

THE SCIENCE NEWS-LETTER

A Weekly Summary of Current Science

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GREEK CHURCH ABANDONS JULIAN CALENDAR OCT. 13

Millions of people who go peacefully to bed the night of September 30, according to their calendar, will "lose" 13 days before daylight comes next morning. The next day for them will be October 14, the beginning of the shortest month of their lives. Such is a result of the decrees of the "Pan-Orthodox Congress" of the various branches of the Eastern Orthodox Church at a meeting last spring, fixing a time for the final abandonment of the Julian Calendar which was for 1600 years that of the Roman empire and of the entire Christian world and which in parts of the world has endured to this day. The change will occur at midnight, October 13, on our common or Gregorian calendar.

Julius Caesar was not a man with a great reverence for ancient customs just because they were old-fashioned. In his day the old Roman calendar had become so inaccurate that it was three months ahead of the sun; when the calendar said it was summer, the sun said it was spring, and festivals fixed by the calendar came at inappropriate times. Julius proceeded to do something about it. He called in Greek and Egyptian astronomers, and established the calendar that bears his name.

The old year had been just 365 days, but the astronomers found that the error in the calendar was due to the fact that the year as measured by the time between two successive vernal equinoxes, or the moment when the sun crosses the celestial equator on its way north, was something longer than this, or about 365 days and six hours. So Caesar invented the Leap Year, adding an extra day every four years and thought the problem solved.

But astronomical science progressed, even during the so-called Dark Ages after the fall of Rome, and by the latter part of the 16th century when it was recognized there was a difference of some 10 days between the sun and the calendar the remedy was also recognized. Pope Gregory XIII called a council of astronomers who, knowing the amount of the error in the method of the Julian Calendar, proceeded to correct it by eliminating one leap year at the end of every century except those for the years evenly divisible by 400. According to this rule 1900 was not a leap year, but 2000 will be.

The Gregorian Calendar was immediately adopted by the Roman Catholic world, but since the adoption of the Julian Calendar the Eastern churches had split away from Rome and acknowledged no allegiance to the Pope, while at the same time the Protestant Reformation was in progress in western Europe and for a long time the Protestant nations stuck to the old reckoning.

England, however, finally adopted the Gregorian calendar in 1752 and it became effective in the American colonies about the same time. The error in the Julian calendar was then 11 days and the day following Sept. 2, 1752 was called Sept. 14. But the several branches of the Eastern Church and the nations where it was the dominant religion kept to the old calendar. Russia was the first to break away, the Soviet government adopting the western calendar in 1918, Roumania and Serbia followed in 1919. Among the nations outside of Christendom, Japan, China, and Turkey had already followed the lead of the western world, leaving Bulgaria and Greece and the Greek Orthodox Church as the only adherents to the older system.

But where that church is strong as in Russia and Roumania there have been two calendars in operation, the religious and the civil, resulting in much confusion. It even affected vitally such American industries which employed Eastern Europeans, since pious Orthodox workmen insisted on observing holidays for a second time, when the belated Julian calendar caught up with our own. This will end next month, and for the first time since 1582 the entire civilized world will be keeping the same time with one notable exception. The Ruthenian Catholics, or Uniates as they are known in Europe, a body of Christians numbering some 8,000,000 of whom half a million are in this country, will still adhere to the astronomy of Julius Caesar. They dwell chiefly in the Russians Ukraine and in neighboring regions, and although they acknowledge the spiritual supremacy of the Roman church they dislike their Greek and Roman Catholic neighbors so heartily that they will not even have the same calendar and the same festival days as they do.

How long they will hold out is a problem; but as things are it seems that the Julian Calendar is doomed to ultimate extinction after having lasted some 1962 years.

READING REFERENCE - The Science History of the Universe, Vol. VIII. Mathematical Applications. New York, The Current Literature Publishing Company, 1910.

HARVARD ASTRONOMERS REPORT "ONLY GENUINE NEW STAR"

The remarkable new star in the constellation of the Serpent, which unexpectedly rose from obscurity fourteen years ago, still maintains its brightness and thereby justifies for it the title of the "only genuine new star", according to stellar photographs recently made at the Harvard College Observatory at Cambridge, Mass. The stars ordinarily called "new" by astronomers are really but temporary affairs that fade away rapidly within a few days or weeks after their sudden appearance.

This interesting object, which has been given the name RT Serpentis, was originally discovered by an astronomer at Heidelberg, and later quite independently at the Yerkes Observatory in Wisconsin. It was, however, on record earlier for a subsequent examination of the store of celestial photographs at Harvard showed the star coming out of darkness nearly a year before its discovery by the German astronomer. For twenty years before that time the Harvard plates give no trace of it.

RT Serpentis was first classed as one of the Novae, or "new" stars, and it also was expected to fade away as all of them have done in the past. But this object proved to be an exceptional phenomenon. It has now maintained its maximum brightness at the tenth magnitude for thirteen years. Measures of the parallax show that its distance is about one thousand light-years.

Scientists have not yet explained satisfactorily the singular behavior of RT Serpentis. Three possible interpretations, however, have been suggested by Dr. Harlow Shapley, director of the observatory.

Could this actually be a new star evolving from a non-luminous and nebulous beginning? A star birth has indeed never been witnessed, and it is not known in what manner stars first become luminous. RT Serpentis already shows signs in its spectrum which indicate that it is well along in its life history; but perhaps for stars of certain size some of the early evolutionary stages are lived through with great rapidity, and this star's birth was actually witnessed in 1909.

The second suggestion is that RT Serpentis is only a variable star of large range in brightness, with a very long interval of time between successive appearances. This explanation would require that sooner or later the star will again decrease in brightness, possibly to return to its present magnitude in some other generation.

The third suggestion proposed, and the one that Dr. Shapley thinks most probable, is that RT Serpentis is an ordinary unvarying star that has recently emerged from behind some obscuring cloud of cosmic dust. Many dark nebulous clouds are known to exist in the Milky Way, some of them at no great angular distance from RT Serpentis. Photographs of the region have been made, and all the stars nearby have been catalogued. If at some future time another star in this region should come or go, the existence of an obscuring cloud may be accepted as very probable.

READING REFERENCE - Hale, George E. The New Heavens. New York, Charles Scribner's Sons, 1922.

Lewis, Isabel M. Astronomy for Young Folks. New York, Duffield and Company, 1922.

EELS USE SUBWAY TO CLIMB BEYOND FALLS

How fresh-water eels get from the ocean past the one hundred foot Maria Cristina Falls of the Agus River into Lake Lanao, two thousand feet above sea level in northern Mindanao, has been discovered by Albert W.C.T. Herre, chief of the division of fisheries of the Bureau of Science at Manila, Philippine Islands. Subterranean passages, Prof. Herre found, offer the solution to this puzzle of nature.

Fresh water eels are born in the ocean, enter fresh water early in life, and after spending practically their entire existence in fresh water, return to

the sea to breed and die. Large numbers of an important species of fresh water eel are however found in Lake Lanao, the only outlet of which is the Agus, a small river less than twenty miles long and a continuous rapid over most of its course, with a sheer leap of over one hundred feet, the Maria Cristina Falls. Scientists have agreed that it is evidently impossible for any fish to ascend or descend these falls directly, and have been puzzled to account for the eels in the lake.

Prof. Herre examined the canyon where the river leaps from the upper valley over the precipice, and found that a third the way above the torrent at the bottom is a layer of rock which is honeycombed with water passages. From this layer many small cascades and spurting streams tumble down the talus into the boiling river below.

This cavernous water-bearing layer of rock, is the explanation of the mystery. There can be no doubt, Prof. Herre said after his inspection, that very slender young eels crawl up the talus, enter the crevices in the water-carrying layer of rock and work their way up against the subterranean streamlets until they reach the river well above the falls.

READING REFERENCE - Thomson, J. Arthur. The Haunts of Life. New York. Harcourt, Brace and Company, 1922.

FALL AND THE HARVEST MOON

By Isabel M. Lewis,
of U.S. Naval Observatory

When the sun "crossed the line" Sunday, September 23 at 9:04 p.m., Eastern Standard Time, fall was ushered in officially and astronomically, for the northern hemisphere. Spring began at the same time for the fortunate inhabitants of Australia, South America and other lands of the southern hemisphere.

On the following day North America was greeted by the Harvest Moon, the full moon that occurs each fall nearest to the time when the sun is at the autumnal equinox in Virgo, or the point where it crosses the equator southward bound. The full moon next following the Harvest moon is known as the Hunter's moon, and it will appear this year on October 24.

On the average the moon rises about 51 minutes later each day now, but this daily retardation of moonrise is subject to great variations owing to the fact that the moon's position with respect to the equator is constantly changing and that the moon does not move at a uniform rate in its orbit. For the latitude of New York the difference between the time of moonrise on successive days may vary anywhere from 23 minutes to 1 hour and 17 minutes. Further north the variation in the daily retardation of moonrise is even greater and within the Arctic circle the moon often skirts along the horizon for a number of days at a time with little if any difference in its time of rising on successive evenings. In the

fall when the sun is at or near the autumnal equinox in Virgo the full moon nearest to that date will occur with the moon in Pisces 180 degrees distant at or near the point where its path makes its smallest angle with the eastern horizon. As a result there will be but little difference in the time of moonrise for several successive evenings. In the latitude of northern Norway, Sweden, Canada, and Alaska the moon will rise at practically the same time for an even greater number of days.

One can readily see what an advantage it would be at this busy season of the year when farmers are gathering in the harvest and working far into the evening to have the illumination provided by the friendly rays of the moon following close upon the setting of the sun for a number of successive evenings. So it is that the full moon coming closest to the time of the autumnal equinox has long been known as the Harvest moon. The full moon next following the Harvest moon also occurs at a time when the moon's orbit rises at a small angle from the eastern horizon and from its association with the hunting season it has received the name of the Hunter's moon.

At the coming of the Harvest moon this fall the daily retardation in the time of moonrise amounts to 30 minutes in the latitude of New York City. The tables of moonrise and moonset published in the American Ephemeris show that the moon rises in New York City on September 23 at 5:16 p.m., Eastern Standard time, on September 24 (when full moon occurs), at 5:46 p.m., and on September 25 at 6:16 p.m. In 60 degrees north latitude the daily retardation in the time of moonrise for this period amounts to only 16 minutes. A month later when the Hunter's moon occurs the moon rises from 30 to 33 minutes later on successive days in the latitude of New York, while in 60 degrees North latitude there is a retardation of from 17 to 26 minutes on several successive days. There is, then, little difference between the Harvest and Hunter's moon in the daily retardation of rising, one being quite as favorable as the other to those engaged in outdoor pursuits in the early evening hours.

SUBSTITUTE FOR ALCOHOL AS SOLVENT DISCOVERED

Isopropanol, a liquid which may be obtained from natural gas or as a by-product in the refining of petroleum, is heralded as a substitute for alcohol as a solvent in medical and pharmaceutical preparations by H. C. Fuller, consulting chemist of the Institute of Industrial Research at Washington. It may be produced cheaper than alcohol, he states, and it has, so far as has been ascertained, no bad effect upon the human organism when taken internally or applied to the skin.

Isopropanol is a colorless liquid, with only a light odor when pure, and with a boiling point of from 81 to 83 degrees Centigrade, or a little above that of alcohol. Chemically, it also is a member of the alcohol family to which ethyl alcohol belongs but unlike it it cannot be made by any known method of fermentation. It mixes with water in all proportions and freely dissolves volatile oils, resins, many inorganic bodies and a large number of organic compounds.

"In general it may be said to parallel ethyl alcohol as a solvent," says Mr. Fuller. "For preparing medicines it has an almost unlimited field. A series

of standard pharmaceuticals has been prepared and kept under observation for a long period without showing any change either in appearance or therapeutic value. These include soap, liniment, spirit of camphor, aromatic spirit of ammonia, tincture of iodine, and many others. It may also be used for preparing mouth washes and other toilet preparations.

"Its physiological effect shows it to be a germicide and disinfectant of a quality superior to ethyl alcohol. It appears to be harmless to animals or men when ingested in quantities comparable to those which would follow its use as a medicinal solvent. It has no effect on the optical system such as wood alcohol has. It has already been used in hospitals for external applications and for rubs and baths without any injurious effect being noted.

"Isopropanol is now being made in commercial quantities at less than half the cost of tax-paid ethyl alcohol. Its fields of usefulness are many and varied and in addition to its solvent and preservative properties it enjoys the advantage of unrestricted sale in that it is not affected by the mass of regulations and difficulties incident thereto that now hamper the handling of ethyl alcohol."

EINSTEIN IS RIGHT AGAIN, SAYS ASTRONOMER

Confirmation of the third prediction of Einstein resulting from the application of his general theory of relativity was announced to the American Association for the Advancement of Science at its recent fall meeting at Los Angeles by Prof. Charles E. St. John, of the astronomical staff of Mt. Wilson Observatory. The lines of the solar spectrum are not identical in position with those due to incandescent samples of the same elements when observed on the earth, and the displacement is toward the red end of the spectrum. This indicates a slowing up of the rate of atomic vibration as predicted by Einstein as a result of the differences of the position of the two samples of incandescent elements with reference to the gravitational field of the sun.

Einstein has stated that his theory of relativity stands or falls according to whether or not this effect is observed. Professor St. John has calculated that the displacements of the lines in the solar spectrum predicted by Einstein amount to 86 per cent of the total observed effect, the remainder being due to other well known effects resulting from conditions in the solar and terrestrial atmospheres and to the sun's rotation on its axis. Dr. St. John considers as proved the main prediction of Einstein, that in the vicinity of the center of the gravitational field of the sun the rate of vibration of atoms is slowed up as compared with their rate of vibration when as far away from the sun as is the earth.

The other two Einstein predictions which have already been verified are the distortion of the orbits of the planets around the sun which was soon confirmed in the case of Mercury; and the more famous one of the deviation of light rays by the action of the gravitational field of the sun when passing close to that orb. This last has been confirmed by several observations taken at the last two solar eclipses of the sun. Dr. St. John's announcement completes the list of

Einstein's predictions, all of which have been verified.

READING REFERENCE - Einstein, Albert. Relativity. Translated by R. Lawson. New York, Henry Holt and Company, 1920.

Slosson, Edwin E. Easy Lessons in Einstein. New York, Harcourt, Brace and Company, 1920.

EXPLOSION WILL NOT STOP SEARCH FOR MORE MILES PER GALLON

Work of the U. S. Bureau of Standards here in the investigating of problems connected with the mechanical and economic efficiency of motor fuels will be only briefly interrupted by the explosion of Sept. 20 that killed or mortally wounded several men and wrecked a large part of the building where the work was being carried on. Only one of the three altitude chambers where engines are tested under conditions approximating great heights was wrecked.

The explosion occurred during the testing of a Ford engine under conditions approximating those experienced in winter. Although conducted in the altitude chamber there had been no reduction of the air pressure, which was that of the surrounding atmosphere, but the temperature in the chamber was reduced to about 10 degrees above zero Fahrenheit. The particular test was an acceleration test, using fuels of four different grades. No one was in the chamber, the instruments being read from outside. With the exception of one man who was crushed under the heavy door which was blown from its hinges, all fatal injuries were due to burns.

The general purpose of the investigations, in which the Society of Automotive Engineers is cooperating, is to conserve the supply of gasoline, to make more use of the lower grades by proper carburetor adjustment and to get a greater number of miles to the gallon and for every dollar expended for fuel. Engineers at the Bureau state that it has already been shown that the fuel resources of the country may be increased 20 per cent by the use of lower grades of gasoline formerly wasted, and that a corresponding increase of mileage may be obtained by more efficient carburetor adjustment but without any material alteration of carburetor design.

The altitude chamber that was wrecked by the explosion was one of three, the first of which was built during the war to test airplane engines and fuels. Pressure may be reduced to the equivalent of an altitude of 30,000 feet and the temperature lowered to conditions which obtain at that altitude.

The first altitude chamber which was the first of its kind in the world when completed in September 1917 saved tens of millions of dollars to the American petroleum industry and made unnecessary additional restrictions on privately operated motor cars during the war period. With the data thus obtained on many kinds of fuels the American representatives went into the Inter-Allied Petroleum conference and showed definitely that American aviation gasoline was superior to that demanded by the French. Since the war the tests made in these chambers have been of great value in the direction of fuel economy and in making possible flights at great altitudes.

RADIO LINKS AIR AND SUBMARINE FOR ATTACK ON SURFACE SHIPS

Submarines with eyes in the clouds and nerves of radio threaten themake life more dangerous for warships plowing the surface of the sea. Reports of torpedo practice received by the Navy Department from the commander of the Pacific Battle Fleet show that the combined use of submarines, airplanes, and wireless has increased the efficiency of submarine attack.

In order to aid and expedite the attack of a submarine division on a target ship in operations in progress on the west coast, DH-4B spotting planes transmitted an accurate estimate of the course and speed of the target ship to the submarines by wireless. Considerable improvement in the scores of the under-water craft was reported.

READING REFERENCE - Stevens, William Oliver, and Wescott, Allan. A History of Sea Power. New York, George H. Doran Company, 1920.

ELECTRICITY GAUGES RATE OF STREAM FLOW

A method for measuring flowing water in large quantities with speed and precision, which is particularly applicable to the needs of large hydroelectric power plants, has been announced as a success by its inventor, Prof. C.M. Allen of Worcester Polytechnic Institute. It depends upon the change in the electric conductivity of water when a known amount of salt is added to it.

A brine of known concentration is quickly added at a certain point up-stream and the time taken for it to pass electrodes inserted in the pipe line further down is noted, the change in the conductivity of the water marking accurately the time of the passage of the brine. If then, the volume of the conduit between the two points is known, the volume of flow may be accurately determined. Comparison of this method with slower and more cumbersome methods now in use have demonstrated its accuracy, Professor Allen stated.

CITY PLANNERS STUDY WAYS OF THE WINDS

City planners should cooperate with the Weather Bureau and learn how to let the wind blow the smoke out into the country rather than over the residence districts, says C.J. Root, meteorologist at the Springfield, Ill., Weather Bureau, who has acted as advisor to the commission in that city which is making a comprehensive city plan for future development. An examination of records showed the prevailing wind to be from the south in all months except January and February, and the industrial district is accordingly to be localized in the northeast section of the city.

Where natural features such as lakes and rivers prevent the growth of a city in a given direction or the establishment of an industrial zone to leeward of the business and residential, some modification is necessary, Mr. Root says,

although in all cases an intelligent use of Weather Bureau records may save millions of dollars damage from smoke and soot.

READING REFERENCE - Ward, R. de C. Climate Considered Especially in Relation to Man. New York, G. P. Putnam's Sons, 1918.

GOVERNMENT SCIENTISTS TO TEST TIRES MADE OF OLD RUBBER

A series of exhaustive tests on the wearing quality of automobile tires made of reclaimed rubber is about to be begun by the Bureau of Standards for the purpose of discovering what proportion, if any, of reclaimed rubber may be used without reducing the wearing quality of the tire.

Fifty motor truck tires made to order by manufacturers have been received at the Bureau and will be used in these tests. The tires are made in four equal sectors, each of which will have equal wear. The proportion of reclaimed rubber to the total amount of rubber used is respectively zero, 10, 18, and 25 per cent.

Forty of these tires are to be fitted to Post Office trucks and their wearing quality observed in road service. The other ten will be tested on the apparatus now in use at the Bureau for that purpose and on new apparatus designed to approximate road conditions even more closely.

DECLARE CEREAL USE CREATES MAN'S GREATEST DIET PROBLEM

"The most important dietary problem confronting civilized man today is that of restoring the balance of essential nutrients which has been disturbed by the prevailing use of cereal products," the subcommittee on animal nutrition of the National Research Council declares in a report in which they outline leading research problems awaiting solution by scientists.

Pointing out that human beings will always consume large amounts of cereal foods, they urge investigation to determine the proper place of animal foods in human diet in infancy, childhood, maturity, reproduction, senescence, sickness, labor, war and sedentary life.

"This group of problems in practical human dietetics has always been and always will be," they say. "We have reached an age, however, in which progress in their solution is possible at rates vastly greater than in any earlier era; and these great problems must be kept constantly before research men in order that no opportunity may be overlooked for contributing to their solution through the undertaking of definite projects of properly limited scope."

The necessary laboratories, groups of competent investigators, and institutions of various sorts providing satisfactory groups of experimental subjects, are not uncommon, they state, but complain that men who are able and interested

to organize and to conduct such investigations, and who can command the necessary human cooperation are rare.

Among the other general problems outlined in the report are the establishment of a scientific basis for judging farm animals, estimation of the metabolic nitrogen as a contribution to the perfection of feeding standards, mineral and vitamin requirements of farm animals, and the effect of diet on reproduction.

The sub-committee offers its cooperation to any who may desire it in the making of detailed plans for investigations in any of the fields suggested. The statement is signed by E. B. Forbes, State College, Pennsylvania; H. S. Gridley, Urbana, Illinois; F. B. Morrison, Madison Wisconsin; C. H. Eckles, University Farm, St. Paul, Minnesota; and C. R. Moulton, 509 South Wabash Ave., Chicago, Illinois.

READING REFERENCE - McCollum, E. V. The Newer Knowledge of Nutrition. New York, MacMillan Company, 1922.
Sherman, H. C. Food Products. New York, Macmillan Company, 1921.

The first modern steel frame office building in Japan was constructed in 1920.

On July 1 of this year, the registration of motor cars and trucks in the United States totalled 13,002,427.

The ancient Huns, long considered as the last word in savagery, had a high culture of their own, especially in architecture and art.

The island of Madagascar, where radium was recently found, has hardly any roads and crude hammocks swung on poles and carried on the shoulders of natives, furnish the only means of conveyance in many places.

Recording thermometers for registering maximum temperatures up to 150 degrees Fahrenheit are in use at some of the U. S. Weather Bureau stations in the desert regions of southeast California.

Galvanized iron dish-pans have been used as reflectors for electric lights in night construction work in California.

Two new airplane lines, operating a twice-a-week passenger service, have been started in Russia.

A new fishing bank 200 by 90 miles in extent was recently discovered off the coast of Labrador.