sporocyst wall assumes a reddish tint. We can not agree between ourselves whether or not the sporozoites are stained a very light blue. At any rate the structures within the sporocyst are rendered visible. We suspect that the improved optical properties are the result of reducing the glare by staining the material about the sporocysts.

The foregoing procedure may be variously modified. The technique may be adapted to oocysts in a test tube instead of under a cover-glass. Also, we have found that if the fresh, non-sporulated cysts are used instead of those in the sporulated condition, development will occur beneath the cover-glass if heat is not applied while the preparation is flooded with acetic acid.

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THE LIGATION OF EARTHWORMS TO REMOVE THE ANTERIOR OR POSTERIOR END

DURING experiments conducted on the regeneration of blood vessels in earthworms, it was desired to remove the anterior thirteen somites. To effect this removal of tissue the following method was found to be superior to the usual method of cutting with a scalpel.

This method consists of tying the worm tightly enough to cause the end to slough off. In a six- to eight-inch piece of number 00 silk thread, a single knot is tied and drawn to a quarter-inch loop through which the worm is caused to crawl. The number of somites can be counted as the worm crawls through the loop and at the desired point the knot is drawn tight enough to constrict the worm to the smallest diameter without cutting the body wall. A little practice will determine how much pressure can be applied to the silk to obtain the desired result. This knot should be tied quickly and drawn against the finger with the ends of the silk on each side of the finger to prevent the worm from twisting into the thread. A second and third knot is then tied and the surplus silk clipped off.

The anterior end remains attached to the posterior for from two to four days; if it remains attached longer than this it is probable that the first knot was not tied tightly enough and a second tying is necessary.

This method is far more successful than that of cutting for several reasons. When the silk is tied around the worm a large quantity of mucus is secreted protecting the region. When the anterior end sloughs off the surface left exposed is very small, averaging about one millimeter in diameter. Around this end at the time of separation there is already a protecting fringe of proliferated epithelium. Extrusion of the digestive tract is very rare, allowing more rapid recovery. When worms are cut with the scalpel the contractions of the body wall often force the digestive tract out, and at best leaves a large surface exposed for bacterial infection, causing high mortality.

A point of great importance, in the work on blood vessels, is the retention of all the blood in the vessels. When the worms are severed by the scalpel much blood is lost. By tying, all the blood is kept in the vessels, leaving the worm in better condition

In summing up the advantages of this method it may be said that it is far superior to cutting, allowing the animal to readjust itself more gradually to the loss of tissue. While the shock of tying the worm so tightly may be as great as the shock of cutting, certainly the post-operative effects are not so great. Regeneration starts more quickly and proceeds more rapidly. Worms severed in this manner showed signs of feeding activities in about one to one and one half months.

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SPECIAL ARTICLES

ON A RELEASE-PHENOMENON IN ELECTRICAL STIMULATION OF THE "MOTOR" CEREBRAL CORTEX

THE starting-point for this investigation was the question as to how the excitability of a motor point of the cerebral cortex and eventually the reactions obtained by its stimulation would be influenced, if changes occurred at all, when the surrounding parts of the cortex were put out of function. To avoid as far as possible shock-producing effects on the cortex, we decided to produce a functional block of the cortex round the motor point under investigation by local anesthesia with novocaine.

The general course of these experiments was as follows: general anesthesia of the animal by intraperitoneal injection of Dial (0.4–0.6 cc Dial Ciba per kg bodyweight), which leaves, as Fulton, Liddell and Rioch recently have shown, the cortex rather well excitable for electrical stimulation. After 1 to 2 hours, or even longer, when an even stage of narcosis is reached, the threshold of a point of the so-called motor cortex was determined for faradic bipolar or

unipolar stimulation during periods of from 5 or 10 seconds, at intervals of 1.5 to 2 minutes. After showing that several of these liminal stimulations yielded constant responses, 1 per cent. novocaine solution colored by toluidine blue was applied round the point, and the stimulation of the motor focus was continued at regular intervals of from 1.5 to 2 minutes. The area around the motor point, surrounded by the novocainized cortex, usually had a diameter of about 8 mm.

When the general condition of the animal remains constant, one finds in the cat, dog and monkey (*Macacus rhesus*) that after 8 to 15 minutes, usually at about 13 minutes, the excitability of the motor point is *augmented, i.e.,* the threshold for the point in question is diminished, or that when the strength of stimulus is kept unchanged throughout the whole experiment, the responses are distinctly stronger and even wider spread; a point which before the novocainization, at 13 cm coil-distance, gave rise to a slight flexion of the fingers of the contralateral hand, may now yield, at the same coil-distance, not only a much stronger flexion of the fingers, but also flexion of the wrist and often flexion of the elbow and retraction of the shoulder. In the cat and the dog we occasionally observed spread of the response to the hind limb of the same side, or, if the primary stimulation took place on the hind leg, a spread of response towards the front leg. Occasionally, also, a reversal together with augmentation of the response could be observed, *e.g.,* the primary liminal flexion changed after the novocainization into a much stronger extension of the same joint and of other joints of the same limb. Very often a marked clonic, partial epileptoid after-discharge entered into the picture. We have obtained in the monkey this augmentation of responses from the face, arm and leg areas of the cortex. This augmentation, which only sets in after a long latent period of from 8 to 15 minutes, subsides after 20 to 45 minutes. Renewed application of novocaine often gives rise once more to the appearance of the phenomenon.

Cortical facilitation is a well-known phenomenon since Exner discovered it in 1882; and especially so since through the investigations of Graham Brown and Sherrington it is known that cortical motor points do not yield fixed reactions, but are more or less "instable," because upon repeated stimulation of a motor point or after stimulation of another cortical antagonistic point, the response may be augmented or may change in pattern, *e.g.,* from extension into flexion (primary and secondary facilitation). These phenomena occur, at least so far as is now known, only when the two liminal stimuli succeed each other within a few seconds, intervals of one minute being sufficient to do away with any ordinary facilitation known at present. In introducing intervals of from 1.5 to 2 minutes we actually did not observe any facilitation, before the local anesthesia with novocaine.

The long latency of 8 to 15 minutes also points in the direction, that in this curious phenomenon of augmentation of response we have not to do with a primary phase of hyperexcitability of the local anesthesia. So far as we know, such a phase, if present at all, in local novocaine-anesthesia is much less marked than in local narcosis by cocaine and stovaine, and even here this primary phase of hyperexcitability through which the nerve goes (for which most of the investigations on changes in excitability during local anesthesia are carried out) occurs within the first minute or minutes after the application and soon passes away. Furthermore, novocainization of a motor point itself gives rise to a marked depression or even a temporary extinction of its excitability. We may safely assume, therefore, in our experiments, that this explanation does not account for the augmentation of response.

The explanation of our phenomenon is difficult to give in the present state of our knowledge of cortical functions. Perhaps the most probable hypothesis is to look upon it as a phenomenon of "release" of function in the sense of Hughlings Jackson and Head, the excitability of a small area of the cortex cerebri becoming (temporarily) augmented when it is "released" from the influence of the surrounding cortical areas.

We have not succeeded in obtaining this phenomenon after circumcision of a cortical point; the circumcision gives rise, as might be expected, to a long lasting depression or loss of excitability of the motor point. Apparently we succeeded in establishing our phenomenon with novocaine because this drug blocks functionally, but without producing cortical shock.

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THE ETIOLOGY OF SWINE INFLUENZA

SWINE influenza ("hog flu") was first recognized as a clinical entity in 1918 and since then has reappeared in epizootic form each autumn and winter in the swine raising states of the middle west. It bears a striking resemblance to influenza in man. Experimentally, the disease can be readily transmitted by contact and also by the introduction of tracheal exudate from infected animals into the nasal passages of normal swine. Eight strains of the disease have been established among our experimental swine during the three years it has been under investigation in this laboratory.

In these experimental infections as well as in diseased animals studied in the field an organism, first isolated by the late Dr. Paul A. Lewis, with whom this investigation was started, has been found constantly