perature. The next morning the rectal temperature was 105.2°. The morning of the following day it was 103.3°. Subsequently a normal temperature was maintained. The lesions were typical of those described for the group of monkeys exhibiting a post-operative rise in temperature and the thalamus was uninjured.

Monkey MC 25 ran a subnormal temperature ranging from 97.6° to 99.9° during the first week in the warm room; and on the third day, when it was removed to a room at 70.8°, its rectal temperature dropped from 98.8° to 95.3° in one hour. On the thirty-eighth day its rectal temperature on removal from the warm room was 100.0° and it fell to 98.5° in 7 hours in a room the temperature of which varied from 70°-72°. The lesions destroyed the lateral hypothalamic area on both sides from the level of the optic chiasma to the caudal border of the mammillary bodies but did not involve the thalamus.

It may be concluded that bilateral destruction of the caudal part of the lateral hypothalamus causes a prolonged loss of the capacity to keep the body temperature up to normal and that lesions in the rostral part of the lateral hypothalamus may cause a temporary rise in body temperature if the caudal part remains intact.

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Oxidation-Reduction Potentials of Some Non-Sporulating Obligate Anaerobes.

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Oxidation-reduction potential studies have been made on cultures of many aerobic and some sporulating anaerobic bacteria, but to our knowledge none has been made on the non-sporulating obligate anaerobes. The potentials produced by the latter group of organisms are of particular interest in connection with current theories as to the relation of such potentials to the growth of obligate anaerobes. A certain degree of negativity was thought to be necessary before the obligate anaerobes are able to initiate their growth processes. Experimental evidence of a positive limit of oxidation-reduction potential required for the germination of spores of *Cl. tetani* has been presented by Fildes[1] and by Knight and Fildes.[2]

[1] Fildes, *Brit. J. Exp. Path.*, 1929, **10**, 151.

[2] Knight and Fildes, *Biochem. J.*, 1930, **24**, 1496.

This positive limit was found to lie in the vicinity of E_h 0 at pH's close to neutrality. The potentials produced in cultures of the sporulating anaerobes are considerably more negative than this positive limit, usually being about 350 millivolts negative at reactions at or near neutrality.[3] In unpublished experiments one of us (W.B.) has found that several strains of *Cl. botulinum* produce potentials around 400 millivolts negative. That anaerobiosis is a matter of oxidation-reduction potential rather than simple absence of oxygen is a theory that has been generally accepted,[4] although there has been some dissent.[5]

The technique used in the present experiment has been previously described.[6] The organisms were grown in a cystine glucose beef infusion broth, the pH varying between 6.4 and 6.9. Anaerobic conditions were produced and maintained by constant bubbling of oxygen-free nitrogen through the medium. Very heavy inoculums were used, usually 1 to 2 cc. of young cultures. Under these conditions we had no difficulty in growing the organisms.

With 2 exceptions, the strains used were isolated from the colons of patients suffering with ulcerative colitis. Strain 39 was isolated from the ulcerated colon of a monkey dying from bacillary dysentery (Flexner) and strain M1 was isolated from the colon of a healthy monkey. Descriptions of these organisms are given elsewhere.[7, 8]

The following strains were used:

Strain No.	*Morphology*
26	Gram variable streptococcus
39	Pleomorphic Gram negative rods and filaments
40	Fusiform-like Gram negative rods with occasional filaments
45	Pleomorphic Gram negative rods and filaments. Resembles strain 117
47	Pleomorphic Gram negative rods and filaments. Resembles strain 397
M1	Small Gram negative rods (Bacteroides)[8]

The results of these experiments appear in Fig. 1. These cultures were known to lyse, some more readily than others. That such lysis may be accompanied by a positive drift in potential has been shown by Hewitt[9] with a number of species of bacteria. This

3 Plotz, H., and Geloso, J., *Ann. Inst. Past.*, 1930, **45**, 613.

4 Hewitt, L. F., Oxidation-Reduction Potentials in Bacteriology and Biochemistry, London County Council, 2nd ed., 1934.

5 Knaysi, G., and Dutky, S. R., *J. Bact.*, 1934, **27**, 109.

6 Burrows, W., and Jordan, E. O., *J. Inf. Dis.*, in press.

7 Dack, G. M., Heinz, T., and Dragstedt, Lester, *Arch. Surgery*, in press.

8 Barringer, Sarah J., and Dack, G. M., PROC. SOC. EXP. BIOL. AND MED., 1935, **32**, 1125.

9 Hewitt, L. F., *Biochem. J.*, 1931, **25**, 1452.

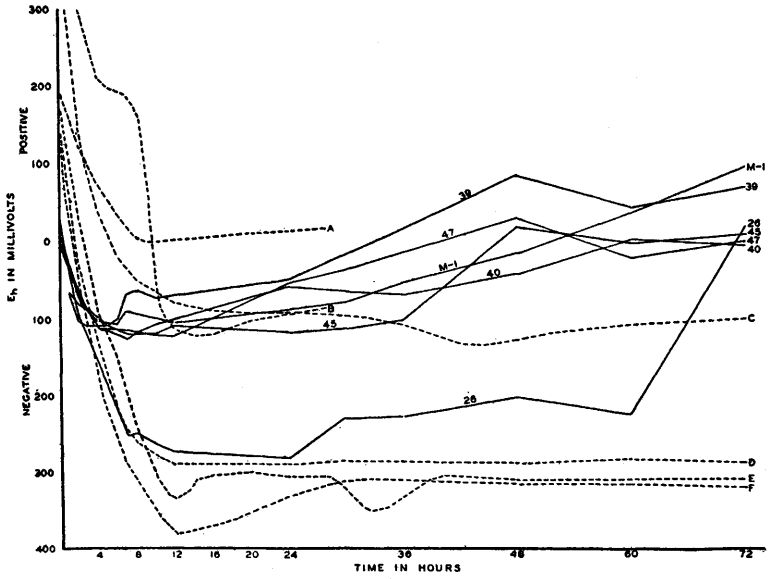

FIG. 1.

Time-Potential Curves Showing the Relations Between the Non-Sporulating Obligate Anaerobes and Other Miscellaneous Bacteria.

The solid lines represent the non-sporulating obligate anaerobes. The strain numbers are appended in each case. The dotted lines are made up from data of other workers on miscellaneous species of bacteria. A—sealed culture of a hemolytic streptococcus in cystine broth[10]; B—aerobic culture of a hemolytic streptococcus in cystine broth;[10]; C—a staphylococcus;[11] D—Cl. welchii;[3] E—Cl. botulinum;[3] F—Cl. sporogenes.[3].

finding is confirmed in our experiments; in each case the rise in potential appears when lysis begins to take place. The point we wish to emphasize, however, is that these organisms do not produce extremely negative potentials in their cultures as might be expected. Certainly their chemistry appears to be more nearly like that of the aerobes and facultative anaerobes than that of the sporulating obligate anaerobes. It is apparent, therefore, that all obligate anaerobes do not produce very negative potentials nor are such potentials necessary to their growth processes. These experiments do not, however, provide evidence contrary to the theory that anaerobiosis is a matter of oxidation-reduction potential, since the potentials produced by these organisms are well within the positive limits found by Knight and Fildes.[2]

[10] Hewitt, L. F., *Biochem. J.*, 1930, **24**, 512.

[11] Hewitt, L. F., *Biochem. J.*, 1931, **25**, 2068.