SCIENCE NEWS

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ELECTRICAL APPARATUS FOR BRAIN CENTERS

IMPROVED electrical apparatus for investigating the functions of deep brain centers and other remote nerve centers has been developed by Professor E. L. Chaffee, of Harvard University, and Dr. Richard U. Light, of the Yale Medical School.

Already in use in research at Yale, this improved method of investigation has been remarkably successful and holds promise of being of great importance in medical research, according to Professor Chaffee.

The new apparatus has the advantage of eliminating one of the principal faults of previous experiments involving the electrical excitation of an animal's nervous system, the necessity of connecting the subject to an electrical circuit by wires.

This method necessitated either anesthetizing the animal, thus suppressing many normal functions, or restraining the animal, thus interfering with normal reactions. The need of connecting the animal to an outside electrical source has been eliminated, thus allowing the animal to move freely and lead a normal life throughout the experiments.

There is no interference with the animal's regular habits of eating, sleeping, drinking and exercising, the subject suffers practically no discomfort at all and thus much more significant results are obtained.

The apparatus operates on the principle of induction, a small coil of wire, the secondary coil, being applied to any portion of the animal that the experimenter wishes to test. One end of this coil is attached to a platinum plate embedded in the animal's tissues. The other terminal is connected to a very thin platinum wire, insulated its entire length except for the very tip, which may be touched to any brain center or nervous tissue that is under investigation.

It is possible with this apparatus to confine the stimulus to a very small and accurately known region, and the tiny wound for insertion of the wire heals quickly and easily with no ill effects to the animal.

Electrical energy is supplied to the small secondary coil from an external or primary coil in either one of two ways. The simpler form is a single coil three or more feet in diameter, large enough to enclose the small cage in which the animal is to live.

The better form consists of three such coils mutually perpendicular to each other and enclosing a similar cage. This type of primary coil permits better control of the stimulus and therefore gives more accurate results. Variation of intensity in various parts of the cage is remarkably small.

The interpretation of experiments involving this apparatus must depend on the knowledge of the wave form, intensity and frequency of the stimulus. Professor Chaffee has developed the theory and experimental method which makes this possible, having first made certain measurements and certain assumptions as to the electrical properties of the animal tissue through which the stimulus must be applied.

The apparatus was designed to allow controlled variation of intensity and frequency, and general control of wave form. The discharge through the three primary coils occurs in rotation, the frequency and switching operations being automatically controlled by vacuum tubes.

ALUM TREATMENT FOR ENCEPHALITIS

A NEW way of getting protection against infantile paralysis, encephalitis and similar diseases which invade the body through the lining membranes of the nose may result from studies just reported by Dr. Charles Armstrong, of the National Institute of Health of the U. S. Public Health Service.

It was in the course of these studies that Dr. Armstrong himself recently suffered an attack of encephalitis as a result of working with the infective virus for many months.

Dr. Armstrong reports that a three per cent. solution of sodium alum dropped once a week into the nostrils of white mice enabled these animals to resist nasal infection with the virus of encephalitis from the epidemic in St. Louis in 1933. This was because sodium alum of just that strength provided the right degree of irritation to make the nasal mucous membrane resistant to the encephalitis virus. Other strengths of sodium alum and other solutions, such as salt and sugar, were not as satisfactory.

In the beginning of his investigations the mice were given weekly doses of the alum solution for several weeks before giving an infective dose of encephalitus virus. It was thought that perhaps such astringent or mildly irritating treatment, if applied in the face of an epidemic or in the presence of the virus, might enhance susceptibility to infection.

Further investigation, however, showed that dropping the solution into the animal's nostrils just before or soon after the infective dose did not increase their susceptibility to infection, but might even lessen it. This point may be of significance in developing the method to give protection during epidemics.

Dr. Armstrong's work has not yet been given practical application, but reading between the lines of his scientific conclusions it appears that he believes it may pave the way for this in the future.

The experimental work here recorded therefore suggests lines of study which may possibly lead to the development of procedure of practical value in preventing infections contracted by way of the nasal mucous membranes.

Since not only encephalitis but the much-dreaded infantile paralysis is among the diseases that enter the body through the nasal membranes, Dr. Armstrong's research, if it develops practical value, will be of tremendous importance in man's fight against disease. The

latest research started from observations by himself and a number of other medical research men, that different substances could modify the local reaction to invading disease germs and viruses. That the effect is purely a local one was shown by the fact that mice that had had the nasal alum treatment were not able to resist the infective virus when it was injected into the brain instead of being introduced by way of the nostrils.

DISEASES OF GAME ANIMALS

THE veterinarian's difficulty in diagnosing the illness of an animal that can not speak to tell him "where it hurts" is encountered in aggravated form by the biologist who undertakes to study the sicknesses of wild animals in their native woods and waters. Yet it is important to understand the diseases of wildlife, for epidemics among game animals and birds frequently kill off a larger proportion of the afflicted species than all guns and traps put together, and can readily undo in a single season all the work of years of careful conservation and propagation.

How an approach to a diagnosis of wildlife disease can be made was outlined before the meeting of the American Game Conference by Dr. J. E. Shillinger, of the U. S. Biological Survey.

Counting the pulse and taking the temperature, standby procedures of the physician and the veterinarian, are of little use to the student of wildlife diseases. Momentary states of excitement or fear, such as might be induced by the very approach or touch of a human being, so change a wild animal's pulse and even its temperature that such readings would be quite meaningless. The wildlife "doctor" must depend on other diagnostic signs.

The natural instincts of a wild animal or bird hinder his efforts still further, for it seems to be the habit of most wild creatures to simulate health as long as they are able to walk or fly at all. Only when they are very sick indeed do they betray their state by abnormal appearance or actions. And even when they begin to "look sick," there is still a baffling sameness about their symptoms, whatever the specific ailment may be—the same lacklustre appearance of fur or feathers, the same lassitude and "droopiness."

Yet there are at least some differences in appearance or behavior that may help the diagnosing biologist. Some illnesses, for example, may cause great muscular weakness without loss of appetite; lead poisoning is such a one. If animals die quickly, without much loss of flesh, suspicion may point at an acute infectious bacterial trouble.

However, even with the best efforts, it is frequently impossible to tell what ails a sick wildlife population until you can find some dead specimens and subject them to a minute and methodical postmortem examination, Dr. Shillinger reports. He gave detailed directions for making such examinations. With the knowledge gained from dead victims of a disease, steps may then be possible to better the lot of those yet living.

The Biological Survey is cooperating with the University of Minnesota in a wildlife disease survey of a sample game area. Results of a year of this work were reported jointly by Dr. R. G. Green, of the University of Minnesota, and Dr. Shillinger.

ELECTRON TUBES USED IN ELECTRIC MOTORS

(By Science Service)

A NEW type of electric motor which is believed to be revolutionary was described before the meeting of the American Institute of Electrical Engineers by the Swedish-born electrical engineer, Dr. E. F. W. Alexanderson, who is consultant for the General Electric Company.

It can be "plugged in" right across the leads of a 2,300-volt circuit and start gently and easily and not burn up. It uses electron tubes to turn alternating current into direct current so that the motor, although it runs off a–c, has the characteristics of a variable speed d–c motor. Instead of being started with a special resistance device for controlling the current supplied to it, the new motor can start from the beginning at "full throttle." The starting of the motor can thus be made entirely automatic from a remote point miles away if desired.

At an experimental installation at Schenectady the motor used is of 400 horsepower. The motor in a household electric fan is seldom more than one quarter horsepower.

In describing the new application of electron tubes to the field of electric motors Dr. Alexanderson in his paper, presented with A. H. Mittag, of the General Electric Company, told how the thyratron tubes employed take the place of the commutator in the usual motor.

A commutator consists of the copper segments at the end of the rotating part of an electric motor. Brushes, usually of carbon, bear against it and pass current through the rotor in the proper way. The make and break of such arrangement finally leads to sparking at the brushes, which requires a cleaning of the commutator and a reshaping of the brushes. With the electron tube commutator device such hindrances are avoided.

The new motor has a stationary armature and a revolving field of the type used in synchronous motors. The armature, however, is provided with a special winding. Unidirectional current is supplied by means of a group of full-wave rectifying thyratron tubes which operate from the three-phase 60-cycle current source.

The operation of the thyratron rectifiers is controlled by means of grids in these tubes so that power is supplied to the motor windings in the proper sequence and amount necessary to give the required torque for operation.

BACTERIA ON DRINKING GLASSES

As many as 50,000 to 100,000 bacteria on a single glass were discovered by Professor W. L. Mallmann and E. D. Devereux, of the Michigan State College.

The investigation covers the sanitary condition of glasses at roadhouses, taverns, and saloons in cooperation with the Lansing department of health.

The possible rôle of eating utensils as a factor in the transmission of disease has been demonstrated from time to time over a period of years, they reported to the So-

ciety of American Bacteriologists. Tableware has been shown to be a carrier of the organisms causing diphtheria, pneumonia and tuberculosis and of two kinds of dangerous streptococcus germs.

Since the repeal of prohibition there have sprung up numerous roadhouses, taverns and saloons for the dispensing of alcoholic beverages. Many of these places are inadequately equipped with means of cleaning and sterilizing glassware. In many places not even running water is available, to say nothing of hot water. As a result various methods of cleaning and sterilizing glassware have developed, many of which are extremely questionable.

The investigation was started some months after a local health ordinance had gone into effect requiring the use of a chlorine rinse containing 200 parts per million of chlorine as a sterilizing agent for beverage glasses. Professor Mallmann and Mr. Devereux examined both the rinses being used and the glasses. Clean and dirty glasses were tested by swabbing the rims to a depth of half an inch on the inside and outside.

Few of the glasses were entirely free of germs, and as many as 50,000 to 100,000 bacteria were found on some. In most cases, there were more bacteria found on the rims of the clean glasses than the dirty ones. This, Professor Mallmann explained, is because the bacteria are washed off into the beverage in the glass. Nevertheless many of the dirty glasses and some of the clean ones had streptococci on their rims.

As a result of their investigation, they recommended certain provisions for sterilization of glasses. These included preliminary rinsing of the glasses to remove all beverage or other material, immersion for at least five minutes in the chlorine rinse or shorter immersion followed by five minutes draining without running off the chlorine water, and then a final rinsing in clean ice water or running tap water.

After these recommendations were made effective by the local health department, a number of places were revisited and the condition of the glassware was found improved.

COSMIC RADIATION FROM ERUPTING STARS

EXPLODING stars as the birthplace of the powerful cosmic rays are suggested by Professor Werner Kolhoerster's researches reported from Germany.

It is not a new idea that more cosmic rays come from the spectacular erupting star in the constellation of Hercules than from the rest of the sky.

Dr. Fritz Zwicky, of the California Institute of Technology, a few months ago put forth the idea that cosmic rays are let loose when a gigantic stellar explosion occurs, but he has felt that even the new Hercules nova, seen since December as a brilliant star near Vega, was too feeble to give many cosmic rays.

Professor Kolhoerster has found that when he pointed his cosmic ray counters directly at Nova Hercules during its recent eruption the cosmic ray intensity increased as the star grew brighter and brighter. An article published in the *Berliner Tageblatt* states the cosmic ray intensity increased from one to two per cent. as he sighted his cosmic ray "telescope" at the star.

Hitherto observers have found no increase in ray intensity as they pointed their instruments at the sun or other stars in the sky; a finding which has led to the belief that cosmic rays come from interstellar space. Professor Kolhoerster's discovery, if confirmed, suggests that these past researches were not timed properly; that the special nova type star is the one which needs watching.

ITEMS

SUDDEN heart attacks, often masked under the name of "acute indigestion" and generally very alarming, are not so often fatal, it appears from investigations reported by Dr. Louis Faugeres Bishop and Dr. Louis Faugeres Bishop, Jr., who pointed out that recovery has been proved to be more frequent by far than formerly supposed. The circulation of blood in the heart muscle itself is the factor involved in many serious heart attacks, a fact which is gaining recognition, they emphasized. The increasing importance of this type of heart disease is widely recognized by insurance companies. A scientific instrument known as the electrocardiograph is of great value in detecting it.

SEISMOGRAPHS, instruments whose normal function is the measurement of distant shakings of the earth's crust, can also be used to detect local tiltings so slight as to escape the most precise measurements by surveying methods. Professor John P. Delaney, of Canisius College, told of using one of his exceedingly sensitive seismographs for the purpose of studying ground tilt toward the southwest in the region around Buffalo, N. Y.

FIGURES for pneumonia deaths per 100,000 of the population during the last few years have surprised health experts. Something apparently has happened to the affinity between pneumonia and influenza death rates. High death rates for these two diseases usually go together, but during the year just ended and also during the year 1932, the picture was reversed, according to statisticians of the Metropolitan Life Insurance Company. In 1934, reports from all over the country showed the fewest number of influenza cases in many years and the influenza mortality rate among the insurance company's industrial policy holders was half that of the previous year. Contrary to expectation, however, there was a pronounced increase in the pneumonia death rate. On the other hand, 1932 began with an influenza epidemic and closed with the lowest pneumonia death rate on record up to that time.

THE uneasy sea bottom off the Aleutian Islands, one of the most active earthquake regions of the world, took another shaking early on Wednesday morning, January 23, when at 2:24.1 A. M., eastern standard time, a severe quake took place. Seismologists of the U. S. Coast and Geodetic Survey gave the epicenter location as latitude 51 degrees north, longitude 168 degrees west. This is approximately 130 miles south of Unalaska Island.