The average deviation of the micro (0.2 cc) colorimetric results from the macro (1 cc) gasometric values was ±1.5%, with extreme limits of −3.6 and +2.8%.

13065 P

Electro-Encephalographic Diagnosis of Extradural and Subdural Hemorrhage.

MARK ALBERT GLASER AND HENDRICKUS SJAARDEMA. (Introduced by C. H. Thienes.)

From the Research Laboratory, Cedars of Lebanon Hospital, Los Angeles, California.

It has been our belief that abnormal waves produced by pressure lesions upon the surface of the brain, such as extradural or subdural hemorrhage, etc., would differ from those wherein the brain was actually damaged or destroyed by laceration, contusion or tumor invasion. In order to determine these facts, we have studied, to date, 30 experimental animals, retesting them for 4 months, and 3 clinical cases of verified acute and subacute hematomas.

In 3 patients with verified subdural hematoma, 2 were subacute and one was acute; the electro-encephalographic diagnosis demonstrated delta waves of 1 cycle per second, with a voltage of 100 microvolts, combined with a rapid wave of 16 cycles per second, and a voltage of 20 microvolts. This pattern was localized over the hemorrhage. Following the surgical removal of these hemorrhages, the waves immediately returned to normal in the acute case. Six months later the 2 subacute cases showed normal waves. In the acute case the test was repeated within 12 hours after the removal of the hemorrhage. The high beta waves had disappeared and the 1 and 2 cycle delta waves of 100 microvolts had changed to 2 to 4 cycle deltas of 75 to 150 microvolts. This type of wave was found in all leads.

The normal electro-encephalogram of the rabbit, as obtained through the intact skull, was established by 150 recordings. No. 5 gelatine capsules, covered with animal membrane, were filled with citrated rabbit's blood. In one-half of these capsules thorotrast was added to make the capsule opaque to the roentgen ray. This addition of thorotrast did not affect the electrical waves. Under aseptic pro-

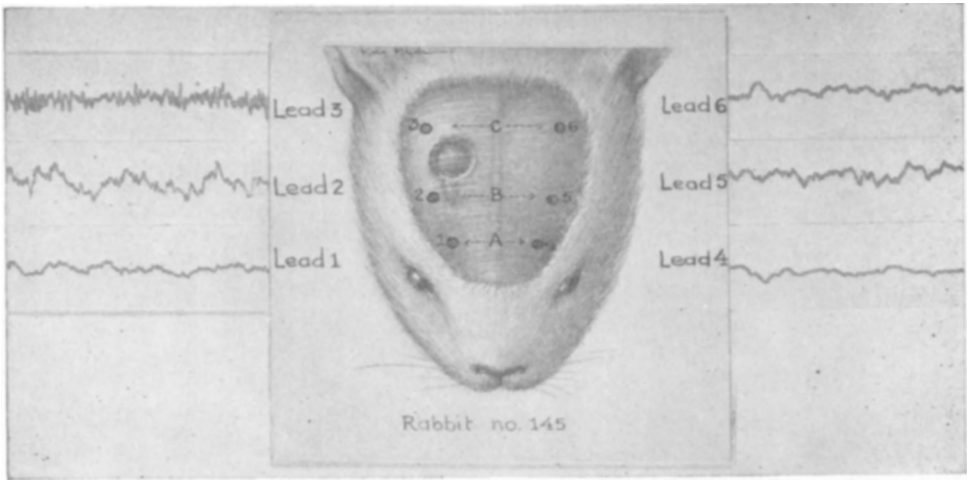

FIG. 1.
Characteristic waves found immediately after insertion of capsule to four months post-surgical.

caine anesthesia the capsules were inserted subdurally in some animals and extradurally in others.

The following wave patterns (Fig. 1) appeared immediately after insertion of the capsule and have persisted for a period of 5 months: (1) The 4 to 6 cycle per second waves of 60 microvolts were absent in all animals; (2) the 16 and 30 cycle per second waves of 5 microvolts were increased to 20 microvolts; (3) a combination pattern consisting of 2 to 4 cycle waves of 50 to 150 microvolts wherein 16 to 30 cycle waves were superimposed upon the 2 and 4 cycle waves.

The electro-encephalogram recorded immediately after removal of a capsule one week after insertion was entirely normal, except that the 4 to 6 cycle per second waves did not appear in those animals wherein they were originally present.

The electro-encephalogram taken immediately after removal of the capsule, which had been inserted 2 weeks prior, showed a gradual decrease in the abnormalities. Within one week's time the waves were entirely normal. The abnormalities found were as follows: (1) The 4 to 6 cycle per second waves of 60 microvolts were absent in all animals; (2) the 16 and 30 cycle per second waves of 5 microvolts were increased and ranged around 10 microvolts; (3) the 2 to 4 cycle per second waves were reduced and ranged around 75 microvolts. The same combination wave existed. In the rabbits, wherein the capsules were removed from 3 to 4 weeks after insertion, the same decrease in voltage occurred as in the 2-weeks group.

At a later date, we will report the length of time necessary for these capsules to remain in the brain to cause permanent damage, the type of abnormal waves associated with cortical and subcortical trauma, and the existence of these patterns in meningioma, gumma, tuberculoma and hydrocephalus.

Conclusions. Three clinical cases of subdural hematoma, and 30 rabbits wherein capsules had been inserted, both extradurally and subdurally, demonstrated a consistent wave pattern.

13066 P

A Comparative Study of Rodent and Burrow Flea Populations.*

M. A. STEWART AND F. C. EVANS. (Introduced by K. F. Meyer.)

From the Division of Entomology and Parasitology, University of California, Davis, and the George Williams Hooper Foundation for Medical Research, University of California, San Francisco.

An area located at Calaveras Dam, Alameda County, California, previously determined to be heavily populated with ground squirrels [*Citellus beecheyi* (Richardson)], was selected for field study of (1) the correlation between flea populations existing at squirrel burrow openings and of flea populations on the rodent hosts, and of (2) the seasonal species composition of these populations. One portion of this area was set aside for the study of the fleas at the openings of the burrows, and a contiguous and ecologically similar portion was utilized for the study of fleas taken directly from their hosts.

Fleas at the burrow openings were collected from pieces of cotton batting placed in each burrow mouth. Thirty burrows were set aside for these studies, divided into 3 groups of 10 burrows each and approximately equally distributed as to direction of exposure, amount of exposure, surrounding cover crop and topography. Collections were made at approximately weekly intervals from April 29, 1940, to October 23, 1940, as shown in Graph 1, and they were made

* This study was conducted with the financial assistance of the Rosenberg Foundation. The authors wish to express their appreciation to Dr. K. F. Meyer, Director of the George Williams Hooper Foundation, for his constant advice and suggestions, to Dr. E. B. Roessler, Head of the Division of Mathematics and Physics, University of California, Davis, for valuable assistance in the analysis of data, and to Robert Holdenried for assistance in collecting material in the field.