

In these experiments a determination of the drug concentration in the blood was with few exceptions made once every day on every animal. (Graph 1.) The method of analysis described by Marshall and Cutting⁵ was employed. On the 3rd day of the drug diet, wounds exactly similar to those of the control group were made. Tensile strengths and histological studies were similarly carried out from the 4th through the 14th postoperative day. A few of the animals in this group failed for one reason or another to build up and sustain "therapeutic" blood levels of the drug. These were discarded.

In 4 instances, 2 in the control and 2 in the experimental group, small localized abscesses were discovered adjacent to the operative site in the stomach. These were discarded. In the remaining animals the wounds healed *per primam*. In each group the averages of the breaking strength for every postoperative interval, as well as the standard deviation, were computed. Fisher's formula for small samples was applied to determine whether the difference in the means of the 2 groups was statistically significant.

Results. Sulfanilamide did not appear to retard or inhibit the healing of stomach wounds in rats. The curves of healing of these wounds as measured by their tensile strengths were practically identical in the control and experimental groups. (Graph II.) Histological studies of the wounds at each time interval revealed no striking differences in the 2 groups. The oral method of administering the drug was found to be effective and easy of application.

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Single Responses of Motor Units in Consequence of Volitional Effort.

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Since the demonstration by Adrian and Bronk¹ that action potentials could be recorded from single skeletal motor units* during

⁵ Marshall, E. K., Jr., and Cutting, W. C., *Bull. Johns Hopkins Hosp.*, 1938, **63**, 328.

¹ Adrian, E. D., and Bronk, D. W., *J. Physiol.*, 1928, **66**, 81.

* Stetson and Bouman used the term *motor unit* to denote (p. 210) " . . . a time interval during which occur contractions more or less synchronous of groups

voluntary muscular activity, several workers have published studies which have made use of this technic. The published material with which we are familiar has, however, dealt with more or less sustained contractions of the muscles voluntarily activated so that records of single motor units have, in all such cases shown repeated discharges. Stetson and Bouman² recorded muscle action potentials by means of electrodes placed against the skin. Their records, therefore, were led from many motor units. However, they found that when a quick, ballistic type of movement was made by the subject, the resulting record often revealed one or more groups of discharges, each of these having a duration of about 50 msec. There was, therefore, the possibility that, where a single unit burst appeared, it represented the activity of a considerable number of motor units discharging asynchronously over a period of about 50 msec, but with each motor unit discharging only once.

It seemed of interest to attempt the registration of a single motor unit discharge resulting from a single, quick, volitional effort. At the present time, 6 normal humans have been used. From each of these there have been obtained records of single discharges of single motor units from one or more of 11 muscles. A high degree of co-operation is required of the subject in order that the muscle unit near the recording electrodes may be made to respond with each



FIG. 1.

Tracing from record showing mechanical movement and electromyogram of brachialis muscle obtained during repeated slight voluntary flexion movements of the forearm. The record is continuous. Toward the end of the record a sustained contraction was produced.

of fibers . . .” Liddell and Sherrington³ employed the term to designate “. . .the motoneurone-axone and its adjunct muscle fibres . . .” It is in this latter and more generally accepted sense that the term is employed in this paper.

² Stetson, R. H., and Bouman, H. D., *Arch. Neerl. d. Physiol.*, 1935, **20**, 177.

³ Liddell, E. G. T., and Sherrington, C. S., *Proc. Roy. Soc.*, 1925, **97B**, 511.

volitional effort but without the complicating responses of other units.

A complete discussion of functional and technical aspects of the experiments will not be undertaken here but Fig. 1 indicates the type of record which has been obtained. The record has been traced in ink to facilitate reproduction. Two steel sewing needles (No. 12), lacquered to the extreme tips, led to the grids of a differential amplifier. An unlacquered needle was grounded. The 3 needles were inserted close together in the brachialis muscle. The heel of the hand rested on the diaphragm of a tambour and served to record a slight flexor movement of the forearm. During the first part of the record, discrete volitional efforts at intervals of about 0.8 sec each resulted in a single discharge of the single motor neurone which innervated the group of muscle fibers close to a recording electrode. Other motor neurones may or may not have sent impulses to other muscle fibers less favorably situated for recording. Somewhat quicker movements caused the appearance of double spikes due either to repetitive discharge of the original unit or to the introduction of potentials from a second nearby motor unit which had previously been inactive. With sustained effort the usual rhythmic discharge is recorded.

It has been generally believed that the simplest volitional movement possible involves a brief but rhythmic discharge of impulses from the anterior horn cells concerned. The present studies indicate that when the volitional movement is sufficiently slight and brief, the motor neurones may discharge only once.

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Retention of Orally Administered Radio-Phosphorus by Mice.*

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This experiment was devised to determine if the whole body retention of orally administered radio-phosphorus could be increased or decreased by the simultaneous administration of various foods or

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