

## ASTRONOMY

# New "Farthest Out" Set At Three Sextillion Miles

**Tiny Nebula, Photographed With 100-Inch Telescope,  
Using Ultra-Fast Plate, Required 3½-Hour Exposure**

**A**STRONOMY'S "farthest out," a faint nebular "universe" of stars three sextillion miles (3,000,000,000,000,000,000,000 miles) from earth, has been sighted by the famous 100-inch world's largest telescope of the Carnegie Institution's Mt. Wilson Observatory.

Using a new, experimental photographic plate, the Mt. Wilson Observatory astronomers have thus extended the observational limits of the 100-inch telescope approximately a third as far again as the previous record.

The nebula just discovered, whose estimated distance is 500,000,000 light-years, to use the yardstick of the astronomers, is traveling through space outward at the amazing rate of 50,000 miles per second, which is more than a quarter of the 186,000 miles per second speed of light, fastest speed in the universe.

Dr. Edwin P. Hubble, veteran discoverer of nebulae and discoverer of the relation between nebular speed of recession and distance from earth, explained that this velocity is based on the assumption that the relationship between speed and distance holds true in the extreme outer reaches of the universe now probed by the giant Mt. Wilson telescope.

To capture the image of the nebula, the faintest object recorded, required a 3½-hour exposure. The photographic plate used was about twice as fast as those ordinarily employed to photograph faint objects. The most distant nebula appears as a minute spot.

The recessional speed of distant nebulae is based on the shift of the lines in their light spectrum toward the red, the so-called "red-shift." This displacement of lines has been interpreted as being caused by an actual rushing away of the nebulae. And the more distant the nebulae, the greater the red-shift and the speed of recession. This has been demonstrated by Dr. Hubble observationally and it also follows from the Einstein theory of relativity. The fact that the farthest out

portions of the universe are rushing away fastest gave rise to the idea that the whole universe is expanding at a tremendous rate.

Just last December the scientific world was told that Dr. Hubble has found a nebula with a recession of 24,500 miles per second, indicating a distance of 245,000,000 light-years. The new discovery just about doubles this record.

A light-year is the distance light travels in a year, about six trillion miles.

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## ETHNOLOGY

## Ancient Navajo Language Now to Be Written

**A**YALE professor, a scientist-priest, and a Navajo Indian are working together on a book.

It is to be a handbook, to aid the Office of Indian Affairs in its project to teach Navajo Indians to read and write their own language.

Thus, the Government forges ahead on an experiment which has extraordinary aspects.

The Navajo tribal language, spoken for centuries, kept alive even with pressure of English and Spanish around it, is entering upon a new estate. It is to become a language that can be read and written by its people.

Never before have Navajo Indians been able to see their "literature" in native print. Now, the biggest tribe in the United States, 42,000 strong on its reservation in New Mexico and Arizona, is to become bilingual in all-round fashion. The children are to take reading and writing lessons at school in two languages, English and Navajo. The Government will send its communications in both languages, so that any Navajo can see for himself what the Government has to say, or can have it read straight to him in his own language. Since many Navajos speak no English, they have had to depend on

interpreters in the past to explain the words of the Government.

An institute for interpreters is being held during January and February on the reservation, to bring the Navajo language up to date, so to speak. With Navajos busy with soil erosion projects, health programs, and education plans, interpreters who explain it all to Navajo-speaking Indians have a hard time. At the institute, specialists doing technical work on the reservation will help the interpreters to find the best Indian terms for modern projects.

The afore-mentioned handbook, being prepared by Prof. E. Sapir of Yale University, assisted by Father Berard Haile of Gallup, N. M., and Albert Sandoval, a member of the Navajo tribal council, is intended as a basis for teaching Navajo to Indian service workers in the field.

Navajo was studied and reduced to writing some years ago, for scientists only to read—most people would have said. Now, that scholarly study which seemed of interest to a small, select group only, has become the foundation for giving an Indian tribe a new cultural asset.

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## PUBLIC HEALTH

## Find Thousands of Germs On "Clean" Glasses

**T**HOUSANDS of bacteria on the rims of supposedly clean, germ-free drinking glasses—as many as 50,000 to 100,000 bacteria on a single glass—were discovered by Prof. W. L. Mallmann and E. D. Devereux, research associate, of the Michigan State College.

These bacteriologists have been investigating the sanitary condition of glasses at roadhouses, taverns, and saloons in cooperation with the Lansing department of health.

"The possible role of eating utensils as a factor in the transmission of disease has been demonstrated from time to time over a period of years," they said in explaining their scientific report made to the Society of American Bacteriologists.

Tableware has been shown to be a carrier of the organisms causing diphtheria, pneumonia and tuberculosis and of two kinds of dangerous streptococcus "germs," they pointed out.

"Since the repeal of prohibition there have sprung up numerous road houses, taverns and saloons for the dispensing

of alcoholic beverages. Many of these places are inadequately equipped with means of cleaning and sterilizing glassware. In many places not even running water is available, to say nothing of hot water. As a result various methods of cleaning and sterilizing glassware have developed, many of which are extremely questionable."

Their investigation was started some months after a local health ordinance had gone into effect requiring the use of a chlorine rinse containing 200 parts per million of chlorine as a sterilizing agent for beverage glasses. Prof. Mallmann and Mr. Devereux examined both the rinses being used and the glasses. Clean and dirty glasses were tested by swabbing the rims to a depth of half an inch on the inside and outside.

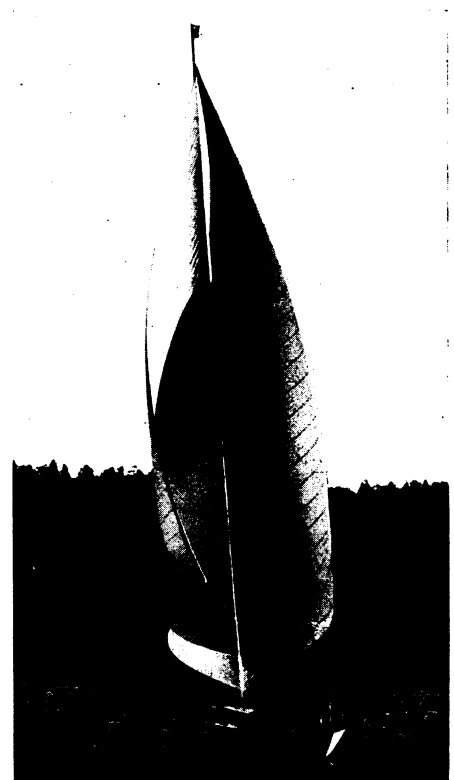
Few of the glasses were entirely free of germs, and as many as 50,000 to 100,000 bacteria were found on some. In most cases, there were more bacteria

found on the rims of the clean glasses than the dirty ones. This, Prof. Mallmann explained, is because the bacteria are washed off into the beverage in the glass. Nevertheless many of the dirty glasses and some of the clean ones had streptococci on their rims.

As a result of their investigation, the bacteriologists recommended certain provisions for sterilization of glasses. These included preliminary rinsing of the glasses to remove all beverage or other material, immersion for at least five minutes in the chlorine rinse or shorter immersion followed by five minutes draining without running off the chlorine water, and then a final rinsing in clean ice water or running tap water.

After these recommendations were made effective by the local health department, the bacteriologist revisited a number of places and found an improvement in the condition of the glassware.

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#### NO BOOM OR STAYS

*Also without foresail is the new type sailboat from Sweden. Running before the wind its double sails open out to give giant parachute effect. On tacking into the wind the two sails lie one atop the other. Reefing of sails is accomplished by means of a revolving mast around which the sail winds like a window shade about its roller.*

#### MARINE ENGINEERING

## New Type Sailboat is Minus Foresail, Boom, and Stays

See Front Cover

**P**AGE the Ancient Mariner! Yachtsmen of Stockholm are discussing a new type sailboat without foresail, boom or stays; a craft so fast that it has beaten larger rivals in recent tests. Yet it is so simple to handle that the yachting experts expect the rules of small boat racing may be changed to take advantage of certain of its novel principles.

Invented by Dr. Fredrik Ljungström of the Academy of Engineering Sciences, Stockholm, the new type boat has a revolving mast on which the mainsail is wound up like a window shade on its roller.

To reduce sail area, as in orthodox reefing, the navigator simply turns a wheel at his elbow in the cockpit and rotates the mast by a system of ropes. Ball bearing rollers in the foot of the mast below decks make this rotation easy.

The mainsail is triangular but double. Running before the wind the double sail opens out into what looks like a great parachute jib sail. For tacking into the wind one sail lies smoothly on top of its mate.

Aerodynamic streamlining is achieved in the sail by having its forward edge fixed in a slot on the bow side of the forty-six foot pine mast. Thus there is no gap between the mast and sail as in ordinary craft.

As the sail fills its general shape resembles an airplane wing; thick and round at the front and narrowing off behind.

The only stay on the boat is tiny wire running from the tip of the mast to the stern. Such a lack of stays may arouse yachtsmen's suspicions; but Dr. Ljungström has sailed his boat in heavy weather with excellent results.

The lack of stays is one reason for the speed of the boat. Stays—the fixed rigging which keeps the mast in position—have more wind resistance than is sometimes commonly believed. Although the surface area of the wires may be small they vibrate in the wind and hence greatly increase their resistance to a breeze.

For small-craft yachtsmen the new Swedish boat has the following advantages:

1. Less and cheaper rigging.
2. Sail cost reduced because only one sail is needed.

3. Fewer torn sails because of faster reefing by simply winding the sail around the mast to reduce its area.

4. Less danger of accidents to persons and also to sails caused by a swinging boom. There is no boom to swing.

It is against the rules of yacht racing to use a revolving mast as does Dr. Ljungström's new craft. Because of the importance of the new invention, however, a movement is originating in Sweden to change this rule.

Sail area of the new boat is thirty-two square meters, or about 345 square feet, when the two sails lie atop one another as in tacking. The sail area is 690 square feet in running before the wind.

Reports Science Service's Swedish correspondent:

"The boat is frightfully fast and has easily beaten larger boats against which it has sailed. Most amazing is the way the new boat beats up against the wind, quicker, and nearer the wind than other boats."

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