

THE SCIENCE NEWS-LETTER

A Weekly Summary of Current Science

EDITED BY WATSON DAVIS

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NEW DRUG SENDS INSANE PARALYTICS BACK TO WORK

A new remedy for general paralysis and locomotor ataxia has just been reported to the American Medical Association by Drs. W. F. Lorenz, A.S. Loewenhardt, W. J. Blackwen and F. J. Hodges of the University of Wisconsin.

The new drug is an arsenical, called "tryparsamid", and it has been found more effective than any other treatment used in early forms of general paralysis and in other kinds of syphilitic infection of the nervous system.

Out of 42 far advanced parietic cases in a hospital for the insane, 21 were discharged after tryparsamid treatment and were able to go to work, the investigators report. In the 12 cases of the early type, 7 fully recovered their normal mentality and 5 seemed mentally able to earn their living but still presented signs of the disease as shown by laboratory investigation.

An official of the American Medical Association said today: "The physicians' conclusions seem modest in view of the results they report."

Most of the patients treated by the Wisconsin investigators were insane and had been, for long periods, in an institution for the care of such patients. There were also included 12 fairly early cases which had not degenerated greatly and who showed instead of mania merely excitable disorders. There were also 14 patients entirely free from mental symptoms, but in whom laboratory examination revealed signs of the early development of this disease. Finally, there were 10 cases of locomotor ataxia and 9 cases in which the nervous system was involved by syphilis without having developed either locomotor ataxia or general paralysis.

The patients made a decided gain in weight and their general state of health seemed remarkably improved. A complete investigation shows that a combination of the new remedy with mercury is more effective in the treatment of general paralysis than any method thus far outlined.

Tryparsamid is another of many combinations containing arsenic as the factor depended upon to kill the infecting germs of syphilis. It is similar to the famous "606", salvarsan, the first successful syphilis treatment. The chief value of the new drug is not so much in its direct effect on the infecting parasites as in its action on the ulcers or other forms of inflammation caused by them. Tryparsamid was first made by Jacobs and Heidelberger, American chemists, in 1915. In 1919 workers at the Rockefeller Institute tested it on infections in animals.

The only drawback to the treatment is the possibility of injury to the eye with this preparation as with the well known "606" or the earlier preparations described by Ehrlich, the discoverer of the first arsenical remedies of this kind. There is a possibility of seriously affecting the nervous tissues associated with vision and the Wisconsin investigators caution physicians against the employment of dosages sufficient to bring about such serious results.

Approximately five per cent of those infected with the venereal disease, syphilis, later develop general paralysis, and from 30 to 40 per cent of persons with this serious venereal disease later show evidence that the disease has reached the spinal fluid.

READING REFERENCES.- Libby, Walter. The History of Medicine; in its salient features. Boston and New York, Houghton and Mifflin Company, 1922.

NEW DRUG SIMPLIFIES SYPHILIS TREATMENT

A treatment for the venereal disease, syphilis, that can be given by hypodermic injection under the skin has been perfected by Drs. Carl Voegtlin and J. M. Johnson, of the U. S. Public Health Service hygienic laboratory here. They have made a new drug called "sulfarsphenamine", which is very closely related to neo-arsphenamine which was made shortly after arsphenamine, known as "606", proved sometimes to be dangerous in administration.

Other arsenical compounds used in the treatment of syphilis must be injected into a vein, which is a more difficult process than simply subcutaneous hypodermic injection.

The process for making sulfarsphenamine has been donated to the public by its discoverers and the preparation is now available to the medical profession.

The new drug contains 22 to 24 per cent. arsenic and is made by treating arsphenamine with formaldehyde and sodium bisulphite.

Dr. Edwin E. Slosson

C H A T S O N S C I E N C E

HAS SCIENCE REACHED ITS LIMIT?

"What is there left for me to discover?" is the common thought of the student as he looks about the library with shelves packed with books or the museum with cases filled with neatly labeled specimens. He realizes that when he enters upon research he is competing not only with his contemporaries but with all his predecessors. No tariff can protect him from the pauper labor of antiquity.

"What are you scientists going to do when you find out everything about everything?" is a common remark of visitors to a laboratory. The scientist will doubtless reply that life is not long enough to find out everything about anything but even he is apt to harbor the delusion that all the really big things have now been discovered and that future investigators will find pretty poor picking. Some scientists have been so rash as to put this opinion into print, much to the amusement of later generations. For instance, the great French mineralogist, Haüy, wrote at the beginning of the nineteenth century:

"Electricity enriched by the labor of so many distinguished physicists seems to have reached a time when a science has no more important steps before it and only leaves to those who cultivate it the hope of confirming the discoveries of their predecessors and of casting a brighter light on the truths revealed."

But we count this the beginning of our knowledge of electricity rather than its end, for over in London at this very time young Michael Faraday in his basement at the Royal Institution was working out the relationship between electricity and magnetism which has led to the dynamo and the radio.

One might think that such a blunder as this would have made later scientists cautious about thinking that nothing much remained to discover, but no, for we find in 1894 the catalog of one of the largest universities in the United States publishing at the head of its list of courses in physics the following discouraging statement:

"While it is never safe to affirm that the future of physical science has no marvels in store it seems probable that most of the grand underlying principles have been firmly established and that further advances are to be sought chiefly in the rigorous application of these principles to all the phenomena which come under our notice . . . An eminent scientist has remarked that the future truths of physical science are to be looked for in the sixth place of decimals."

But the very next year Roentgen discovered the X-rays that led to radium and the electron.

When Newton laid down the law of gravitation the solar system was reduced to a simple mechanism and the movements of the planets could be accurately predicted. What was there left for the astronomer to do? Bigger telescopes would doubtless reveal more satellites and show finer markings on the moon but how could we ever hope to learn anything about the composition of the heavenly bodies? Yet now we can know how the electrons behave inside the atoms of stars whose light requires thousands of years to reach us, and Einstein has pointed out that even Newton's law requires modification.

Some branches of science may well have reached a terminal. I suppose it is safe to say that about all the large animals on the earth have been discovered and described. It is true that the okapi, which is almost as conspicuous as a giraffe, managed to keep himself concealed in the African jungle until 1900, but not many such can have escaped the eye of the zoologist. But he can make no end of queer looking animals when zoology becomes donstructive instead of a descriptive science.

The scientific discoveries of the twentieth century have not only been more numerous than in any previous century but they have been greater. Our investigators are not engaged in verifying the sixth decimal but are projecting far-reaching and

fundamental theories.

When you throw wood on a campfire in the night you expand the lighted area but you also extend the circle of the surrounding darkness. So it is with science. With each increase in enlightenment a larger circle of surrounding ignorance is disclosed.

READING REFERENCES.- Sedgwick, W. T. and Tyler, H. W. A short history of science, New York, MacMillan Company, 1921. Libby, Walter. An introduction to the history of science. Boston, Houghton Mifflin Company, 1917.

CEILINGS ELIMINATE OFFICE NOISES

An oil-cloth ceiling, full of small holes, over a thick layer of felt, is the latest contribution of acoustical science to the elimination of office noises. As explained by Clifford M. Swan, consulting engineer, this special ceiling has reached that stage of perfection which will do away with annoying reverberation.

Tests in offices of banks, department stores, and other large mercantile establishments, have shown that the perforated ceiling greatly reduces office noises and substantially produces the effect of an office in the open air.

"The most common source of acoustical trouble", said Mr. Swan, "is reverberation. This is more true today than it used to be, owing to modern fire-proof construction, and its hard walls and plain surfaces. In the technical sense, reverberation signifies the prolongation of a sound by its multiple reflection from surface to surface before its energy is sufficiently absorbed to become inaudible. Since the average sound must be reduced approximately to one-millionth of its original intensity before it reaches the limit of audibility, and since such a sound once produced in a bare room loses but from two to four per cent of its energy at each reflection, it is evident that such a sound must be reflected several hundred times before it becomes inaudible. Since the average sound must be reduced since this process consumes time, owing to the finite velocity of propagation, the sound is prolonged for a period of several seconds after the original source has ceased to emit energy.

"It is this reverberation, particularly of high-pitched noises, that has been found to be most distracting and tiring to the worker. It is only by the unconscious expenditure of energy, indeed, that an office worker can get 'accustomed' to noise. It is the function of acoustical engineering, therefore, to do away with reverberation and with high-pitched noises.

"The remedy now offered, with the perforated ceiling of oil-cloth and felt, is based on the researches of the late Prof. Wallace C. Sabine, of Harvard, who is recognized everywhere as a world authority on acoustics. The felt eliminates the reverberation by absorbing high-pitched sounds of short wave lengths. The perforated oil-cloth provides a covering for the felt which obviates the reflection which would take place from an unbroken painted cloth surface."

NEWS OF THE STARS

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

TOTAL SOLAR ECLIPSE COMING

For the first time in five years Americans will have a chance to see the sun totally extinguished in their own country when on September 10 the moon will blot out the light of the sun.

The phenomenon in its partial phase will be visible throughout the United States but in order to observe the total disappearance of the sun in full day, observers must go to southernmost California, Lower California, or the adjacent parts of Mexico.

Again the Einstein theory of relativity is to be tested although it will not be of paramount interest as it was at the Australian eclipse of last year. The nearly perfect agreement between the values predicted by the Einstein theory and the measurements of star images on photographic plates taken last fall by the Lick Observatory expedition, coupled with the British tests of 1919, are very convincing, yet observers will be in the field this fall equipped to duplicate and check these tests.

The axis of the moon's shadow-cone will strike the earth at sunrise, Sept. 10, near Kamchatka in Asia. From there the path of total eclipse, about 150 miles wide, will sweep across uninhabited tracts of the Pacific Ocean until it touches the large group of islands off the coast of California south of Santa Barbara and west of San Diego. It will reach this point at about one p.m. local time. Duration of totality here will be three minutes and thirty-six seconds on the central line which passes midway between Santa Rosa and San Nicolas Islands and directly over San Clemente Island. From this point the path of total eclipse passes to the peninsula of Lower California. The small Mexican town of Ensenada lies within five miles of the central line and can be reached by auto stage from San Diego. A number of observers will doubtless locate in this vicinity as weather and observing conditions are expected to be very favorable in Lower California. There will be excellent facilities for observers on the islands off the coast of California but the weather reports indicate that the prospects of fair weather are less favorable for the islands than for Lower California. The central line of eclipse crosses the mainland of Mexico to Yucatan. It passes midway between Hermosillo and Guaymas in Sonora and runs fifteen miles southwest of Cuencame in Durango and twenty miles southwest of Tampico. Payo Obispo on the east coast of Yucatan lies close to the central line but the eclipse occurs here late in the afternoon and the duration is reduced to about two minutes and twenty-five seconds. After leaving Yucatan the shadow path passes to the south of the West Indies and leaves the earth at sunset to the southeast of Porto Rico. The chances of fair weather at eclipse time in Mexico are not very great except in the vicinity of Hermosillo and Cuencame as the rainy season comes during the summer months and is not due to end before the last of September.

The partial phase of the eclipse will be visible over all of North America. At the Mt. Wilson Observatory the greatest obscuration will be 98.5 per cent and though astronomers will be sent from this observatory to the central line it is expected that it will be possible to obtain some valuable observations on Mt. Wilson with the powerful equipment there available. Expeditions will be sent to the central line from most of the large observatories in the United States and in addition to testing the Einstein theory once more many observations will be made of the structure of the solar corona and of the position of important lines in the 'flash' spectrum and the coronal spectrum.

The amateur astronomer will also have his chance to contribute something of value to the sum of scientific knowledge by making drawings of the corona, observing shadow bands and in various other ways.

Dr. A. E. Douglass of the Steward Observatory of the University of Arizona will lead an expedition into Mexico, and amateurs are also planning an expedition into the Sonora desert by automobiles to the central line, a distance of 160 miles from Douglas, Ariz.

READING REFERENCES- Abbot, Charles G. The sun. New York. D. Appleton and Company, 1911. Lewis, Isabel M. Astronomy for Young Folks. New York. Duffield and Company, 1922.

THREE MOUNT WILSON PARTIES TO OBSERVE ECLIPSE

At two temporary stations and the main observatory, scientists of the Mount Wilson Observatory of the Carnegie Institution of Washington will observe the total solar eclipse on September 10, Dr. Walter S. Adams, acting director, said in response to an inquiry by Science Service.

One expedition will be located well within the path of totality, probably at the Military Reservation at Point Loma near San Diego, California.

The other expedition will be at the edge of the shadow at some point east of San Diego. The observations here will consist mainly of photographs of the sun's atmosphere or so-called chromosphere with spectroscopes of various types. When the moon just covers the sun the observer, looking at the sun's edge through a spectroscope, sees a vast number of bright spectral lines flash into view. These are produced by the gases which constitute the solar atmosphere and form what is termed the "flash" spectrum. The study of their intensities, the level to which they rise and their exact positions forms one of the most important investigations made at eclipses.

At the central station within the path of totality the observations will cover a wider range. These will include direct photographs of the corona, as the sun's outer atmosphere is called, and of the field of stars in the vicinity of the sun, the latter to be used for determinations of the bending of the rays of light near the sun's edge as predicted by Einstein's theory of relativity. Measurements will be attempted with a delicate thermo-couple of the amount of heat radiated by the corona, and its spectrum will be investigated with several different instruments, including an interferometer. Observations will also be made of the "flash" spectrum, and the attempt will be made to determine the position (wave-length) of some of the bright lines with a high degree of accuracy.

The observatory now has under construction a 50-foot interferometer intended primarily for the measurement of the diameters of stars. It is hoped that the central section of the large steel beam will be completed in time for use at the eclipse. It will consist of a structural steel framework 18 feet long, 4- $\frac{1}{2}$ feet wide, and 10 feet deep, mounted upon a pier and driven by clockwork. To this can be attached several of the instruments to which reference has been made, and the whole apparatus can be pointed directly at the sun, thus obviating the use of reflecting devices. In addition, a portion of the Snow telescope will be used at the central station, and a smaller reflecting telescope for the station at the edge of the path of totality.

About 98.5 per cent of the sun's disk will be obscured at Mount Wilson, and it is probable that certain valuable observations can be made with the powerful equipment which is there available.

MEXICAN OBSERVATORY TO AID VISITING ASTRONOMERS

Assistance to foreign astronomical expeditions coming to Mexico to observe the total eclipse of the sun on September 10 will be given by the Astronomical Observatory of Tacubaya. Dr. Joaquin Callo, director of the observatory, has secured from the Mexican Meteorological Service, data as to what parts of the path of the total phase are most likely to be free from clouds at the time of the eclipse.

From these data it is concluded that one of the best locations is the region of Cuencame in the state of Durango where little rain falls in September. The region of Berrendo in San Luis Potosi and Matehuala presents also a minimum of cloudiness although on many days which are cloudless the sky is hazy. Coastal regions on the Gulf of California and on the Yucatan peninsula experience excessive cloudiness. The part of the path of totality lying in the western Sierra Madre mountains suffers from lack of easy communication.

The Tacubaya observatory hopes to be able to send two expeditions into the path of the total eclipse with the twofold object of making observations and of being of assistance to foreign expeditions there for that purpose. Six expeditions from North America are expected and it is possible there may be one from France, one from England, and two from Spain. Passes will be granted for the free entry into the country of the scientific instruments, as well as a discount on railway freight rates on materials used by the foreign expeditions.

The observatory here hopes to be able to take a series of motion pictures of the eclipse, to be used for instruction and study. A diffraction grating will be used for a study of the spectrum of the solar corona, and an artist will accompany the expedition to paint a faithful reproduction of the spectacle.

Poisoning rats as a measure to prevent plague is said to be dangerous because as long as the fleas stay on the rats they are not dangerous, but when the rat dies they leave his body for another warm-blooded host.

OBSERVE SUN SPECTRUM DURING COMING ECLIPSE

An expedition lead by Dr. S. A. Mitchell, director of the Leander McCormick Observatory of the University of Virginia, will observe the total eclipse of the sun, September 10, probably from the Catalina islands off the coast of Southern California.

Dr. Mitchell has made a specialty of observing the spectrum of the sun during total eclipses. As long as a small portion only of the sun is visible its light is so powerful that the ordinary solar spectrum of dark lines on a bright background is always found. But at the instant of totality everything is changed. The dazzling disk of the sun is covered up, and the sun's atmosphere of heated gases is then permitted to give its spectrum without interference from the more brilliant light of the solar surface. The spectrum of the heated solar gases, the so-called "chromosphere", consists of a series of bright lines on a dark background. The change from the dark-line or Fraunhofer spectrum to the bright-line spectrum of the chromosphere takes place at the instant of the beginning of totality. The change is an abrupt one and the bright lines are seen to flash out so suddenly that the spectrum has been called the "flash spectrum".

Since its discovery by Young of Princeton in 1870, observation of the flash spectrum has found a very important place at each total eclipse of the sun. At first the observations were made visually but greater and greater success has been obtained by the use of photography. The flash spectrum was first successfully photographed as recently as the eclipse of 1896.

There are many problems that can be studied only under the conditions of an eclipse. Such observations with the spectroscope furnish the constitution of the solar atmosphere and the height in miles to which each gaseous layer extends above the surface of the sun. It is safe to say that these researches have given more information regarding the gases in the sun's atmosphere than is known of the earth's atmosphere from the work of all of the weather bureaus all over the world, and this in spite of the fact that we live and move and have our being in the earth's atmosphere while the atmosphere of the sun is ninety three millions of miles away.

This will be the fifth total solar eclipse which Dr. Mitchell will have witnessed, yet the total time for observation which has been available from the preceding four is only ten minutes! The spectroscope used in the coming eclipse will consist of a powerful Rowland grating ruled on a concave surface and used without a slit.

Camels lived in Florida hundreds of thousands of years ago.

For every barrel of portland cement manufactured, approximately 200 pounds of coal are burned at the cement plant.

There are twenty-four clock and watch factories located in the Black Forest of Germany.

Lumber production in the United States has been steadily decreasing for 13 years, in the face of a need unparalleled in the history of the country.

WOULD PROBE MOVIES' EDUCATIONAL VALUE

Thoroughgoing scientific investigation of the educational value of the motion picture was urged recently in an interview with Dr. Raymond Dodge, chairman of the Division of Anthropology and Psychology of the National Research Council, Washington. This inquiry, he suggested, should include fatigue tests of the eyes after ordinary school work and after seeing movie films of various lengths, as well as examinations to determine the accuracy and amount learned from the picture screen in comparison with results from the best oral instruction.

Emphasizing the importance of clearness of all projected pictures, Dr. Dodge explained that the human eye in viewing the movies is commonly subjected to three sources of fatigue. There is, first, a pursuit motion of the eye as a whole in which it follows the moving objects on the screen. This is the most fatiguing type of eye-movement. In addition, there are likely to be gross changes in illumination in the occasional use of moving pictures in schools due to the turning on and off of lights. Such illumination changes, if they are numerous, are fatiguing to the muscles of the iris. They force the pupil of the eye to expand and contract to adapt itself to the alternate changes. Finally, non-professional projection is apt to be blurred. The slightest blur in the picture may produce very fatiguing activity of the ciliary muscles that control the curvature of the lens. Blurred retinal images are the stimulus for re-focusing the eye. When the object is blurred the eye can never correct it. But it keeps trying. This is one of the main reasons why projection pictures, both still and moving, tend to produce eye strain. While all of these movements induce eye fatigue, he said, the human eyes in normal condition can stand a good deal.

"Before moving pictures are conceded any important educational role," said Dr. Dodge, "we need to know just how this fatigue compares with that experienced by the eyes in ordinary school work and just what length and quality of film is best for the eyes and how often it is advisable to have movie lessons. All three kinds of fatigue of the eyes can be measured. Fatigue of the external muscles can now be determined by means of apparatus that takes continuous photographic records of the speed of eye movements. These records are in the form of dotted lines. The slant of the lines shows the speed of eye movement and indicates the fatigue of the eye. Many universities are now equipped with such photographic apparatus for recording eye movements, including the University of Chicago, Columbia, and Harvard."

Besides being inferior from a mechanical standpoint and putting a strain upon the eyes, Dr. Dodge said some of the so-called educational pictures used today have such improbable plots and absurd incidents as to put a strain on human credulity as well. The stories woven around the facts to be presented are so improbable that they leave doubt in the spectator's mind as to the facts themselves. Nine-tenths of the pictures the child sees outside his school lessons are frankly fiction and this is bound to have its influence on the effectiveness of the other tenth.

"They naturally produce in the student's mind the tendency to regard the rest also as fiction," he said. "Like all untruths and false alarms they prejudice us against the real and important cases. The average person probably realizes most of the time at a movie show that he is seeing shadows and not real people doing real things. Colored pictures and some means of giving depth and plasticity to the representation would help make them seem more real and would con-

sequently make them more effective agencies of education."

Just how much a film really gets across to children or adults can be accurately determined by suitable examinations or questions. A comparison of the effectiveness of film instruction and other kinds of school work is both possible and feasible.

READING REFERENCES- Boyer, Charles C. History of Education, New York. C. Scribner's Sons, 1919.

TABLOID BOOK REVIEW

MOTOR FUELS, THEIR PRODUCTION AND USE, - By Eugene H. Leslie, Ph. D., Associate Professor of Chemical Engineering, University of Michigan. The Chemical Catalog Co., New York.

This 650 page volume while written principally for the technical man and engineer has still much interest for the general reader with only a limited knowledge of the subject. It covers thoroughly the chemical side of the motor fuel industry, yet does not neglect the geological and social phases. An important feature is a discussion of the various substitutes proposed and to some extent used as substitutes for gasoline. Of these the most important is alcohol, the possibilities of which are stated to be great. In this connection a plea is made for a more liberal enforcement of the Eighteenth Amendment with respect to industrial alcohol and for a greater realization of the importance of this substance in the chemical and automotive industries.

A MOTHER'S LETTER TO A SCHOOLMASTER. WITH AN INTRODUCTION BY JAMES HARVEY ROBINSON. KNOPF. \$4.

A fascinating volume for teachers and parents. A child works out his own system of education and social system quite as Prof. Dewey would have had him do. The imaginary town of Primton becomes an educational utopia. The reader wonders if Prof. Robinson did not have more of hand in it than the preface.

Nearly 6,000 diamonds, some of which are said to equal the finest stones ever discovered in India, have been found in diamond mines in Arkansas.

It was 1400 years between the discovery by Galen, the second century Roman physician, that the arteries contain blood, and the discovery by William Harvey, the Englishman, that the blood runs in a circle.

The Museum of the American Indian in New York, the greatest museum in the world devoted exclusively to the Indian, grew out of the purchase by George Gustav Heye of a Navajo Indian shirt.

Mohammed said: "If it were not for that fine dust which we see floating in the sunbeam, and if it were not for the danger from stagnating waters, Adam's son would live ten centuries."