

## PHYSICS

**Lamp Tells Sound Speed**

The blinking of a red neon light is the index by which physicists can measure accurately for the first time the speed of sound waves in liquids. This has been accomplished by Dr. John C. Hubbard and Alfred L. Loomis, working in the latter's private laboratory at Tuxedo Park, N. Y. It is one of the side products of the researches by Dr. R. W. Wood, of Johns Hopkins University and Mr. Loomis on "super-sonics," waves similar to sound waves, but vibrating many times too rapidly to be detected by the ear.

In the new apparatus, which is to be described by the experimenters in the English scientific magazine *Nature*, and is called a "Sonic Interferometer," these same super-sound waves are used. A disc cut from a crystal of quartz, like that used in modern radio stations to keep the wave length constant, only much larger, furnishes the waves. This disc is placed between two metal plates which are connected to a vacuum tube also like that used in radio broadcasting. The tube furnishes a rapidly oscillating electric current. However, while two kilowatts of electrical power were used to run the tubes in the earlier experiments, the sonic interferometer uses only 50 watts, about the same amount of power as used by an ordinary electric light bulb.

When the current is turned on the quartz crystal oscillates, giving off waves which vibrate from 200,000 to 400,000 times a second and from an eighth to five-sixteenths of an inch in length in a liquid medium. The human ear can not hear sounds which are in faster vibration than about 20,000 a second. The middle C on the piano vibrates only about 256 times a second, and the waves from it are about four feet in length.

A vessel containing the liquid to be tested is placed over the vibrating crystal and the waves travel up through it. Immersed in the liquid, parallel to the quartz plate is a metal disc which can be moved up or down by a very small amount. At certain positions of the upper disc, the waves from the quartz are reflected back so that they are exactly in step with the waves coming up from the bottom. In such positions the little neon lamp goes out. By measuring the position of the upper disc, the lengths of the waves can be determined to within a twenty-five-hundredth of an inch. The number

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## ASTRONOMY

**Mars' Canals Not Man-Made**

By ROBERT J. TRUMPLER

Dr. Trumpler is astronomer at the Lick Observatory of the University of California and has made extensive observations of Mars with the great 36-inch refracting telescope of the Lick Observatory, the second largest in the world. In the following article he gives the latest scientific opinion of the Martian "canals."

The so-called canals of Mars have attracted great interest among astronomers as well as the general public because the claim was put forward by some observers that they must be artificial, a sign of the existence of intelligent beings on Mars.

At the close approaches of 1924 and 1926 I undertook a careful study of the surface of Mars by photographic and direct visual observation with the 36-inch refractor of the Lick Observatory. These observations confirm the existence of a general net-work of dark lines and spots on Mars. They contradict the view of former observers that these lines are narrow, uniform, straight canals arranged in regular geometrical figures. This net-work was found to cover the whole surface of Mars, not only the yellow-orange areas thought to be deserts, to which the canals have formerly as a rule been confined, and it exhibits, after all, not much regularity, the marks being densely crowded in some regions and sparsely distributed to others.

The lines themselves are not of uniform canal-like character, but show a wide variety of formations from faint narrow lines to diffuse dark bands, several hundred miles wide. Even the same line may change in width intensity and definition along its course and a few cases were noted in which such lines break off or run out before reaching an end point. No impression of artificiality is conveyed by this network, but it seems perfectly feasible to interpret it as a natural topographic feature of the planet's surface.

It is true that many lines appear straight on shorter or longer stretches, but the difficulties of observation have undoubtedly the effect that the observer tends to overlook small deviations and to over-emphasize the straightness. Even if many of the network lines follow parts of great circles, the shortest distance between two points on a sphere, this does not speak against their natural origin. A comparison of the Moon and the Earth gives a vivid illustration of how dissimilar the surface formations of planetary bodies may be. As Mars differs in many respects

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HARLOW SHAPLEY

**Cluster Specialist**

A Missourian should make a good astronomer, for both demand to be shown. In the case of Dr. Shapley, one has, for he has not only shown himself but others. One thing that he has shown the astronomical world is how to find the distances of certain astronomical bodies so far away that they are beyond the reach of ordinary distance measurements.

Some years ago Miss Leavitt, of Harvard, found that in a certain peculiar kind of variable star, exemplified by delta Cephei, the average brightness could be computed if the period of variation was measured. Taking this discovery, Dr. Shapley worked out the important "period-luminosity" law. By means of this law, if any star cluster contains a Cepheid variable which can be quickly recognized, we at once have a means of finding its distance.

Dr. Shapley himself applied this to the globular star clusters, great spherical swarms of myriads of stars, and showed their distances. And in the last few years Dr. Hubble, of the Mt. Wilson Observatory, has applied it to finding the distances of the spiral nebulae, and showed that they are systems like our own Milky Way system, but far beyond its borders. So far, in fact, are they, that their light takes millions of years to reach us.

Nashville, Mo., was the place where Dr. Shapley first saw the light of day on November 2, 1885. He graduated from the University of Missouri in 1910, took a master's degree there in 1911 and then went to Princeton. Here he studied under Prof. Henry Norris Russell, one of the greatest of

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### Mars' Canals

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(size, mass, force of gravity at the surface, scarcity of water, density of atmosphere) from the Earth and the Moon, it can hardly be surprising that its surface should also have a different topographic structure.

Our lack of knowledge about the geologic formations on Mars does not at present permit any definite conclusions as to the kind of topographic features with which the network should be identified. The close relationship between the network and the extended dark areas of Mars which are of a bluish-green tinge suggests the hypothesis that both are made visible by vegetation and that the network-lines represent lanes of greatest fertility: perhaps depressions in the surface, valleys, in which more moisture accumulates, or perhaps faults or cracks of volcanic origin offering exceptionally favorable conditions to plant life.

If we reject the network of Mars as a sign of intelligent life, this, of course, in no way affects the possibility of our neighbor planet being inhabited. It simply puts any discussion of this subject in its proper place, in the realm of speculation on questions of which we have no definite knowledge.

Science News-Letter, August 13, 1927

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The life of a chimpanzee in its native surroundings is about 20 years.

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Auto tires wear out faster on rear wheels than on front wheels.

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Several hundred kinds of flowering plants and ferns have been found in the north polar region.

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Houses in modern Egyptian villages are still built of bricks very like those used over 5,000 years ago.

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Pneumatic tools are being used to clear away the hardened mud in which the Italian City of Herculaneum lies buried.

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The four months' intensive fight against the European corn borer has resulted in the destruction of more than 95 per cent. of the pests.

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The sight of children between three and six years of age is being tested at a New York pre-school clinic to prevent eye troubles from developing unrecogized.

### Cluster Specialist

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living astronomers. He took his doctor's degree in 1914. After seven years at the Mt. Wilson Observatory his ability was so well recognized that in 1921, at the age of 36, he was called to the directorship of the Harvard College Observatory as the successor of the famous E. C. Pickering. Since that time he has amply showed that the choice was a just one.

Science News-Letter, August 13, 1927

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### Lamp Tells Sound Speed

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of vibrations per second of the crystal is known, and so the speed of the sound waves can be measured with an extremely high degree of precision.

As a result of their investigations, Dr. Hubbard and Mr. Loomis find that the sound waves travel through pure water at a temperature of 60 degrees Fahrenheit with a speed of 4850 feet per second. If the water contains one-half of one per cent. of salt, the speed increases to 5050 feet per second. Increasing the temperature of the pure water to 77 degrees increases the speed to almost the same figure. From previous measurements, the speed of sound in air has been determined at about 1100 feet per second.

According to Mr. Loomis, this work opens a new field in studying liquids, for by no other method is it possible to measure so accurately sound speeds in them. From these speeds can be calculated the compressibility of the liquid and other important facts about its composition.

Science News-Letter, August 13, 1927

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The Japanese eat whale meat raw, chopped fine and mixed with vegetables.

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Tiles of yellow, brown and blue are being used to pave streets in Sweden.

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The Spanish government is encouraging the development of silk-worm culture in Spain.

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A spider in the Pacific Islands spins a web large and strong enough to be used as a fishing net.

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A new automobile carburetor which uses kerosene instead of gasoline has been devised by a Swedish firm.

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When tulips were introduced into northern Europe in 1554 there were only two varieties, red and yellow.

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A number of new instruments for testing elevator safety devices have been developed by government experts, in order to make elevator operation safer.

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A new method of joining steel rails so that they are practically in one piece and yet can move longitudinally with changes in temperature has been reported by a Swedish inventor.