice before personnel is blamed for accidents—a frequent practice in the past. It can and should start with the assumption that men make mistakes and will continue to make them and that a large part of the safety job consists in developing and using instruments and machines that go wrong far more seldom than mere human beings.

An additional heavy responsibility, shared with the Securities and Exchange Commission, is to see to it that the tragic financial history of the railroads is not repeated at the expense of future air travelers and investors. Recent difficulties of the merchant marine and the railroads, it is stated, can not be blamed entirely on decreased traffic to-day. In many cases, particularly in the case of the railroads, the difficulty can be laid at the feet of operators who in past years engaged in unwise overexpansion and in many cases indulged in practices now outlawed. Provisions looking toward prevention of this are worked into the laws creating the SEC and the new CAA.

LEONARD H. ENGEL

THE NEW CURTISS-WRIGHT 30-PASSENGER TRANSPORT PLANE

MARKING the entry of a fourth company into the large transport manufacturing field, a new Curtiss-Wright 30-passenger twin-engined airplane will be ready for its initial flight before the end of the year. Now in the jigs at a factory in St. Louis, the new plane, breaking with the Boeing and Douglas policy of putting four engines on large passenger planes, embodies a number of novel construction features, according to T. P. Wright, director of engineering of the Curtiss-Wright Corporation.

Designed to accommodate 30 passengers by day or 20 by night, the ship is not to be compared with planes such as the 42-passenger DC-4 or larger size planes now on the drawing boards. Size has been kept down so that airlines using the ship will be able to feature frequency of service.

Two engines developing 1,600 horsepower at take-off and 900 horsepower when cruising comprise the power plant of Model 20, as it is known. The design is such that 2,000 horsepower engines, now under development for the U. S. Army Air Corps and expected to be commercially available a year after the first Army planes are equipped with them, can be used on the plane.

Gross weight of the plane, which will have a 108-foot wingspread and a length of 76 feet, will be 36,000 pounds. It will cruise at 200 miles an hour at 10,000 feet. Like both of the other new large landplanes now nearing commercial use, the C–W 20 will be equipped with a pressurized cabin to keep atmospheric pressure above that of the rarefied atmosphere through which it will fly.

Although Mr. Wright makes no such statement or inference, it is believed that an underlying motive behind design of the plane is the belief that the larger planes already in existence and the still bigger ones planned will prove uneconomical and that the 30-passenger plane size will prove the most satisfactory.

ITEMS

A PREHISTORIC dog that threw in his lot with mankind over 7,000 years ago is attracting attention at the International Congress of Anthropological and Ethnological Sciences. The dog's remains are pronounced the oldest of any domesticated dog known. They are Maglemosian, an era of transition in northern Europe, when mankind shifted from the Old Stone Age into the more enlightened New Stone Age. This happened 7,000 to 5,000 B.C. Dogs are considered the first animals domesticated by man.

STRANDED for a million years or more on a "lost world" plateau in the wild interior of Venezuela, hitherto unknown animal and plant species have been brought to this country by an expedition sponsored by the American Geographical Society. In the current issue of the *Geographical Review*, G. H. H. Tate, of the American Museum of Natural History, gives the first report on the work of the Phelps-Venezuelan Expedition. The area visited is a high tableland known as Auyantepui, cut off from the rest of the world by its high, rocky, precipitous sides and by a wide surrounding belt of dense jungle and is only about 100 miles from Mt. Roraima. The animals found on top of Auyantepui for the most part are relatively small, including ant-eaters, opossums and wild rats and mice. They and their ancestors have been marooned on the plateau since early in Ice Age times—something between one and two million years.

THE AMERICAN STANDARDS ASSOCIATION has set up a coordinating committee to lead in the establishment of new and revised automobile and traffic standards. Spurred by the rapidly spreading requirement for periodic inspection of automobiles, the committee will draw up inspection standards for brakes, tires, lights, alignment, accessories and other auto equipment. Among a large number of other projects, it will revise the traffic signal code. It is explained that there is a growing tendency in the automotive industry to deviate from the national standard shades of green, red and yellow used in traffic signals.

A HINT has been obtained that too great accumulation of phosphorus has something to do with leukemia, which is an overgrowth of the white blood cells and one of the deadliest diseases known. Dr. John H. Lawrence, assistant professor of medicine of the University of California, has found that bones, liver and spleen, in which leukemia cells concentrate, exchange a much higher percentage of radioactive phosphorus than do normal cells. The radioactive phosphorus was artificially manufactured in the atom-smashing cyclotron at the university. In effect, this radioactive phosphorus is "tagged" by its radioactivity and the increase of radioactivity in the various parts of the body gives a method of determining how much phosphorus they absorb and a new method of studying the abnormal metabolism in this disease. Mice were used as experimental animals. The selective concentration of phosphorus in the leukemic mice may make possible treatment of the disease by artificial irradiation taken into the body by the phosphorus. At present, however, the experiments will be confined to mice. No successful treatment for leukemia is known, but success in producing the disease in mice, recently achieved, opens the door to experimentation.