

## ASTRONOMY

# Cosmic Collapses Held Cause Of Birth of Spiral Nebulae

Abbe Lemaitre, of Expanding Universe Fame, Expounds A New Daring Theory Supported by American Data

**W**ORLDS are, because parts of the universe collapsed. This, in a sentence shorter than a telegram, sums up a theory of the genesis of the spiral nebulae, the vast islands of suns that swim at vaster distances apart in the depths of space, as presented by the Abbé Georges Lemaitre of Louvain University before a Washington audience of scientists.

The Abbé Lemaitre, who is at present a visiting professor at the Catholic University of America, developed this theory as a part of his larger theory of an expanding universe.

The universe, the lecturer reminded his hearers, is exceedingly empty. The masses of the stars, and of their aggregations into galaxies, are impressive; but when all matter is averaged out into all the space through which it is distributed, it comes to about one atom to a cubic yard of space. How could so thin a population of particles ever become aggregated into whole whirlpools of suns?

For answer, the Abbé postulated regional irregularities in his expanding universe—regions where the rate of expansion was slowed down to a certain critical low velocity. In some of these regions, the velocity of expansion failed to accelerate again; there were "collapses," permitting the aggregation of particles, and their condensation into the spiral nebulae.

Such a moment of critically low velocity of expansion, with resultant collapse and formation of aggregates of matter, occurred for the odd millions of light-years of space with which we are familiar about a billion years ago, Abbé Lemaitre suggested. This billion years is much less time than is called for by the theory of the passing of all stars through the same stages of development, from giant globes of unimaginably hot gases to aged "dwarf" stars of relatively feeble temperature energy. The Abbé does not think it necessary to postulate this uniform evolutionary course for all stars; his theory admits of

the simultaneous and very rapid formation of stars of all classes.

His contacts with American astronomers on his present visit to this country, he said, have supplied him with data which appear to support his present daring theory.

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## AVIATION-PHYSICS

## Improved Radio Beacon To Aid Aviators

**T**HE CHANCES for an air pilot to keep on his course or to reorient himself if he should become lost are now greatly increased, thanks to the innovations brought about in the present type of radio range-beacon by F. W. Dunmore of the Bureau of Standards.

The system makes possible the sending of four different signals in four directions, namely, one dot in a westerly direction, two dots east, three dots north, and four dots south. By noting which signal is the loudest the pilot may determine his general direction.

With the radio beacon now in general use the determination of absolute direction or position on airways is difficult because the same signal is sent to

four points of the compass. When the aircraft is near the radio beacon a pilot may pass from one course to another without knowing it. If lost it may take him an hour to reorient himself and the danger in case of shortage of fuel or the importance of time lost when on an errand of mercy will be apparent. It is believed by the inventor that the present scheme obviates these difficulties admirably.

The method consists of changing the so-called figure-of-eight transmission for the courses to the unidirectional cardioid transmission by changing the point of coupling into suitable phasing sections in the transmission line feeding the antenna, or, by superimposing on a figure-of-eight radiation through a suitable hybrid coil circular radiation in phase with figure-of-eight direction.

The method has been tried out extensively at the Bureau's experimental field at College Park, Md., and has been found altogether satisfactory. No additional equipment is required for receiving the signals on aircraft.

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## SOCIOLOGY

## City Dumps Tell Story Of Present Civilization

**S**INCE the present learns more about the past from city dump heaps than from art and literature, the picture below may well represent the chief source of knowledge concerning the current civilization to archaeologists of the future. At least, this is the view of officials of Logan Museum, Beloit, Wis., who prepared the diorama shown below. In the layer representing the (*Turn Page*)



DIGGING INTO THE TWENTIETH CENTURY

Here is a laboratory-built cross-section of a typical city dump heap showing the changing variety of articles discarded since 1893.

past decade appear an automobile radiator, electric flashlight, radio tubes, aluminum cooking ware and fashionable shoes. The 1913 to 1923 layer encloses a carpet sweeper, an old square toaster that was used on top of the stove, a coffee mill and, near the bottom, a whiskey bottle with a distinct air of good breeding. Down deeper another decade gives up an oil lamp, kerosene can, ornamental stove, fancy gas light fixtures and high lace shoes. From 1893 to 1903 it can be seen that people threw away funny brownish-looking old photographs, gramophone horns, irons that had to be heated over a fire, horseshoes and high button women's shoes.

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#### CHEMISTRY

### Bootlegger's Tricks Legally Age Liquor

**M**ANY reputable distilleries, getting ready for the end of prohibition, are turning to some of the bootlegger's tricks in an effort to beat him at his own game by getting a supply of good liquor ready for the consumer in a hurry.

Quick aging of whiskey, so long as it does not involve rectification, is permissible under the law now as it was before prohibition and even during it for medicinal whiskey, Dr. W. V. Linder, chief of the technical division of the Bureau of Industrial Alcohol, explained. Rectification, the dilution or "cutting" of good whiskey with water, coloring matter and raw alcohol, is not permitted.

The various methods hastening the aging process nearly all involve heating the whiskey. At first this was done by putting the barrels in a warm room or by using a steam pipe. Then electric current was tried. Ultraviolet rays and even X-rays are among the methods that have been or are being tested.

Chemical processes to hasten the aging have involved the use of various charcoals that absorb the esters, fusel oils and other objectionable materials in raw whiskey.

Some 25 or 30 different concerns have applied at the Bureau of Industrial Alcohol for permission to try out various quick aging processes.

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"Turn down the electric lamp" may sound like a slip of the tongue, but you can do just that with the latest lamps: they come in three wattages, all combined in one lamp.

#### CHEMISTRY

## Long-Known Chemical Found To be Most Versatile Solvent

**O**NE DREAM of the ancient alchemists, the "universal solvent," has been brought nearer to realization than ever before by the discovery that acetamide, a compound made from acetic acid and ammonia, has a wider range of solvent power than any other known substance. This discovery has just been announced by Prof. O. F. Stafford of the department of chemistry at the University of Oregon.

Because all life processes occur in solution, and because many important industries are dependent upon solubility relationships, Prof. Stafford's discovery is regarded by his colleagues as an outstanding contribution to the science of chemistry, both in its pure and applied aspects.

The best common solvents hitherto known have been ammonia and ordinary water; acetamide is declared to be superior to both. To test his discovery, Prof. Stafford ascertained the approximate solubilities of some 400 organic and 200 inorganic substances. Working on the theory that a substance is most soluble in another substance chemically related to it, he found that acetamide has such chemical kinship to an unusually wide range of other substances. That is, each of the atom-groups in its makeup reaches out, like a hand, toward similar atom-groups in many other compounds. It is this fact which gives it its great solvent powers.

Acetamide contains a methyl group that gives it solvent powers for hydrocarbons; its carbonyl group relates it to ketones, esters and acids; its tautomeric hydroxyl group gives it kinship to water and the alcohols; its amino group brings it into line with ammonia and its derivatives, while the ease with which it yields nitrile suggests a relationship to cyanogen compounds.

Acetamide has long been known to chemists, though its extraordinary solvent powers have only just been discovered. It is a solid at ordinary temperatures, but it melts at about 80 degrees Centigrade to form a mobile liquid. It is easily and cheaply manufactured from acetic acid and ammonia. Its ability to dissolve many things at present near-

ly or quite insoluble is expected to lead to important industrial applications.

Prof. Stafford is already well known in his field, especially for the invention of a process of wood carbonization, which is in large-scale use at an industrial plant at Iron Mountain, Mich.

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#### PUBLIC HEALTH

### New Method Controls Scarlet Fever Epidemic

**A** NEW method of giving children resistance to scarlet fever has been reported by Drs. J. D. Allen, Jeshill Love and E. H. Sandlin of Louisville, Ky. The method is said to develop the children's resistance more quickly and with fewer and smaller doses than the method now in use and the resistance is said to last longer.

Instead of using a toxin produced by the scarlet fever germ to develop the resistance to the disease, the Louisville physicians have developed a preparation that is akin to the bacteriophage or "germ eater." They call it "phagoid."

The preparation was tried during an epidemic of scarlet fever in Louisville schools, at the request of the city health officer, Dr. C. H. Harris. None of the children developed scarlet fever after receiving the first dose and the epidemic was immediately controlled in every school.

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#### PUBLIC HEALTH

### Public Told How To Combat Amebic Dysentery

**M**EANS of curbing the spread of amebic dysentery, which has already reached epidemic proportions, lie partly within the power of the general public, Chicago health officers declare. In view of nationwide dissemination of amebic dysentery, Dr. R. R. Spencer of the U. S. Public Health Service issued a statement stressing prevention aid.

The disease has reached epidemic proportions, Dr. Spencer said, because of the large number of healthy carriers uncovered among food handlers. The