

# THE SCIENCE NEWS-LETTER

*A Weekly Summary of Current Science*

EDITED BY WATSON DAVIS

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## EYE HOLDS SECRET OF TRAFFIC SAFETY

A "look-one-way" traffic system as a preventive of many of the frightful automobile accidents of America's deadly streets was suggested by Dr. Raymond Dodge, authority on visual psychology and head of the psychological section of the National Research Council. Traffic signs, signals, and routes, he emphasized, should be determined according to a thoroughgoing study of what the human eye can see easiest.

"In the present regulation of traffic," he said, "both driver and pedestrian never cover less than forty-five degrees of visual angle and may be required to look over an angle of over two hundred degrees. Such a range of vision is humanly impossible without moving the head from side to side. This always involves an interruption in the view of the part of the street from which trouble may come. One of the greatest dangers in crossing the street comes from vehicles that suddenly emerge from a side street.

"As a matter of safety there are grave doubts as to whether the present regulations that limit pedestrians to a narrow street crossing at exact intersections of streets is the best practicable solution. It may be more convenient for drivers, but the exact intersection of streets is most dangerous for pedestrians. Behind waiting cars is safer than in front of them. Twenty feet from a cross street would diminish the probability of being surprised by turning cars.

"Use of all parallel streets as one-way streets would be a great advantage. There is a slight but real difference between the sides of the street for pedestrians. It can be demonstrated that the left-hand sidewalk is safer. When the pedestrian is on the left sidewalk about to cross a street he has to watch only automobiles on his left and to the right of him, while a walker stepping off on the right hand sidewalk across a street has to be alert to possible danger from his left, to his left rear, and to his right. It is well known that the left hand side of the street should be used by pedestrians when there is no sidewalk."

There is a very real and important problem with respect to the ideal construction of a traffic sign, Dr. Dodge pointed out. How many words would be read in the available time? What would be the minimum size of letters? What should be the structure, place, color, and content of signs? He contends that there is already a body of practical experience and scientific information available which would only need to be adapted to highway use and experimentally justified.



For instance, he said, it has been thoroughly demonstrated that adults do not read familiar words letter by letter but by familiar letter groups. Yet, here in Washington, we have signs reading "Slo". Dr. Dodge said that when he first saw that strange sign it took him many times the effort and time to understand and interpret it that would have been sufficient for "Slow".

"The nature and time of hand and arm signals by automobile drivers should be also regulated," Dr. Dodge said. "They are sometimes short, and sometimes long, sometimes early and sometimes late. The continuous indication of a driver's intentions beginning at least five seconds before a movement is executed and continuing until a movement is completed would be a great advantage."

Traffic policemen should wear white sashes and trolley posts should be painted in alternate bands of white and black to increase their optical usefulness, he said.

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#### TRACES OF CHEMICALS DO GOOD AND HARM

Negligible traces or impurities may mar or make a chemical process or a product, Jerome Alexander, consulting engineer of New York, told the American Institute of Chemical Engineers at its annual meeting in Richmond recently.

The Germans scrapped their own poison gas plant when they learned how the British made their "mustard gas" or diethyldichlorsulphide during the war by analyzing it and determining its impurities, he explained in labeling such traces tell-tales.

"Among the traces that help are vitamins," he said. "Also the value of traces of salts in water, for brewing, baking, and other operations is beginning to be appreciated, and we hear now of these being specially added. While 0.216 percent of arsenic reduces the conductivity of copper 39 per cent., pure copper rolls much less readily than that containing arsenic, and yields tubes that corrode ten times more rapidly. A little lead in brass makes it machine easily and prevents chattering. The reputation of Swedish iron is due to the manganese impurities it contains. A little copper inhibits the corrosion of steel. Small quantities of barium harden lead and make it ring like a bell. In many alloys small quantities of aluminum deoxidize the melt and prevent atmospheric corrosion of the casting. In the electro-deposition of metals small quantities of 'addition compounds' which are in many cases protective colloids, give a desirable cathodic deposit. Auer von Welsbach found the great effect produced by ceria in the thoria mantle, the optimum value being about 1 per cent. Thus in a certain flame the pure thoria mantle gives 7 candle power, whereas the standard mantle with 1 percent. ceria gives 88 candle power. With 1/4 per cent. ceria the luminosity sinks to 56 candle power, while with 5 per cent ceria it is only 44 candle power. Goodyear had no trouble in vul-



canizing his rubber because of the various nitrogenous impurities present in the crude product of his day. With the advent of modern pure plantation rubber, it has become necessary to add various accelerators. Old patents show that celluloid dissolved in the "wood spirits" of that day, which contained ketones in considerable quantity, but refined wood alcohol is not a solvent for it. Traces of lead-ethyl will take the 'gasoline knock' out of an internal combustion engine, even 0.06 per cent. being effective."

But other traces hinder rather than help, Mr. Alexander said. Iron was described as powerful in small amounts. A manufacturer of brewing sugar came to see how his new product was working in a brewery and found the brew-master running an inky black liquid into the sewer, he related. Being a chemist, he immediately wired his analytical department that their product was full of iron, and in reply received a telegram saying that the batch complained of had only 0.002 percent of iron. But that was enough to make plenty of ink with the hop tannins.

"In making dry batteries, traces of iron in the pyrolusite or of copper in the ammonium chloride are highly objectionable," he said, giving further examples. "One part of sulphur per million in cocconut oil is said to create trouble in the soap making process. In lead burning traces of arsenic in the hydrogen used to make it impossible to secure a good joint. Attempts to make a good nickel steel were for years frustrated by impurities present in the commercial nickel of the day."

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(A Chat on Science)

#### WHAT IS THE MATTER OF THE ARTISTS

By Dr. Edwin E. Slosson

The most common remark to be overheard at an exhibition of ultra-modern art is, "Why, these artists must be crazy!"

Now to call another man "crazy" is not enlightening. It is too easy and explains nothing. Besides each one of us thinks those who differ from us in opinion, and especially in taste, are a bit wrong in the head.

"All the world is made, except thee and me", said the old Quaker to his wife, "and sometimes I think thee is a little queer".

We are not all so frank as the Quaker, even to our wives, but I suspect we feel much the same way about the world.

But if, instead of recklessly applying the word "crazy" to everything we do not like or understand, we should analyze ourselves to find what is the reason, or rather the cause, of our instinctive repugnance, it might be helpful to us. It may be that we hate the new thing merely because it is new. If so, we may say that we are merely suffering from neophobia. Giving a complaint a Greek name is a great



consolation as every physician knows.

Or we may set a psychological expert to analyzing the people who are disturbing our minds by their unconventional notions and so find out why they show such strange tastes. Dr. Stewart Paton, lecturer on psychiatry at Columbia University, has made such an analysis of modern art in his new book, "Signs of Sanity", and has come to the following conclusions:

"The futurist art expresses, not intellectual superiority, but very primitive emotion, and illustrates a reversion to ideas and ideals of the Stone Age. It is not what its devotees claim for it, the product of conscious intellectualization of the creative spirit. The futurist, like a good many other people who are trying to find some compensation for defects in their personality, instead of being an interpreter of new sensations and emotions, is expressing those that were more characteristic of man during the early periods of his history than they are of human beings today. The literary, as well as musical moderns, in their unsuccessful efforts to find new and startling lines of expression, have practically only succeeded in recalling some forgotten memories of very primitive ancestors. The futurists practically depend for their inspiration upon the revival of subconscious mental activities that extend far back in the history of the race, and they surrender unconsciously to the primitive vision and emotions of an almost forgotten past. Their philosophy of art is based almost entirely upon illusion and fallacy; for instead of listening to reason, they simply succeeded in giving expression to very primitive tendencies that have been successfully inhibited by the real intellectuals who have contributed to the progress of civilization. It is of great assistance in preserving our sanity to have some appreciation of the nature and genesis of these primitive impulses and not to make the mistake of believing them to be evidences of intellectuality."

This explains why successive waves of fads in art, each more extravagant than the last, have swept over the world and shows their connection with other signs of the times. The recrudescence of superstition, the revival of race hatreds, the growth of belligerency, the glorification of brutality, the defiance of law, the contempt for intellectuality, the prevailing tendencies in music, dancing, literature and dress, as well as in painting and sculpture, all indicate a reversion to that primitive psychology that arose out of the war, or out of which the war arose. The Pre-Raphaelite movement of the last century has become the Pre-Troglodyte movement of the present century. Young artists who used to go to Paris or Rome for study now seek inspiration in Tahiti or the Congo.

But while recognizing the fact that futuristic art points backward we may continue to admire it or be amused by it, according to our taste. A dip into the primitive or a flight into the unconventional may not be a bad thing for us once in a while. It will keep us from getting stuck in the mud.

But if it should become epidemic and chronic -- then, goodbye, civilization.

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## VACCINE THROAT SPRAY MAY BANISH PNEUMONIA

It may soon be possible to spray your throat and so become immune to pneumonia infection. Dr. Russell L. Cecil and Gustav I. Steffen of the Hygienic Laboratory of the U. S. Public Health Service, working at Bellevue Hospital, New York, have completed experiments on monkeys that suggest that considerable immunity against virulent pneumonia can be obtained by the mere spraying of the throat with pneumococcus vaccine.

Monkeys can be completely protected against pneumonia by injections of the vaccine under the skin, and recent tests prove that injecting the vaccine directly into the trachea or windpipe, leading from larynx to lungs, is just as completely effective. Although throat spraying did not produce complete immunity in the case of monkeys, the bacteriologists believe that it may prove effective when used on a human being. They found that monkeys when having their throats sprayed closed the opening into the windpipe and the vaccine did not get a fair chance to act. The human trachea could easily be reached by the spray and immunity produced, Dr. Cecil believes.

Protection against pneumonia produced by spraying or injection of vaccine into the windpipe probably extends only as far as the cells that would be first attached by the microbes producing pneumonia, as tests indicate that a protective substance is not formed in the blood as in the case of smallpox or similar immunization. Further tests to amplify the experimental data and perfect methods are to be undertaken in order that practical use of protection against pneumonia can be achieved at the earliest possible time and the greatest possible safety.

During the war Dr. Cecil and collaborators tested the prophylactic value of pneumococcus vaccine on recruits in the U. S. Army and found that the cases of pneumonia were few in the organizations that were treated with vaccine injections under the skin. There were some severe reactions at the time of the inoculations, however, and further research was thought advisable before active immunization against pneumonia would be practical in civil life. For this reason experiments leading to the spraying method were taken.

The vaccine used consists of a salt solution suspension of killed pneumococci, the microbes that produce pneumonia. As many as 120,000,000,000 pneumococci are used in a single vaccination experiment.

In 1920 pneumonia was responsible for 137.3 deaths out of every 100,000 people in the United States, and in fatality it was outranked by only tuberculosis and organic heart disease. In 1918, when influenza deaths mounted to the high total of 300.8 per 100,000, frequent pneumonia as an after effect caused a pneumonia death rate in that year of 286.2.

Through the use of pneumococcus vaccine and further experimentation it is probable that these high rates will be greatly reduced when the vaccination against pneumonia is practiced widely. Eventually, it may even be possible to control this respiratory disease as completely as smallpox, public health experts believe.

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## MAY FORECAST QUAKE BY EARTH WEAKNESS

Possibility of forecasting earthquakes and making preparation for them is held out by an investigation of the movements of the surface of this terrestrial ball now under way in California. The U. S. Coast and Geodetic Survey in cooperation with the Carnegie Institution of Washington is engaged in this promising study, the annual report of Secretary of Commerce Hoover, just issued, reveals.

Even if earthquake prediction is not made possible, it is expected that the work will at least result in marking out areas where special precautions in construction should be used and where certain types of construction should be avoided, the report declares. In order to study the shocks more thoroughly, new and more highly sensitive seismographs may be installed at the magnetic observatories at Tucson, Arizona, and Sitka, Alaska, because these stations are in quiet regions relatively near to regions of great earthquake activity in the present or near past.

During the last century, says the report, six major earthquakes have occurred in the United States, Alaska, and the insular possessions. Some have caused great loss of life and property. Two of these, that at Charleston in 1886 and that in the upper Mississippi Valley in 1811, then sparsely inhabited, but now densely populated, were in regions not generally considered to be subject to earthquakes.

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NEWS OF THE STARSMore Moonlight in Winter Than In Summer

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

While the allotted hours of sunlight decrease as the date of the winter solstice, December 22, approaches it is some consolation to know that the full moons of winter ride higher and stay longer above the horizon than the full moons of summer.

Winter days are short and winter nights are long but as the sun of winter sinks in the southwest a friendly full moon may be rising in the northeast to remain with us through the long hours until the sun appears once more.

In a single month the moon passes over nearly the same path in the heavens that the sun passes over in a year. Also the full moon is always diametrically opposite to the sun in the heavens. So when the sun is south of the equator the moon is north of the equator and when the altitude of the sun is low - as it is in winter - the altitude of the full moon is high.

In latitude 40 degrees the plane of the earth's equator is inclined at an angle of fifty degrees (90 degrees minus the latitude) to the horizon plane. Thus the celestial equator, which is the great circle of the heavens lying directly over the equator, crosses the meridian at an altitude, or elevation, of 50 degrees above the south point of the horizon. When the sun is south of the equator then, as it is in winter, it crosses the meridian at a lower altitude than 50 degrees, in latitude forty, and when it is north of the equator, as it is in summer, it crosses the meridian at a greater altitude than 50 degrees. The greatest departure of the sun north or south of the equator is  $23\frac{1}{2}$  degrees so its least altitude above the horizon



in latitude forty is 50 degrees minus  $23\frac{1}{2}$  degrees, or  $26\frac{1}{2}$  degrees and its greatest altitude is 50 degrees plus  $23\frac{1}{2}$  degrees, or  $73\frac{1}{2}$  degrees. The greatest departure of the moon north or south of the equator is about 28 degrees so the altitude of the moon above the horizon, for latitude 40 degrees, ranges from 50 degrees minus 28 degrees, or 22 degrees, to 50 degrees plus 28 degrees, or 78 degrees. As we have seen above, when the sun is south of the equator the full moon is north of the equator and vice versa. At the date of the winter solstice, then, in 40 degrees north latitude, about the location of Philadelphia or Denver, the altitude of the sun is only  $26\frac{1}{2}$  degrees at midday but the altitude of a full moon at that date would be considerably over 50 degrees and it might be as great as 78 degrees which brings it within 12 degrees of the zenith at midnight.

For a different latitude, of course, the equator would be inclined at a different angle to the horizon and the altitude of the sun and moon above the horizon would be different. The altitude of the point at which the equator crosses the meridian is always equal to ninety degrees less the latitude, however. Knowing the distances of the sun or moon north or south of the equator it is then a simple matter to find their elevation above the horizon.

At the north pole the celestial equator lies in the horizon. For this reason when the sun is south of the equator, as it is for six months each year, it is below the horizon, and therefore invisible. But the moon is north of the equator half of the time and above the horizon continuously from first to last quarter or for fourteen days each month, adding beauty and cheer to the long winter night of six months duration. In lower latitudes within the arctic or antarctic circles the period of moonlight is shorter than it is at the poles. But all lands that enjoy in summer the phenomenon of the midnight sun have in winter the phenomenon of a full moon that never sets.

#### FLYING CHEAP TRAVEL SAYS AIR EXPERT

If airplanes could get enough business, passengers could be carried much more quickly at little greater cost than by railroad, Archibald Black, aeronautical engineer of Garden City, N. Y., told the American Society of Mechanical Engineers at its recent meeting in New York while discussing the proper design for commercial flying machines. "For example, the distance from New York to Chicago by the Pennsylvania Railroad is 908 miles, or a flying distance of from 750 to 800 miles," he said. "Were it possible to load the airplane fully each trip, the operating cost would be 6.5 cents per passenger mile or \$48.75 to \$52.00 per passenger. This compares with the railroad rate of \$51.30, including fare, excess fare, and pullman. Allowing for the trip to and from the fields, as well as an intermediate stop, the time by air would average about 9 hours as against 20 hours by the Pennsylvania Railroad's 'Broadway Limited'. The only reason why airplanes cannot carry passengers at such rates today is that it costs too much to get the business."

Moderate size machines only, he emphasized, could be efficiently operated at this low cost and the requirement of ability to fly on one of two engines is utterly impractical for commercial airplanes because of the prohibitive cost. The commercial plane should be designed for jumps lasting not over four hours, while high speed is undesirable and high climbing ability unnecessary and impractical for the commercial craft, he said.

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## TO REDISCOVER OLDEST CAPITAL IN HISTORY

American and English scientists are cooperating in an expedition that will rediscover the capital of the oldest dynasty in history, according to Dr. D. C. Davies, director of the Field Museum of Natural History, Chicago. A party of excavators representing the Field Museum and the University of Oxford, England, left England for Bagdad early in November. The expedition will explore long forgotten cities in the East during the next three years.

Between the rivers Euphrates and Tigris in Mesopotamia, where tradition asserts that the Garden of Eden once blossomed, lie the graves of many long-dead cities, Dr. Davies says. Eight miles to the east of Babylon a series of low mounds rise to the height of 70 or 80 feet above the still fertile plain. Beneath the mounds, which the natives name Tell El-Ohemer, lies buried the ancient royal city of Kish. Not only was Kish the seat of the oldest dynasty in history, but in the days of its glory it was the capital of three more powerful later dynasties which, for 1,700 years, (4,500 B.C. to 2,800 B.C.) ruled the whole of western Asia. Even after that date, the city occupied a prominent place in the history of Babylonia, maintaining that position until the Babylonian empire crumbled away in the 4th-5th centuries B.C. Thus the mounds of Tell El-Ohemer cover not only the remnants of the earliest history of mankind but the continuation of it for more than 4,000 years. If anticipations are realized, the light that will be shed on this long forgotten, blurred, page of human history will prove to be of incalculable value and interest.

The expedition that will uncover this 6,500 year old city is under the supervision of Dr. S. H. Langdon, Shillito professor of Assyriology at Oxford. Prof. Langdon, who occupies a prominent position among Assyriologists, is an American, having been born in Monroe, Michigan, in 1876, and is a graduate of the Michigan, Oxford and Sorbonne Universities.

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A farm which raises diamond-back terrapin for the market by thousands has been conducted for many years near Savannah, Georgia.

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Hookworm was first discovered in miners engaged in cutting the St. Gothard tunnel through the Alps.

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Elevator screenings, which grain elevators have been paying to get rid of, have been successfully used to fatten sheep in Canada.

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Betelgeuse, the bright red star in the constellation of Orion, is about 215,000,000 miles in diameter and about as dense as the gases in a vacuum tube.



## STAR TRAFFIC SPEEDS AT 720,000 MILES AN HOUR

Two hundred miles a second is the speed at which some stars are racing through space, Dr. Walter S. Adams, acting director of the Mount Wilson Observatory, declared in a recent lecture at the Carnegie Institution of Washington.

The rapidity with which the stars move, he said, depends upon their stage of development, their true or intrinsic brightness and probably their mass. The giant stars are moving more slowly than the dwarf stars and the increase of velocity with decreasing mass is a regular one. But these individual stars, he pointed out, are not moving at random. They move in great streams and the speedway of the heavens is in the plane of the Milky Way.

"None of the rapidly moving stars are going in the same direction as our sun," he said. "The speed of the sun is about twelve miles a second when referred to the slowly moving stars and over one hundred miles a second with reference to the exceptionally speedy stars.

"From a knowledge of the spectrum of stars we have been able in the past to learn both their chemical constitution and order of evolution as regards temperature and physical state, and their motions toward or away from the earth in miles a second. In recent years we have been able to add a third use to which the spectrum may be put, and we can now determine the true or intrinsic brightness of a star directly. This quantity combined with a knowledge of its brightness as it appears to us enables us to determine its distance in a very simple manner."

The method has nearly tripled the number of stars for which we know the distances, Dr. Adams said, and a knowledge of the distances has made it possible to determine the true motions of these stars in space.

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URGES ELKS TO QUIT WEARING ELKS TEETH

Elks will have to quit wearing elk teeth or elk will be no more. This was the gist of an illustrated address by Representative Albert H. Johnson, of Washington, before the Ninth National Game Conference meeting in New York. He made a strong plea that in order to save from extinction the animal for which their lodge is named, the B.P.O.E. pass resolutions condemning the wearing of elk's teeth by their members.

He told very vividly of the damage done by poachers who kill bull elk in the spring of the year simply to extract their teeth which have a commercial value, in that members of the Elks Lodge buy them for watch charms, cuff buttons, and other decorative uses. As long as these teeth command a fancy price, men will be found who will take any risk to procure them, he said, and this means the ultimate extermination of the elk.

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Diamonds represent 94.3 per cent of the \$20,696,000 worth of rough gems which the world produces annually in normal years.

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Durable, noiseless, noninflammable factory flooring is being made from tanneries and shoe factory waste by a shoe company.



## TABLOID BOOK REVIEW

SIGNS OF SANITY AND THE PRINCIPLES OF MENTAL HYGIENE. By Stewart Paton, M.D., New York. Charles Scribners' Sons, 1922. pp. 241.

"Unless our body and mind are kept constantly keyed up to meet the demands of this century in which we live, the very old primitive, untutored and uncultured man, the old Adam, reasserts himself and unconsciously develops the attitudes expressed by the notions, ideas, prejudices, standards of judgment, and moralities of the older civilization. Often when we think we are using our reason to do something new or striking we are actually dropping back to a remote period in history; facing a dilemma we are driven by the same impulses, rejecting or accepting a line of action for exactly the same reasons or lack of them that have been the cause of man's muddling through most of his troubles since the beginning of history."

EFFECTS OF WINDS AND OF BAROMETRIC PRESSURES ON THE GREAT LAKES. By John F. Hayford, Research Associate, Carnegie Institution of Washington. Carnegie Institution Publication No. 317. October, 1922.

A report of an investigation in progress since 1911 dealing with the fluctuations in the water level of the Great Lakes. Prof. Hayford believes that the elevation of the water surface in each of the Great Lakes must be controlled by means of movable dams for the benefit of navigation and power development. His work shows the possibility of determining the average level of the lake from observations taken at one station.

## AMATEURS TO RADIO BACK AND FORTH ACROSS ATLANTIC

Amateur radio will be placed on an international plane when American, English, French and Canadian operators send and receive across the Atlantic during the extensive tests scheduled from December 12 to 31.

As a result of preliminary test held last month by the American Radio Relay League, 318 American amateur stations qualified to compete in the final tests by sending over 1,200 miles or better. They averaged 1,400 miles distance of transmission. These stations have each been given a special individual schedule and secret code letters for transmission during the finals. Attempts at Trans-Atlantic sending will take place every evening.

In the preliminary tests of last month the record of the carefully planned finals of last year, when Paul F. Godley set up an American receiving station in Scotland, were nearly equalled. British amateurs last month logged 23 American amateur stations. Only two years ago, attempted Trans-Atlantic tests failed. For the first time this year European amateurs will send while American amateurs will listen to determine if their signals get across the Atlantic, American Radio Relay League officials explained today. Special times have been set aside for these tests.

Results of the amateur radio trans-Atlantic tests will be reported by radio each morning. Through arrangements made with W. A. Winterbottom, traffic manager of the Radio Corporation of America, reports of the results of the tests will be sent to the United States by the station at Carnarvon, Wales (MUU). Upon receipt of the daily report, New Brunswick, (WII) one of the most powerful American stations, will broadcast on a wave length of 13,600 meters, the results to American and Canadian amateurs. Thus, the entire world will have the opportunity of learning what stations were successful in bridging the Atlantic Ocean. Broadcasts will be sent at 2:00 a.m. Eastern Standard Time, (0700 G.M.T.).