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BLUE AND YELLOW STAR  
LIGHT HAVE SAME VELOCITY

(By Science Service)

Cambridge, Mass. Feb. 00.- The chances are five to one that the difference in the time of passage of blue light and yellow light through empty space is less than one second in three hundred years, according to a result just announced by the Harvard College Observatory. It is inferred from this result that there may be no difference in velocity whatever.

The new and extremely sensitive test of the relative velocity of light of different wave-lengths is made possible, it is stated, by the recent determination of the distance of a remote globular star cluster named Messier 5, and by the completion at Harvard of a long study of the variations affecting the light of some of the cluster's brighter stars. The distance of Messier 5 is 12.2 kiloparsecs, which is the equivalent of two hundred million billion miles; it takes light nearly 40,000 years to travel across the space between the star cluster and the earth.

From a study of photographs made at the Harvard astronomical station at Arequipa, Peru, a large number of variable stars have been found in this remote star swarm. The changes in the light of these variables have been studied at Harvard, and more recently several series of photographs of the cluster were made with a big reflector at Mount Wilson, California, using plates sensitive to blue light and to yellow light. The time of the brightening of the variable stars was then determined separately for the two colors; but no difference in the time of arrival of the blue and yellow pulses of light was found at the end of the journey across empty space—a journey that has taken the last 400 centuries.

The uncertainty of the measured result is so small, according to Dr. Harlow Shapley, director of the Harvard Observatory, that he finds the chances are twenty



to one that blue and yellow rays differ in velocity by less than two inches in a second while traveling through space at the rate of 186,000 miles a second.

Blue light is closer to the X-rays and radium emanations in frequency or wavelength than yellow light, which approaches more closely the electrical waves. Whether the velocity of light changes with the color, that is with its frequency or wavelength, has been a disputed question among physicists and astronomers, although most of them believe that the velocity is constant. The velocity of light is 186,330 miles per second.

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#### NEWS OF THE STARS

##### Three Solar Eclipses To Test Einstein Theory.

By Isabel M. Lewis,  
of the U. S. Naval Observatory.  
(Science Service)

Within the next three years there will appear three total eclipses of the sun that are now being looked forward to with unusual interest. Observations of these eclipses may throw further light on the problem of the existence or non-existence of the Einstein effect: that rays of light are deflected from their course upon entering the sun's gravitational field. The results of the British observations of the eclipse of May, 1919, it will be remembered, were strikingly in accord with the theory and set the whole world talking. But confirmatory evidence is needed.

Next Sept. 20 there will be a total eclipse of the sun visible in Australia and certain islands of the Pacific Ocean that will have a duration of nearly six minutes at certain points on the central line. This is considerably longer than the average duration of a total eclipse and a number of eclipse expeditions will be sent forth from Europe to take advantage of the favorable circumstances of the eclipse. The Lick Observatory will have an expedition in the field and there will be expeditions sent forth from observatories in Australia.

On Sept. 10, 1923 there will be a total solar eclipse of about three and one-half minutes duration visible in southern California and Mexico. This eclipse will find many expeditions in the field, particularly in Mexico where conditions will be very favorable, and in the vicinity of San Diego where the eclipse will occur near midday.

On Jan. 25, 1925 according to the computations of the Nautical Almanac Office, which have recently been announced, there will be a total eclipse of the sun visible in New York, part of Pennsylvania, and New England in the early morning. This will



be the last eclipse visible in this part of the United States until Aug. 31, 1932 and, though it is less favorable in its circumstances than the other two, it will pass over a very thickly populated part of the country. A number of observatories will lie directly in its path. The sun will rise totally eclipsed in Northern Minnesota. The central path passes from that point across the northern part of Wisconsin and Michigan and directly over Niagara Falls and Buffalo, Watkins Glen and Binghamton, N. Y., and crosses the Hudson River between Newburg and Poughkeepsie. New Haven and Montauk Point also lie almost exactly on the central line. At the last-named point it leaves the United States passing across the Atlantic Ocean and ending north of Scotland. All points within a distance of fifty miles on either side of the path will experience a total eclipse of the sun. The southern limit of total eclipse passes across Northern Pennsylvania, through New York City, and between Jamaica and Mineola, L. I. The northern limit passes a little to the south of Syracuse and Cooperstown, N. Y., and Springfield, Mass., through Providence, R. I. and a few miles north of New Bedford, Mass. The total phase of the eclipse will occur about 9.13 A.M. Eastern Standard Time. Although the duration of this eclipse is only about two minutes in New England and the eclipse occurs at an unfavorable time of year there is no doubt that extensive plans will be made to observe it at the observatories lying directly in its path.

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#### REVISE BUILDING REGULATIONS ADVISE ENGINEERS AFTER KNICKERBOCKER DISASTER

(By Science Service)

Washington, Feb. 6.— Can it happen again? That is the question that is being asked about the Knickerbocker Theater disaster here, which killed nearly 100 people and injured many more.

Are buildings, particularly those in which large numbers of people can congregate, being designed correctly, are they being built safely, are they being inspected by the city authorities so that there is little or no chance for such disaster to occur again?

Investigations of the ruins, made by competent engineers, have disclosed one salient fact about the construction of the Knickerbocker. Its heavy concrete slab roof was supported by a system of steel trusses and girders that rested in steel beam supports that were imbedded in the terra cotta walls of the building. Experts are practically agreed that the fall of the roof began with the slipping off of the main truss from its beam seat. The wall in which this truss rested is now out of



plumb. Support of steel roof framing by masonry walls is not considered bad practice. This method has been used in the construction of many recent theaters and dwellings.

But in November a Brooklyn theater collapsed during construction, killing at least seven men, and its roof was supported directly on masonry walls. Now the Knickerbocker tragedy occurs under similar circumstances.

The findings of the grand jury and the investigations of the Congressional committees into this Knickerbocker disaster will undoubtedly affect the building codes the country over.

Engineers are asking: Shall the building regulations of our cities be revised so as to require that theaters, or buildings in which more than a very few people can come together under one roof, be built like an office building, with a rigid continuous self-supporting frame of steel or reinforced concrete.

The frame of a modern office building, without the aid of the walls, will support the weight of the building itself and all that can be placed in the building.

The opinion of the Engineering News-Record, a leading civil engineering weekly, expressed in connection with the previous Brooklyn disaster is:

"Is it not time, in the development of building practice, to demand that building laws should require steel supports for heavy steel carrying members such as trusses or girders? There has been a growing tendency, these many years, to avoid placing heavy concentrated loads on the brickwork of buildings, and to restrict the load-carrying functions of the masonry to minor service, a limitation justified by the inevitable uncertainties of load distribution where steel main members are supported on brickwork. This development has taken place in the face of the fact that every one recognizes the strength and dependability of well laid masonry whether stone or brick. One difficulty is that the excellence of workmanship and the perfection of bearing and bracing to secure the load distribution aimed at, and to avoid disintegrating actions on brickwork, are far less easily obtained than ample design and thorough workmanship in a shop-fabricated steel column. Building regulation, we believe, aims to establish the safer practice of two alternatives; the principle involved herein well warrants the requirement of steel column supports."

Most of the building regulations now in force in the cities of this country pay much more attention to the location of exits, the fire-proofing and other matters than to the actual design and construction of theaters, according to a survey made by experts of the Bureau of Standards of the Department of Commerce who are engaged in writing a model building code. Backing up and enforcing any building regulations there should be an inspection force, as aggressive and as efficient as the best police and fire departments, say the engineers.



SCIENCE OF GROWING THINGSAgricultural News of the WeekRAIN BRINGS SULPHUR  
FERTILIZER TO CROPS

(By Science Service)

Pullman, Wash., Feb. 00.- Rainwater contains appreciable amounts of sulphur, and doubtless the quantity deposited in the soil varies with the rainfall in the different sections of the country. But this fertilizer from the heavens is not sufficient.

Plants, particularly alfalfa, require sulphur, as is shown by the increase in crop yields when sulphur has been added to the soil, according to investigations made by Washington Experiment Station chemists, Geo. A. Olson and J. L. St. John. Where the rainfall is limited the supply of sulphur in the soil may become depleted by crop production, unless sulphur is available from other sources.

Most soils have been considered to contain enough sulphur for producing good yields, but recent experiments show that when sulphur has been added to the land, the production has been increased and the feeding value of many plants, especially legumes, has been improved. Field tests with sulphur in the form of gypsum show the increase in yield of alfalfa on various farms in eastern Washington to be from 80% to over 250%.

This discovery may be of value in many of the older farming sections of the United States, and particularly in regions with only a medium amount of rainfall.

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SOUTHERN CATTLEMEN  
TO MEET AT KNOXVILLE

(By Science Service)

Knoxville, Tenn. Feb. 00.- A livestock program for the Southern states will be considered when the Southern Cattlemen's Convention will be held here from Feb. 14 to 16. This organization was formed ten years ago to combat the cattle tick in the South and now it is turning its attention to a broad program that will stabilize production and hasten improvement of the southern cattle industry.

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TWO IMPORTANT DATES IN AMERICAN AGRICULTURE. - On Feb. 9, 1889 the government agriculture work was raised to the status of a Cabinet department. On Feb. 12, 1855 the first agricultural college was established by act of legislature in Michigan.



BROADCASTSRadio News of the Week.AMATEURS WILL RELAY RADIOGRAM  
FROM GOVERNORS TO PRESIDENT

(By Science Service)

Hartford, Conn., Feb. 00.- An attempt will be made on March 6, 7 and 8, to transmit a radiogram from the governor of each state to President Harding by relaying from station to station along the routes of the American Radio Relay League. Only privately owned stations will be used.

As the range of the stations is limited and also because the best stations are in towns other than the state capitals repeated relaying will be required in every case. Several hundred stations will be used.

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HOOVER CUP FOR BEST  
AMATEUR RADIO STATION

(By Science Service)

Washington, Feb. 00.- Herbert C. Hoover, Secretary of Commerce, has given a loving cup to be awarded annually during his administration to the owner of the best American amateur radio station of which a major portion is home made.

The first award is retroactive; it will be made for the best station in actual operation in 1921.

Rules of award have been drawn up by the American Radio Relay League, headquarters at Hartford, Conn., whose board of direction will act as a committee of award.

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LIGHTNING TELEGRAPH  
SERVICE FOR GERMANY

(By Science Service)

Berlin, Feb. 00.- A new service for the rapid transmission of all telegrams is to be inaugurated shortly for the whole of Germany. The test of the service will be a trial service between Berlin and Hamburg. "Lightning wireless" stations will be inaugurated in both towns, and a message will be received by telephone, wirelessed to the other station and then delivered by telephone.

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BETTER DRUG FOR  
HOOKWORM TREATMENT

(By Science Service)

Washington, Feb. 00.- Carbon tetrachlorid, a common chemical, may in the future replace chenopodium, the substance now used in the removal of hookworms and ascarids in man. In the last few years, millions of people in the tropics and warmer regions have been cured by modern medical methods of the hookworm disease and the work is still in progress.

Dr. H. M. Hall of the Bureau of Animal Industry of the Department of Agriculture has made conclusive experiments that show that carbon tetrachlorid in addition to being more effective is safer and cheaper than the drugs used now.

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EARTHQUAKE AS SEVERE AS ONE  
AT SAN FRANCISCO IN 1906.

(By Science Service)

Washington, Feb. 00.- The earthquake that jarred the seismographs of all the world on Feb. 1 would have created another San Francisco disaster had it occurred there, according to Dr. W. J. Humphreys, in charge of the seismographic work of the U. S. Weather Bureau here.

It was just as severe as the quake of 1906, and it occurred somewhere in the favorite field for earthquakes that extends from British Columbia to Ecuador, some 2,500 miles from Washington. Dr. Humphreys has not located it exactly because of lack of data from other stations.

This earthquake probably occurred along a fault in the earth's crust, 200 to 300 miles long, and it was severe for probably only ten to fifteen miles on each side of this line.

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AUSTRALIA'S NATIONAL FLOWER.- In England the supple twigs of the osier willow used in making fences, etc., are called wattles. Early English settlers in Australia, in the absence of willows, used the pliant boughs of the various species of Acacia for similar purposes. Hence these trees, which are very common in Australia, came to be known as wattle-trees -- now shortened to wattle. The beautiful golden blossom of the wattle is the national flower of Australia.

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DIAGNOSE ILLS OF  
4,000 YEARS AGO

(By Science Service)

Chicago, Feb. 00.— Present-day post-mortems of human beings who lived 4000 years ago and examinations of cave bears and a crocodile who basked in the sun some 900,000 years ago have revealed the medical aches and pains of those times.

Bones of ancient life have previously given medical clues to scientists of today, but the late Sir Armand Ruffer devised methods of studying the soft tissues of the Egyptian mummies that the hot sands and dry climate of Egypt have preserved for thousands of years.

The bacteria, the diseases, and man's reaction to them have not changed during the thousands of years that have passed, he found.

The inhabitants of the Nile Valley, the cradle of history, suffered from stiffening and swellings of the joints to a far greater degree and at a much earlier age than we now see this disease. A hump backed priest of Ammon, 1000 years B. C.

owed his hump to Potts' disease, which shows how little 3000 years have altered

the behavior of tuberculosis. Bacteria in these old bodies can still be stained, and traces of pneumonia can be seen. Lesions closely resembling smallpox can still be recognized and studied by modern microscopic methods in these old mummies.

Hardening of the arteries was common and severe in those days, when tobacco, excessive meat eating, modern strenuousness, and such things that nowadays are blamed for this condition certainly did not exist.

"Men were commonly stiff and old by the time they had reached 50 years, and the good old days were not so good from the sanitation standpoint", says the Journal of the American Medical Association in commenting on Dr. Ruffer's late work, "and we find that royalty was of very common clay, with extremely bad teeth and gums, queens bald of head, and even, we blush to say it, princesses with nits in their hair. Syphilis has not yet been demonstrated in early Egyptian bodies, a fact which may have influenced the sociology of the day. Food habits varied from time to time and in different classes, as shown by the degree of wearing down of the teeth, but at no time did there exist those prehistoric dentists of whom all popular histories of Egypt relate, although they certainly were sorely needed."

The best mummy material obtained is that which is naturally preserved by the Egyptian climate. The Egyptian embalmers had no such supernatural skill as tradition ascribes to them, but they did remove the vital organs of the body before burial, much to the sorrow of present medical archeologists.

Even the illnesses of the dinosaur who lived many thousands of years before the Egyptians have been investigated. Prof. Roy L. Moodie of the University of Chicago has found pathologic lesions on the tail of this pre-historic reptile.



## TWO PAGES OF FILLERS OR A DAILY FEATURE

## DO YOU KNOW THAT -

About twenty kinds of flies frequent houses. Practically all of them are potential carriers of disease.

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The Mulford exploration party, now in South America, has secured photographs in Bolivia of what is considered to be the largest tree cactus in the world. It has a limb spread of forty feet or more.

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An automobile railway car is being used on some railroads for short runs.

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The volume of water flowing in the Ohio River is 300,000 cubic feet per second or enough to cover in one day 595,000 acres to a depth of one foot.

## DO YOU KNOW THAT -

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Alaska was once sub-tropical in climate, according to a study made of ancient plants imbedded in coal there.

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Equipping Chicago policemen with miniature wireless telephones to keep them in constant touch with headquarters is being considered.

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Street cleaning by a new type of flushing machine can be done at the rate of over 11,000 square yards an hour and requires less than one-half a gallon of water per square yard of street.

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One-sixth of the timber cut in this country each year is used in boxes and crates.

## DO YOU KNOW THAT -

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The army airship mooring mast, which holds the airship by a cable attached to its nose, is made in four sections that can be easily transported on trucks.

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Alfalfa is a nearly perfect forage. It can be used as hay, for pasturing, as silage, and can be ground into meal. As a human food it can not compete with staples and it has no special medical properties.

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With satisfactory ventilation in English tin plate mills, there is three per cent. less labor output in summer than in winter.

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The direction in which the fibers run in fiber-board boxes has been found to have a considerable effect upon the serviceability of the boxes.



DO YOU KNOW THAT -

The United States Geological Survey estimates that 9,000,000,000 barrels of oil recoverable by methods now in use remained in the ground in this country January 1.

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The evaporation from the leaves of plants causes a slight cooling in their neighborhood.

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Mice destroyed one-twelfth of the young apple trees of Maine in a single year.

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A mixture of oatmeal and fat in the form of a paste is considered by the English to be the best bait for rat-traps.

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DO YOU KNOW THAT -

Japan has water power developed to the extent of 1,000,000 horsepower and India, her closest rival in Asia, has only 150,000 horsepower.

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A recent English writer states that he marched for 11 days in Somaliland with a string of camels, none of which had a drop of water during that time. Camels endure both the hottest climates on earth and the bitterly cold winters of the Asian plains.

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Data compiled by the American Engineering Counsel show that duration of life in America has been expanded by five years since 1909.

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While the telephone is an instrument upon which dangerous bacteria are commonly deposited and there continue to live for some time, a recent investigator believes that the danger of infection from this source is probably slight.

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DO YOU KNOW THAT -

It has been estimated that at the present rate of consumption the green plants of the world would exhaust the air of carbon dioxide in about thirty years if it were not constantly being replaced.

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Many steamship companies have installed disinfecting plants at European ports to disinfect immigrants coming to this country.

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A new lighthouse structure now at Fairport, Ohio, on Lake Erie, was constructed on shore and transported 147 miles to its location at a saving of \$10,000.

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Only from one-half to three-quarters of a live stock animal can be turned into edible marketable meat.