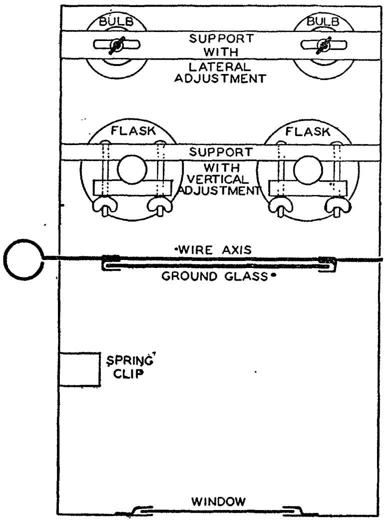

FIG. 1. Illuminator for viewing a transparent object by transmitted light with a binocular dissecting microscope.

inverted position on a wooden cross-piece in such a way as to provide for lateral adjustment. In front of the bulbs are two identical 500 cc flasks with alkaline copper sulfate solution. They are held in clamps to allow vertical adjustment and are at such a distance apart as to give a correct angle between the beams at the microscope mirror. In front of these flasks is a ground glass from a 5 by 7 inch camera. This glass is mounted in two pieces of folded tin soldered at the top to a heavy wire running through the two sides of the box and bent at one end to form a handle. By rotating this wire, the glass can be raised out of the beam of light into a horizontal position and held there by a spring clip. The window in front is 8 cm high and is made of a lantern slide cover or other piece of plane glass slid into a dust-tight groove.

In assembling the outfit care should be taken with regard to rotation of the bulbs so as to present the flat surface of the filament to the flasks. The distances between the bulbs and the flasks must be determined empirically according to the condensing focus of the particular flasks used. The other distances can be approximately determined from the distance at which the microscope is to be used, and by means of the clamps, final adjustment can be made to the position of greatest efficiency in actual use.

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A MODIFIED BULB PIPETTE

WHILE isolating and transferring Protozoa with a pipette of the medicine dropper type, it occurred to the writer that the manipulation of the pipette might be made much easier if the rubber bulb were moved down over the pipette a short distance. This actually proved to be the case when pipettes of this type were made and used for various types of work. The writer has found no mention of such a modification in the literature and felt that a sketch and a few explanatory remarks as to the construction of the pipette might be of some value to others.

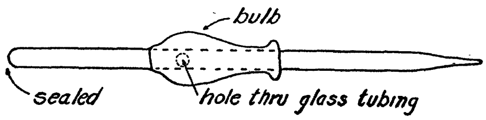

FIG. 1.

The pipette, shown in the accompanying figure, is not difficult to make. One end of a length of glass tubing is first sealed with a flame. The region where the bulb is to be placed is then heated with a small flame and a hole is blown through. The edges of the hole are then rounded down in the flame. A small hole is made in the end of an ordinary rubber pipette bulb, and the bulb is pushed down over the glass tubing. It is placed in such a position that the chamber of the bulb will communicate with the lumen of the pipette by means of the hole previously made in the side of the tubing. To insure a tight fit, cord or fine wire may be wrapped and drawn up over either end of the bulb. The open end of the glass tubing is then heated and drawn out.

The size and kind of glass tubing, as well as the length of the pipette, the size of the point, and the place for the bulb will depend upon the preference of the user and the use to which the pipette is to be put.

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NEW TOWER FILLING MATERIAL

MANY types of tower packing are at present available for such purposes as filling reaction, absorption and distilling towers. The author has recently developed a novel form which is free draining and presents a large active surface per unit volume. It consists of a maltese cross whose wings have been rotated a sufficient number of degrees (for example, thirty degrees) to impart a rotating motion to the gas passing through the packing. This packing may also be made in circular form, with two or more wings, in which case it roughly resembles a propeller. Projections or webs may be added for structural strength or to prevent too close contact between adjacent packing units. For example, the center may be considerably thickened so that if two units superimpose they will not touch at all points. Holes may be introduced for drainage. Two or more units may be connected by webs or other suitable means if so desired. The packing wings may be either plane or curved surfaces, or with suitable projections, and may be made of any of the usual materials of construction, such as stoneware, copper or wire screen.

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SPECIAL ARTICLES

POTENTIAL RHYTHMS OF THE CEREBRAL CORTEX DURING SLEEP

RECENT interest in brain potentials has induced us to put on record the results of experiments carried out in the Loomis Laboratory, Tuxedo Park, in which a new phenomenon in this fascinating field has appeared most clearly—namely, the very definite occurrence of trains of rhythmic potential changes as a result of sounds heard by a human subject during sleep. Since the work of previous investigators[1] has emphasized that rhythms which spontaneously appear in a person at rest with eyes closed disappear when an object is viewed or the attention concentrated, we believe the definite demonstration of a means of inducing rhythmic brain discharges to be of considerable interest. At the same time the method of continuous study and correlation with other body changes over periods of seven hours, described herein, greatly facilitates interpretation of results where many factors, difficult to control, are undoubtedly involved. Sleep was selected as a condition during which brain activity is at a minimum and physiological conditions most constant.

The records are made on paper wrapped on a horizontal drum 8 feet long and 44 inches in circumference revolving once a minute. Two high-speed dynamic siphon recorders describe a pair of spiral lines one fifth inch apart, as they move horizontally parallel to the drum at the rate of one foot per hour. Each heart beat, each respiration, each bed movement and any noises in the bedroom are recorded by one pen (red ink) as characteristic marks, while brain potentials are recorded by the other pen (green ink). In addition three rachet devices sum the heart beats, the respirations and the bed movements each minute, marking the rate per minute on the paper. The drum, driven by a synchronous motor, acts as its own clock, and stimuli may be sent to the sleeper each minute by electric contact on the drum, thereby placing a series of responses near together on the record and allowing easy comparison with the condition where no stimuli are sent in. The amplitude of the brain potentials are ascertained regularly by calibration with sinusoidal potentials of from 2 to 30 per second frequency and from 10 to 50 microvolts amplitude. The siphon recorder records have been checked from time to time by the cathode ray oscillograph.

The finished record is a sheet of paper 44 inches high and 8 feet long with vertical red and green lines, each pair representing a minute of time. Changes in the processes recorded can be seen at a glance. Either the red or the green lines can be rendered invisible by viewing the record through a red or green glass and inspection thereby simplified. The single sheet of paper, even though large, is a great improvement over the use of paper tape, which was abandoned because examination of the one half mile of tape necessary for an eight-hour run was too time-consuming.

The subject sleeps in a quiet, electrically screened room, containing a very sensitive microphone and a photo-electric bed movement recorder. Electrodes for detecting the various physiological processes are attached to the subject and the amplified impulses sent through shielded cables to the control room 66 feet away. Details of the apparatus will be described in a later paper. Facial movements, swallowing, clenching the jaws, etc., give rise to muscle potentials which appear on the record, but which are quite characteristic and easily distinguishable from brain potentials, as are also disturbances due to passive movements of the scalp.

Our investigation of the brain potential rhythms during night sleep (brain electrodes on high forehead and crown of head) has led us to the following conclusions:

(1) They are undoubtedly of cortical origin and distinct from muscle potentials and movement artifacts. Different persons show quite different potential records.

(2) In a night record certain hours of sleep show many "spontaneous" bursts of waves, while other hours show relatively few.

(3) They often appear in trains lasting 5 to 12 seconds, at intervals of ½ to 2 minutes.

(4) The frequency is on the average an irregular 10 per second, but frequently very regular bursts lasting 1 to 1½ seconds of 14 per second frequency appear. The amplitude builds regularly to a maximum and then falls regularly so that we have designated these "spindles," because of their appearance in the record. Shorter spindles or "balls" of ¼–⅓ second duration occasionally appear. Five other types can also be distinguished.

(5) They are not correlated with heart beat nor necessarily with respiration, but at times a definite characteristic potential change has accompanied each respiration.

(6) Regular snoring does not necessarily initiate

[1] Literature in paper by Adrian and Mathews, *Brain*, 37: 355, 1934; also Jasper and Carmichael, SCIENCE, 81: 51, 1935. See H. Berger in *Arch. f. Psychiat.*, 1929–35.