gas formation as well as fermentation with acid. Galactose, raffinose and rhamnose were fermented with acid formation but gas production was quite variable. Inulin was fermented in only one instance.

In *milk* acid was formed in most instances though with 2 strains an alkaline reaction occurred. Coagulation took place in a few instances. Indole production was absent in all but 3 cases.

In general it will be noted that the organism studied in these cases of bronchial asthma gave typical cultural characteristics, morphology and biochemical reactions of members of the mucoid encapsulated group of bacilli.[5] When present in bronchial asthma there was an associated hypersensitivity of the patients towards the intra-dermal test with vaccine prepared from the bacilli.

7761 C

Augmentation of the Positive After-Potential of Nerves by Yohimbine.

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A nerve poisoned by yohimbine exhibits, after a single response, a recovery curve of excitability characterized by a refractory period, a supernormal period, and a subnormal period.[1] Of these the first 2 have been recognized as existing in unpoisoned nerve and have been brought into approximate relationship with the parts of the action-potential known as the spike and negative after-potential. A subnormal period has been recognized in unpoisoned nerve but only after the nerve has been tetanized, in which case the subnormality is associated with the positive after-potential.[2] The latter association suggests that the effect of yohimbine is to augment the process responsible for the positive after-potential. Such being the case, the apparent absence of a subnormal period following a single response in unpoisoned nerve would be interpreted as due to the small size of the positive after-potential which there exists.

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[5] The Mucoid-Encapsulated Group, A System of Bact. in Relation to Medicine, Med. Research Council, His Majesty's Stationery Office, London, 1929, **4**, 289.

[1] Graham, H. T., PROC. SOC. EXP. BIOL. AND MED., 1933, **31**, 193.

[2] Gasser, H. S., *Am. J. Physiol.*, 1934, in press.

A few experiments sufficed to demonstrate that the potential is augmented as was anticipated. The nerves (isolated sciatic of *Rana pipiens*) were treated in all cases as in the excitability experiments, and their potentials recorded on a cathode ray oscillograph after amplification with a direct-current amplifier, the latter being necessary to avoid distortion of potentials of the length in question.

The progress of the potential-change can best be followed in connection with Fig. 1. All parts of the figure start from a potential-

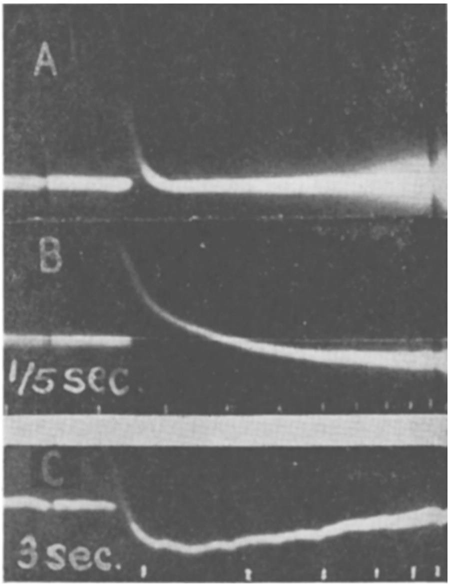
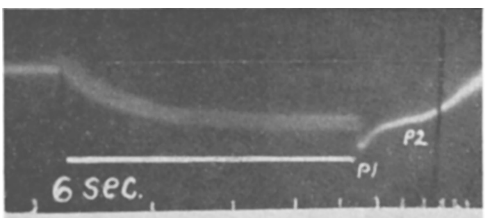


FIG. 1. Effect of yohimbine on after-potentials: A and B on the same time scale and at same amplification; A, normal; B, after yohimbine; C, same condition as B recorded with slower sweep and greater amplification. The nerve is killed under the distal lead. An upward deflection in all records means that the proximal (active) lead is negative. Temperature 24°C.

level reached after a long period (15 minutes or more) of freedom from activity. Activity is induced by a single break induction shock and starts with the spike potential, which throws the spot far off the record. The actual record starts with the negative after-potential and is continued by the positive. In the initial unpoisoned state (Fig. 1 A) the positive after-potential reaches a maximum of about $5\mu v$ and is not distinguishable for more than about 0.6 sec. In the period after yohimbinization it becomes larger and longer (Fig. 1 B). As shown in Fig. 1 C, it reaches a maximum potential of $33\mu v$ at 1.7 sec. and has only dropped to one-third of the maximum after 15 sec. Other experiments resemble the one cited, though there is a considerable variation. Maximum positivity usually occurs in the neighborhood of one second. Half restoration comes commonly in the range 6 to 9 sec., and the total duration may be one-half minute or more. There is thus good correlation with the dimensions of the subnormal period manifested by yohimbinized nerve.[2] The curves reproduced in Fig. 1 show an increase in the duration of the negative after-potential. This is a spontaneous increase which occurs characteristically in all isolated nerves. It is not typical of yohimbine action. When the negative after-potential has developed *before* the application of the drug the effect of the latter is to decrease and shorten it.[1]

As holds for the positive after-potential of normal nerve, accumulation of potential occurs during and after tetanization of yohimbinized nerve. Compared with normal nerve there is a striking difference, however. In the latter the negative after-potential keeps pace with the positive so that during the tetanus the level of the negative after-potential is maintained approximately constant at its maximum. In yohimbinized nerve, on the contrary, the positive potential is so dominant over the negative that, in spite of a constant contribution of negative after-potential by each succeeding impulse in the tetanus, the algebraic sum of the 2 potentials becomes increasingly positive and the



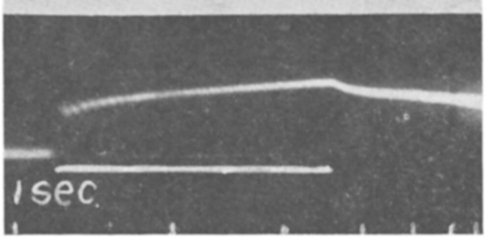


FIG. 2. (Top.) Positive after-potential during and after a tetanus of a yohimbinized nerve. Period of the tetanus marked by white line. Frequency of stimulation about 5 per sec. 1 cm. deflection = 0.52 *mv*. Temperature 22°C.

FIG. 3. (Bottom.) After-potential during and after a tetanus of a veratrinized nerve. Frequency of stimulation 20 per sec. Nerve at room temperature, about 23°C.

negative after-potentials fail to pass the zero level even at their maxima. The course of events is illustrated in Fig. 2. At the break in the line the tetanus starts. Only the after-potentials are visible, the width of the white band of the record being determined by the increments of negative after-potential. If swept out the component responses would look like Fig. 1 B. The top of the band is determined by the negative after-potential crest and the bottom of the band by the amount to which the potential has subsided at the time of arrival of the succeeding impulse. As the tetanus proceeds the positivity at first increases; then the 2 potentials come into balance and a steady state is maintained on the positive side of zero. When the tetanus ceases the negative after-potential subsides much earlier, revealing the positive potential unopposed. In the subsequent restoration of the potential to the resting value 2 parts are seen which are also characteristic of unpoisoned nerve[2]: a rapid portion manifest initially *(P1)* and a slower portion which completes the restoration *(P2)*.

For contrast with the potential accumulation in a yohimbinized nerve during a tetanus, the accumulation of potential as seen in a veratrinized nerve in a similar experiment is shown in Fig. 3. Negative after-potential is here dominant, and the level of the latter rises continuously during the tetanus and lasts long after the latter has ended. In fact, in some nerves the crest of the negative after-potential is not attained until after the tetanus is over.

7762 C

A Fermentation Inhibiting Substance Produced by B. Coli.

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When diphtheria bacilli were grown in broth media in which colon bacilli had previously been cultivated, the fermentation of dextrose, galactose and dextrin was inhibited or retarded. Usually this retardation was evident over a period of about 7 days and at the end of this time fermentation began to become evident. This inhibitory effect of the previous growth of *B. coli* on the fermentative activity of *C. diphtheria* was only evident when small batches of media (150 to 175 cc.) were exposed to the action of *B. coli*. In larger batches of media this inhibitory effect did not develop.