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SPIRAL NEBULAE MAY NOT BE OTHER UNIVERSES

(By Science Service)

Cambridge, Mass. May .- That the spiral nebulae are not other "universes" similar to our own Galaxy of stars is the most natural explanation to be given to a highly important observation received at the Harvard Observatory in a telegram from the Lowell Observatory at Flagstaff, Arizona. Distinct changes in the structure and form of the nucleus of the well-known spiral Messier 99 are recorded by Dr. Lampland at the Lowell Observatory.

The nebulae of the so-called spiral family are very numerous throughout the depths of space, buttscientists have not as yet been able to determine their size, distance, and composition, or discover what laws govern their motions, or how they are related to the stars and planets. Many astronomers have maintained that the spirals are stellar systems, so distant from the carth that the individual stars appear to blend together in a hazy nebulous pattern of luminous matter. That view of the spiral nebulae constitutes the longstanding and fascinating "island universe" theory, which would make our own Calaxy of stars but one of many hundred thousand stellar systems, all appearing to be nebulous objects when seen from a great distance.

Other astronomors have contested this "island universe" theory on the basis of much recent work done at the great American observatories. To them the spirals appear really to be masses of gaseous material and not composed of stars at all.

The new observation by Lampland, which was made by the comparison of a series of photographs taken with the Lowell 40-inch reflecting telescope, opposes the "island universe" theory, and if supported by future work it will help in establishing the newer theory that the nebulae are not distant systems of stars. If a nebula were so distant that it might be considered a separate stellar system, it would not be possible to see changes in its form by comparing photographs taken o nly a few years apart, even if the velocity of the change is very large. If measurable change of form is detected, it means that the nebula is not exceedingly far away.

The nebula Messier 99, also known as Dreyer 4254, was discovered more than a hundred years ago. It is near the northern boundary of the constallation Virgo. It can be seen visually in a small telescope as a hazy spot. With a photographic telescope it shows faint spiral arms running out from a bright irregularly shaped nucleus. Some evidence of changes in the spiral arms of a few other nebulae had been recorded before, but this is the first time that definite changes in the nucleus of a spiral has been found.

NOTE: BE SURE TO SEE PAGE FOUR FOR THE BEGINNING OF A SERIES OF EXCLUSIVE INTERVIEWS.

## BLOWPIPE MAKERS COULD PROFIT BY PHYSICS OF CENTURY AGO

#### (By Science Service)

Release Wednesday afternoon, May 25, or Thursday morning, May 26. Chicago, May 25. - That all the oxy-acetylene blowpipes made today and used for cutting and welding metal are built without due regard to fundamental principles and that some of them may prove to be dangerous and likely to cause serious explosions during use, was the declaration of R. S. Johnston, engineer-physicist of the National Bureau of Standards, at the meeting of the American Society of Mechanical Engineers here today.

Sir Humphrey Davy, who invented the miner's safety lamp at the beginning of the last century, developed the laws that govern the way in which gases burn, and these same laws hold in the modern high temperature blowpipe, Mr. Johnston declared. But the makers and engineers who have been designing and constructing the oxy-acetylene blowpipes in use today, have apparently ignored past history of physics and in spite of continuous expensive attempts to design a torch that will not "flashback", just as the gas stove does at times, there are no torches made that are properly designed. When the torch ran is making the torch eat metal or is joining two pieces of steel together, all the makes of torches that were tested in the investigation reported upon, would at times go out, or flashback, and thus hamper the welder.

Occasionally, with the present construction of blowpipes, the gases will flow in the pipes in such a way as to cause an explosive mixture. At times this causes a disastrous explosion.

According to Mr. Johnston, the two gases must be delivered at the mouth of the blowpipe in equal volumes at equal pressures at all times, even when molten slag or steel completely blocks the tip of the pipe. A blow pipe designed to satisfy these conditions would not flashback and would be perfectly sa fe, and in addition, would be capable of making much better welds than can be made today.

The tests and researches that were described by Mr. Johnston were made during the war period in an attempt to obtain the best oxy-acetylene welding and cutting equipment for the A. E. F. in France.

OFFICIALS DISCUSS HONEST WEIGHTS AND MEASURES

## (By Science Service)

Washington, May .- Weights and measures and how they affect the bread, coal, meat, gasoline, and other commodities of every-day life are being discussed by the men who inspect scales and measuring devices in all parts of the country at the Fourteenth Annual Conference on Weights and Measures being held here at the Bureau of Standards, May 23 to 26.

One feature of the program is a discussion of the bill recently introduced in Congress to fix the metric system of weights and measures as the single standard for the country. Sealers and other state and city officials who safeguard the average citizen by seeing that weighting and measuring devices register correctly are discussing the best ways of assuring that there are four full quarts in every gallon of gasoline bought and that the housewife will get the legal weight of bread for her money.

PT.AN WORLD-WIDE RESEARCHES ON SUN-SPOTS AND EARTH EFFECTS

(By Science Service)

Washington, May .- Two scientific institutions have under way extensive plans which they hope will eventually give definite relations between sun spots and other solar phenomena and such earth effects as solar radiation, polar lights, magnetic storms, atmospheric electrical manifestations, and the earth currents which affect telegraph and cable communication. They hope to provide data that engineers can use in preventing damage to electrical lines such as occurred last week.

A network of magnetic and electric observing stations is planned by the Department of Terrestrial Magnetism of the Carnegie Institution of Washington. Simultaneous records of earth phenomena will be obtained at these observation points, which will cover the globe. Eventually, data on electric effects as complete as that which has been made available during the past decade by the Carnegie Institution's magnetic surveys on land and on sea, will be gathered.

The aurora that lights the northern sky, magnetic currents that affect the mariner's compass, and earth electric currents that damage cables and interrupt the telegraph are related to sun spots, as the experiences of last week demonstrated. Definite connections between these phenomena have been worked out by a number of investigators in the past few years, according to Dr. L. A. Bauer, of the Carnegie Institution, but the exact methods of the way in which they operate are unknown, and this lack is spurring on the efforts of experts.

On mountain peaks in Arizona and Chile the Smithsonian Institution has observers, and delicate heat-measuring apparatus that measures from day to day how much warmth the sun's rays bring to the earth. Sun spots of past years and the solar radiation during the periods they were present, have been correlated, and according to Dr. C. G. Abbot in charge of this work these immense spots on the sun may either cause an increase or a decrease in radiation.

At the time of the big sun spot or group of spots observed March 22, 1920, the sun's heat was diminished one-twentieth, but for numerous spots in several previous years it was found that the radiation was increased two to four per cent.

Astronomers explain that sun spots are areas of increased activity on the sun's surface. This increased activity would account for the higher radiation that sometimes occurs during the time of sun spots, and Dr. Abbot explains the occasional lessening of heat by pointing out that the surface of the sun is actually cooler where the spot occurs and that if rays from the spot are caught less heat than usual will be measured.

ME. CURIE RECEIVES HONORARY L.L.D. FROM PITTSBURG UNIVERSITY

Relea se Friday, May 27.

Pittsburg, May 26. Mme. Curie, discoverer of radium, who is visiting this country as the guest of the women of America, was given the honorary degree of L.L.D. at the University of Pittsburg this afternoon. Chancellor Bowman conferred the degree.

MAE CURIE RECEIVES TWO HONORARY DEGREES

Release Tuesday, May 24.

Philadelphia, May 23. - Both the University of Pennsylvania and the Women's Medical College conferred honorary degrees on Mme. Curie, famous woman scientist, at exercises held this afternoon. NOTE: THIS IS THE FIRST OF A SERIES OF EXCLUSIVE WEEKLY INTERVIEWS WITH LEADING EXPERTS IN VARIOUS FIELDS OF SCIENTIFIC RESEARCH. EACH WILL INDICATE WHAT IN HIS OPINION IS THE DISCOVERY MOST NEEDED TODAY IN HIS PARTICULAR BRANCH.

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### THE NEXT GREAT STEP AHEAD

1. IN MEDICAL RESEARCH

An interview with Dr. George W. McCoy, Director of the U. S. Public Health Service Hygenic Laboratory, Washington. (By Science Service)

In medicine, what's next?

Today's need is not more knowledge of cholera, typhoid, dysentery, bubonic plague, or the dread diseases that have decimated past armies and civilizations.

According to Dr. George W. McCoy, Director of the Hygienic Laboratory of the U. S. Public Health Service the next step in investigative medicino that scientists are striving to take is to learn the nature and control of the so-called respiratory diseases, such as influenza, pnoumonia, tuberculosis and meningitis.

"If I had \$50,000 for medical research, I believe it would be used to study these diseases," Dr. McCoy said when questioned.

"Perhaps", he added, "the money could be used more beneficially to spread the medical knowledge we already have and don't apply."

"Relatively little is known about these diseases that the doctors assume are air-carried and that are therefore labelled "respiratory." In most cases it is not known in what manner or at what stage of the disease they are spread.

Dr. McCoy illustrates this by a story. During the influenza opidemic that swept the country in the winter of 1918-19, intensive tests were planned in an attempt to discover the rature of the disease. Two groups of doctors and volunteer subjects went into isolation, one party in Boston, the other in Sam Francisco. All possible precautions were taken to make the tests successful. Infected food and other material from the bedsides of influenza sufferers were taken to the men who were willing to risk their lives to gain scientific knowledge. Days passed. Firally, the group in San Francisco received a telegram from Boston: "We can't infect our volunteers." San Francisco physicians ill every day, yet science was baffled when it tried to cause the flu to catch among the volunteers.

While the amount of our knowledge regarding these "plagues" of today is small, much money and the energies of many men are being spent in finding out what they are and how to combat them.

Even the germ of that disease which we all get sooner or later, measles, has not been discovered, nor has any one been able to tell at what time during the progress of the disease the infection takes place, although practically all that come in contact fall before it. Similarly the germs of mumps and influenza have thus far successfully hidden themselves from man although their actions have caused . \_ much trouble. We do know what the germs of tuberculosis, meningitis, and some kinds of pnoumonia look like.

Dr. McCoy is as much interested in applying the knowledge we now have as he is obtaining more medical knowledge.

"Vaccinati on for smallpox is an absolutely sure way to prevent it, yet last year there were from fifty to sixty thousand smallpox cases in this country because people neglected vaccination," he points out. "Clean, uncontaminated water for a city practically eliminates typhoid, and yet some cities have a high typhoid tate due to unclean water, and this is much more commonly true of smaller cities and towns."

AN ALMANAC FOUR THOUSAND YEARS OLD (By E. E. Free, Science Service)

Three thousand eight hundred and ninety-eight years ago this summer there as conded to the throne of Babylon a gentleman named Ammi-zaduga. Doubtless he had among his contemporaries a character and some reason for distinction. He was perhaps a big army man or he advocated including Elam in the Babylonian League of Nations. But it is not for these things he is remembered now. His excuse for getting into an article written nearly four thousand years after his death is a curious one. He employed an astronomer.

Back of this there is a story; the story of how two scientists collaboarated though one of them was dead nearly forty centuries before the other one was born.

This story begins with the fact that we are able to set down the date of this king so exactly; 3808 years ago, or 1977 Before Christ. A decade ago we would not have dared to be so precise. The records kept in Babylon itself were interrupted, of course, when the city fell to Alexander in 331 B.C. and gradually lost its importance. Although the baked clay documents of the earlier times furnish the rames and reigns of many of the kings there has been no way in which these documents could be dated exactly in terms of the Christian Era. Whether a particular King lived in 1900 or 1800 B.C. was necessarily a matter of inference and the individual judgment of each historian. That this uncertainty has been replaced by an exact chronology brings us to King Ammizaduga and his astronomer.

In the collection of clay tablets brought back by Sir Henry Layard to the British Museum were two which proved on translation to contain a record covering twenty-one years and giving the days of the month on which the planet Venus first appeared and disappeared as evening and morning star successively. The figures are of exactly the same sort as you will find in any modern almarac. The observations for the eighth year are dated in the text as having been made in the eighth year of the reign of King Ammi-zaduga.

The purpose of these records was doubtless to discover whether the movements of the planet could be related to important events occurring thereafter in the country or perhaps to the King. The Babylonians took astrology very seriously and endeavored for many centuries to develop a reliable method of foretelling the future from the stars. But the interest of these observations to us lies in the fact that they can be dated exactly by means of astronomical calculation. Modern almaracs are made, as everyone knows, by advance calculations, using the known motions of the heavenly bodies to predict, for ins instance, the days on which Venus will be evening star or morning star during the coming year. By extending exactly this same calculation backward it is possible to set down the same information, that is the almanac, for any given year in the past. All that was needed therefore, in order to date exactly the Almanac of King Ammi-zaduga was to calculate the Venus data for a century or two at about the time of the King and then find which successive twenty-one years out of this period agreed with the observed data recorded in the ancient tablet. This has been done by Dr. Kugler, the distinguished Dutch astronomer. He found three periods which would fit the ancient data; 2041-2020 B.C., 1977-1956 B.C., and 1858-1837 B.C. There is historical evidence proving that the middle one of these possible periods is the correct one, and we have therefore an exact date in our own chronology for the reign of this ancient King and the labors of his astronomer.

One wonders what use will be made of modern almaracs, if any survive, after another thirty-eight hundred years; twice the interval which separates

us from the time of Christ.

Whether a well-known sucking fish, belonging to the genus Echeneis, was formerly used by the Indians for catching other fish has been a subject of much discussion among naturalists. Reports of such use date back to Columbus. The method, as reported, was to attach a line around the tail of the Echeneis, which would then fasten itself to another fish, so that the latter could be hauled in and netted. According to Dr. E. W. Gudger the method is feasible, as the Echeneis will stand a pull of 50 pounds or greater.

One of the many distinguished victims of the shocking economic conditions prevailing in Austria was Dr. Franz Steindachner, for fifty years director of the Natural History Museum in Vienna, who died December 10, 1919, at the the age of 85. Steindachner died of cold, there being no coal obtainable to heat the museum, in which he had his living quarters.

A smooth coating of ice on branches, telegraph wires, and other objects, due to rain which freezes as it falls, is often called "sleet" in this country. But "sleet" is a word of many meanings, and the deposit in question is now described as "glaze" by the United States Weather Bureau. In England it is known as "glazed frost."

A few years ago beavers were practically extinct in the Adirondacks. The restocking of the region with 34 of these animals in 1906 and 1907 has had disastrous results, for they have multiplied to such an extent that they now destroy many thousands of dollars' worth of timber every year. It is estimated that every beaver dam costs the state ninety dollars. Beavers are now protected by law in New York State, but this protection will probably be withdrawn.

Besides being the breeding ground of the most valuable herds of scals in the world, the Pribilof Island support herds of blue foxes, which, like the scals are a source of revenue to the United States Government. On St. George Island, of this group, the foxes are fed regularly through the winter with scal meat preserved from the killings of the previous summer.

Fish of certain species devour the larvae of mosquitoes in such numbers that their introduction into waters where mosquitoes breed has become an important part of the antimalaria campaigns conducted by the U. S. Public Health Service.

According to a recent estimate, cats in New York State destroy 3,500,000 birds a year.

In the making of moving-plotures at night, thousands of dollars' worth of damage has been done by moths spotting the films. A special trap for catching moths, containing powerful electric lights and a suction fan, is in use at the Hollywood studios.