SCIENCE NEWS

Science Service, Washington, D. C.

EXPANSION OF THE MILKY WAY

(Copyright, 1939, by Science Service)

A GIGANTIC aura of escaping, super-speedy stars has been discovered enveloping our own universe of stars, the Milky Way, through the researches of Dr. Harlow Shapley, director of the Harvard Observatory, and his colleagues. This increases the dimensions of our nebula or galaxy to the vast extent of an approximate sphere nearly half a quintillion miles in diameter. That is a chunk of space so large that it takes light some 80,000 years to cross it. Dr. Shapley announced the discovery in the first scientific session at the dedication of the McDonald Observatory on May 5.

The great aggregation of stars in which our sun is located is seen as the Milky Way in the night sky. Great telescopes, such as the new one going into service on the Texas mountain top at Fort Davis, show thousands upon thousands more stars than the eye can see. Most of the stars are located in a thin elongated disc 6,000 light years thick and some ten times as long. Ninety-nine out of a hundred stars of our galaxy are in this most densely star-populated part of the galaxy.

What is newly discovered is that stars unquestionably belonging to the Milky Way are found far beyond its old limits. These are faint and of high velocity, speeding some 120 miles per second. Dr. Shapley believes that they are the lighter stars that have in effect been thrown out from the main body by gravitational effects. Mathematical physical theory agrees with the actual astronomical finding that this envelope or shell forming this greater galaxy should be a sphere in shape and not a disc like the main mass of the Milky Way. When inquiring telescopes and photographic plates are pointed at other nebulae or galaxies, such as that in Andromeda, similar star-halo envelopes or shells are found. In some cases the shells of galaxies overlap with those of other, near-by galaxies. The limits of the shell are very indefinite, just as it is difficult to say just where the earth's atmosphere definitely ends.

The two most recently discovered near neighbors in space to our Milky Way, unusual star aggregations in the constellations of Sculptor and Fornax, have had their distances from us determined by use of famous Cepheid variable stars, whose waxing and waning of light measure the universe for astronomers. They are about 300,000 light years away. Dr. Shapley explained that they are part of our super-galaxy, which roughly includes the volume of space within a million light years of us.

THE RELEASE OF ATOMIC POWER

(Copyright, 1939, by Science Service)

RELEASE of atomic power is "not at all impossible" and "closer than ever before," Dr. Arthur H. Compton, of the University of Chicago, told the Southern Division of the American Association for the Advancement of Science meeting at Alpine, Texas, in a preliminary to the McDonald Observatory dedication on May 5.

The provision of power for our civilization is one of the major problems that scientists must solve. From the standpoint of chemical and mechanical power, those living to-day are in a preferred position. We are using the petroleum and coal stored up in past ages. While there are possibilities of obtaining power from the wind, agricultural products and other current sources not now largely utilized, Dr. Compton explained that society needs ever more and more power.

The most promising possibility for the future, in Dr. Compton's opinion, is the release of atomic power, brought definitely within the realm of possibility by the recent splitting of the uranium atom. There is evidence that heat and light from stars are produced by changes within the hearts of the atoms in much the same way that artificial radioactivity is created by atomic bombardment. Dr. Compton therefore believes that the astronomer, using new tools like the giant reflector of the McDonald telescope, can help physicists to try to make efficient on earth the methods used in the sun and stars for transmitting matter into energy.

A NEW MATHEMATICAL CONCEPT OF THE UNIVERSE

(Copyright, 1939, by Science Service)

A NEW kind of universe built out of mathematical logic instead of physical observation, yet capable of encompassing and explaining other suggested universe pictures painted by Newton, Einstein and other cosmologists, is offered to science by the British mathematical astronomer, Dr. E. A. Milne, of the University of Oxford, speaking at the dedication program of the McDonald Observatory.

A sort of universe to end, or at least reconcile, all universes, the Milne cosmology has the appeal of being more philosophically and religiously satisfying. It does not call upon any irrational factors or mystical ideas to explain it. Not only is the immense far-flung expanse of galaxies explained, but the Milne universe can be applied to the hearts of atoms, gravitation and electricity. Although its need arises out of the American exploration of space with giant telescopes, resulting in the discovery of millions upon millions of giant galaxies of stars, Dr. Milne's universe-building discards as a basis the physical observations of the world about us. Instead of starting with what the telescopes show to be in the visible universe, Dr. Milne builds physics from the bottom up, renouncing outside facts, and starting only with the fundamental phenomenon of the passage of time.

By time-tried mathematical procedures, Dr. Milne derives from our individual awareness of the passage of time a system of agreeing time-keeping in different places in the universe. From these time relations come a kind of kinematics and dynamics that are used to give a logical meaning to what is called uniform time. This allows explanations of gravitation and electromagnetism as well as the observed facts about the physical universe.

In a sense, Dr. Milne has attempted to do for physics and astronomy what the Greeks did when they took the

isolated facts of Egyptian mathematics and combined them into a logical system. The bringing of the atomic world into the same set of rules that governs the rest of the universe is one of the unsolved problems of science. Einstein and others have also been attempting to bring gravitation and electrodynamics into one set of theories. If the Milne picture of cosmology succeeds in accomplishing these objectives, it will be a major achievement.

One consequence of Dr. Milne's work is that the two conflicting conceptions of space and time, the Newtonian static universe and the expanding universe of Einstein's special relativity, can be reconciled and in fact shown to be variations of the real universe. The universe based on Newtonian dynamics, which Dr. Milne calls "Tau time" because he uses that Greek letter to designate it in his equations, is stationary, homogeneous, infinite in extent and hyperbolic in space type. The expanding universe of special relativity in what is called T time has the nebulae or star systems rushing out with tremendous speeds, its matter is not evenly distributed, it has a finite limit to its maximum expansion. It is described as a "flat private space." Yet analysis by Dr. Milne shows that T time becomes Tau time when the universe is viewed from any particular location.

One consequence of the Milne formulations of space and time is that if a material solid rod of some sort could be made to join two great stellar galaxies rushing away from each other at tremendous speeds, it would not break because it would expand at the same rate as the expanding universe of which it would be a part.—WATSON DAVIS.

THE TREATMENT OF PNEUMONIA

DISCOVERY of a better drug than sulfapyridine, the new remedy that is revolutionizing the treatment of pneumonia, was predicted by Professor E. K. Marshall, Jr., of the Johns Hopkins University, at the meeting in Toronto of the Federation of American Societies for Experimental Biology. Sulfapyridine is excellent so far as curing pneumonia is concerned, but "it has every disadvantage a drug can have," according to Professor Marshall. It makes many patients miserably ill, as if they had seasickness. More serious is the fact that in some patients it is changed chemically to a substance that forms stones in the kidneys. When sulfapyridine is given by mouth it is absorbed irregularly, making it very difficult to know how much to give to each pneumonia patient. It does not dissolve without special chemical treatment, which makes it difficult to give it to patients by injecting the drug into their veins. For these reasons Professor Marshall believes pharmacologists must and will find some better compound to use in pneumonia.

A discovery that may help doctors to tell at the beginning whether a pneumonia patient will live or die, whether he should get sulfanilamide or serum treatment, and how much serum to give was announced by Dr. Arthur W. Frisch, of Wayne University, Detroit. Dr. Frisch believes that all these facts can be determined definitely by looking under the microscope at a drop of the rusty, bloody sputum a pneumonia patient coughs up. If he can count more than one hundred free pneumonia germs in this drop of sputum, the patient's chances are very bad. If the number is less than ten, the patient is not seriously ill. Dr. Frisch's work is the first attempt to determine the outcome of pneumonia from examination of the rusty sputum. Heretofore doctors have been guided by the number of white blood cells, the number of lobes of the lungs affected and the presence or absence of pneumonia germs in the blood. For the first time, also, Dr. Frisch has learned exactly what sulfanilamide does to pneumonia germs in human patients. The effect of the drug, he finds, is to decelerate the growth of the germs for from two to four days. After that time, the germs become resistant to the action of the drug and continue to grow. Pneumonia serum has exactly the opposite effect. It does nothing to the germs but increases the body's defensive forces. For these reasons Dr. Frisch believes a combination of serum and sulfanilamide is the best method of treating pneumonia. How much serum to give can be determined, he believes, both by the number of free pneumonia germs in the patient's bloody, rusty sputum and by whether or not the germs are clumped together. The clumping indicates that the patient is developing immunity to the germs, he believes, and consequently that less serum is needed. Because of the high cost of serum treatment, estimated at from at least $75 to $100 per case, it would be an advantage to know when serum treatment could safely be stopped.—JANE STAFFORD.

THE FIGHT AGAINST GRASSHOPPERS

GRASSHOPPERS are beginning to emerge from winter quarters in the main crop and range areas east of the Rockies; the current battles raging in California are only preliminary actions with the advance guard.

The 'hopper hordes will be very numerous this year, as is indicated from egg surveys conducted by field workers of the Bureau of Entomology and Plant Quarantine. Myriads of eggs were left in the soil last fall by the last generation of female insects, and the winter survival rate was high.

Defenses are already being prepared. A continuing appropriation, authorized by the Congress several years ago, enables the embattled entomologists to prepare and distribute their ammunition well in advance of the anticipated campaign, and the agricultural appropriation bill now up for action carries provision for additional funds. In addition, there are small quantities of poison bait left over from last year, sufficient to rush into immediate action if required.

Poison bait is materially cheaper now than it used to be. It has been found that the bran, formerly used "straight," can be mixed with a considerable proportion of sawdust before the arsenic is added, and that the grasshoppers do not seem to know the difference.

Poison bait will be distributed along the grasshopper front in the great crop areas, as usual. The crucial stage of the campaign, however, will not be reached until early June. If the rangelands of the Plains Area dry out then the grasshoppers will migrate, and it will be necessary to send poison-warfare forces into the range areas. Whether this action will become necessary can not be de-

termined for several weeks. Meanwhile the California front has received reinforcements from the CCC camps. The Forest Service has detailed 100 young men from three camps to assist in the fight against the swarming insects.

Other insect pests attacking grain do not look particularly serious at the present time. Mormon crickets are crawling out of the coulées in the Great Basin country and elsewhere in the West, but on the basis of present indications government entomologists do not expect this to be as bad a Mormon cricket year as 1938 was. Chinchbug and Hessian fly infestations seem to be low.

THE FOREST FIRE HAZARD

THIS spring's long wet spell in the eastern half of the United States, which has driven farmers to despair because it made their fields too wet to plow, has been hailed as a blessing by foresters because it made the woods too wet to burn.

Especially in New England has this been the case. Late snows, followed by persistent rains, have kept the vast tinderbox of down trees left by last fall's hurricane well blanketed against the fire that the whole region rightly dreads. Meanwhile thousands of axes and saws are working against time, to salvage the timber for use and remove as much as possible of the fire hazard.

Congress provided a $5,000,000 appropriation for the salvaging of the wind-felled trees. Already about $3,000,000 worth of logs and sawed lumber have been bought and are in storage, the logs in ponds and the lumber in guarded piles. The logs amount to some 255,000,000 board feet, the sawed lumber to 30,000,000 board feet. There are 200 sawmills under contract for the work, of which 125 are now operating. In the woods 1,200 men, mostly former CCC enrollees, are doing the front-line work. They constitute 25 fifty-man camps, which are kept on a mobile basis.

It is only during the past few days that the woods have begun to show signs of drying out. The foresters and timber workers know that their rainy luck can not last forever and they are taking advantage of every possible working day. Even after the fire season starts, they will keep up the battle, until either they or the flames win out.

Elsewhere in the country, the forest fire situation is beginning to shape itself——in some regions quite critically. The Pacific Coast forests are already acutely menaced by fire, in a region where the "normal" fire season does not open until July. Long and severe drought on the coast, especially toward the north, is responsible.

High danger of forest fire also exists in the Southwest, in Arizona, though New Mexico forests are not in a dangerous state at present. Other danger spots reported by the U. S. Forest Service are Alabama and the Southern Appalachians. Foresters in other parts of the Southeast, the East and the North Central areas report only "low to moderate" fire hazards.—FRANK THONE.

ITEMS

A GIANT iron meteorite, among the half-dozen or so largest to be found in the United States, is being brought out of the Modoc National Forest in northeastern California, where it was found last fall by a hunting party. Because it was discovered on U. S. Government-owned land it has become the property of the Smithsonian Institution in Washington, D. C. It is to be taken to San Francisco for display at the World's Fair, and next autumn will be shipped to the U. S. National Museum for permanent exhibition. The great wedge-shaped sky-iron, which is four feet long and from one to three feet wide, with an estimated weight between one and three tons, was discovered by C. A. Schmidt, of Oakland, while on a hunting trip last autumn. Mr. Schmidt informed U. S. Forest Service authorities, who have kept the information confidential until now, so that preliminary scientific investigations could be made.

MARKING the first large-scale installation of blind landing equipment on commercial planes, apparatus for use with the Bendix curved glide path system is being installed for training and test purposes aboard ten transcontinental airliners of United Air Lines. The apparatus will be used during the coming summer months to teach pilots how to fly their way into airports without looking out the cockpit window. For training purposes only, blind landings will be made only under good weather conditions. The airline is not planning any immediate use under bad weather conditions, nor will it change its minimum visibility-and-ceiling rules. Should a superior system make its appearance in the future, it will be able to change over readily and its pilots will have the benefit of training in instrument landings.

SHELLS from two thousand eggs have been used to fill the glass in place of sand in the world's largest swinging hour glass, a part of a half-ton pendulum disc swinging at the end of a 24-foot shaft in a special timepiece on view at the World's Fair to symbolize leisure made possible by electrical equipment, designed by engineers of the Westinghouse Electric and Manufacturing Company. Colored and crushed, they weigh but 28 pounds. The equivalent volume of sand would have broken the glass. In resorting to the eggshells, the engineers resorted to an ancient practice of the Phoenicians, who also used eggshells.

COMMON gray house mice are accused of new wickedness —carrying the virus of a central nervous system disease and transmitting it to human residents in the house. Corralling mouse suspects from two Washington homes in which this disease, choriomeningitis, has appeared, Dr. Charles Armstrong, senior surgeon of the U. S. Public Health Service, reports that the active virus of the disease was isolated in three out of five mice. "The failure to find the infection in twenty-one mice trapped in eight homes and buildings wherein human cases had not occurred indicated that the association between the human cases and the infected mice is more than a coincidence." The disease, characterized by acute onset, headache, nausea or vomiting, stiff neck and moderate rising fever, is usually followed by recovery in ten days to two weeks, without any paralysis or nerve complications remaining as an after-effect.