to above and the data reported here, it would appear that the circumstances associated with the low serum potassium concentrations encountered in clinical medicine may be outlined as follows:

1. A fall in serum potassium with testosterone therapy appears to reflect an increase in total tissue potassium associated with an increase in tissue nitrogen consistent with an increase in tissue mass.[18] It is not associated with weakness or paralysis or marked alterations in blood sugar.

2. A fall in serum potassium and decrease in blood sugar following the injection of insulin appears to be associated with a decreased urinary potassium and phosphorus excretion and an increased intracellular potassium and phosphorus (possibly without increase in muscle mass). It is not associated with loss of muscle contractility.

3. A fall in serum potassium during attacks of periodic paralysis is associated with a decreased urinary excretion and increased tissue retention of potassium and phosphorus similar to that observed following insulin but is not associated with alterations in blood sugar.

4. A fall in serum potassium that follows excessive administration of desoxycorticosterone is associated with no change in blood sugar, an increased urinary excretion of potassium, a decrease in muscle potassium concentration, an increase in muscle sodium concentration, and a decrease in muscle strength.

Finally in experiments on rats[12] it has been shown that within wide limits neither the amounts of potassium in muscle cells nor abnormally low concentrations of potassium in the serum limit the capacity of rats to swim.

Thus our observations on the fall in serum potassium concentration and alterations in intracellular potassium balance during testosterone therapy supplement the existing evidence indicating that such changes in potassium distribution do not *per se* determine muscle contractility.

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Comparison of pH and Population of *Trichomonas Foetus*.*

BANNER BILL MORGAN. (Introduced by M. R. Irwin.)

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Witte[1] first showed that *Trichomonas foetus* could tolerate a pH range of 5.5 to 8.5. This was later confirmed by Riedmuller[2] who also reported that the optimal pH for *T. foetus* in pure culture was 6.5 to 7.5. Lyford[3] demonstrated the adaptability of *T. foetus* in pure cultures to various hydrogen-ion concentrations with final pH readings of 4.8 and 5.2. Morisita[4] stated the optimum pH for *T. foetus* ranged from 6.6 to 7.8; the flagellate could survive between 5.6 and 8.4, and the range during maximum growth was 5.4 to 5.6. Johnson[5] reported the population in relation to pH with a pure culture of *T. vaginalis*. Prior to this report, the relationship had not been completely established with *T. foetus*.

This paper is concerned with the correlation between pH and population of several pure culture strains and 2 strains of *T. foetus* in association with an atypical strain of *Corynebacterium renalis*.† This strain is unable to ferment dextrose.

Strain A,‡ originally isolated by Glaser and

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1 Witte, J., *Zentr. f. Bakt.*, 1933, **128**, 188.

2 Riedmuller, L., *Ibid.*, 1936, **137**, 428.

3 Lyford, H., *Am. J. Hyg.*, 1941, **33**, 69.

4 Morisita, T., *Jap. J. Exp. Med.*, 1939, **17**, 1.

5 Johnson, G., PROC. SOC. EXP. BIOL. AND MED., 1940, **45**, 567.

Coria,[6] strains B, and C, isolated by the writer,[7] and strain D,§ were used in this work. The culture medium used was a modification of Schneider's[8] citrate; whole egg and defibrinated bovine blood slants overlaid with 5% bovine serum in modified citrate solution, sterilized by autoclaving at 15 pounds pressure for 30 min. The pH of the fluid medium was adjusted with N/1 HCl or N/1 NaOH. The incubation temperature was 37 ± 1°C. The pH determinations were made with a Coleman 200 Electrometer which was checked against a standard buffer.

The flagellates were counted in a Neubauer hemacytometer every 12-24 hr until motility of the organisms ceased. Twenty cultures were examined at each pH. Each tube was inoculated with 100,000 organisms from a 96-hr culture of the various strains mentioned above. The pH of the original medium was set at 7.2. Total amount of fluid in each tube was set at 5 cc. Controls consisted of uninoculated tubes. Blood agar plates were used to check bacterial contamination.‖ (Veal infusion agar + 5% bovine blood).

Strain A. Maximum numbers occurred between pH 6.1 and 6.3 at 96 hr with a count of approximately 3 million organisms per cc. Final pH was 5.4. (Fig. 1).

Strain B. Maximum numbers occurred between pH 5.4 and 5.8 at 96 hr with a count of approximately 4.5 million organisms per cc. Final pH was 5.2. (Fig. 2).

Strain C. Maximum numbers occurred between pH 5.7 and 5.9 at 96 hr with a count of 4 million organisms per cc. Final pH was 5.3. (Fig. 4).

Strain C + Corynebacterium renalis.

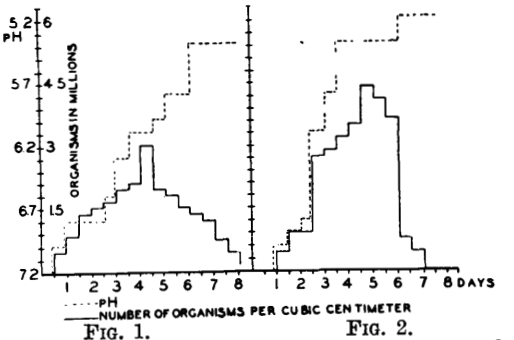

FIG. 1. FIG. 2.

Figs. 1 and 2 show the maximum numbers and pH of strains A and B, respectively.

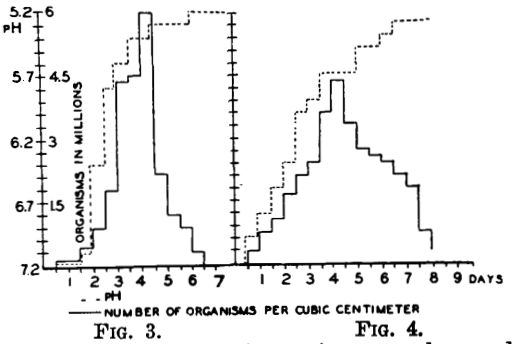

FIG. 3. FIG. 4.

Figs. 3 and 4 show the maximum numbers and pH of strain C + *Corynebacterium renalis* and in bacteria free-cultures, respectively.

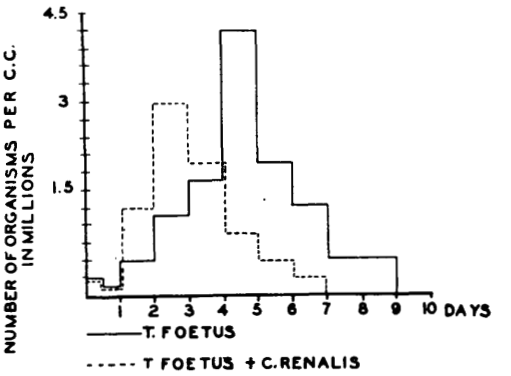

FIG. 5.

Fig. 5 shows the maximum numbers and pH of strain D in bacteria-free cultures and in the presence of *Corynebacterium renalis.*

† The writer wishes to thank Dr. I. A. Merchant and Dr. S. Kenzy, Department of Veterinary Hygiene, Iowa State College, and Miss M. Bernstein, Department of Veterinary Science, University of Wisconsin, for identification of this strain of bacteria.

‡ Strain A was supplied by Dr. A. Tatum and Dr. J. Byrne, Department of Pharmacology, University of Wisconsin.

[6] Glaser, R., and Coria, N., *Am. J. Hyg.*, 1935, **22**, 221.

[7] Morgan, B. B., and Wisnicky, W., *J. Am. Vet. Med. Assn.*, 1942, **100**, 783.

§ Strain D was supplied by Dr. B. Schwartz, Zoological Division, U.S.D.A., Washington, D.C.

[8] Schneider, M., unpublished thesis, Library, Univ. Wis., 1941.

‖ The writer wishes to thank Miss Myrtle Bernstein, Department of Veterinary Science, University of Wisconsin, for making the bacterial examinations.

Maximum numbers occurred between 5.3 and 5.6 at 72 hr with a count of 6 million organisms per cc. Final pH was 5.2. (Fig. 3).

Strain D. This strain was received in a contaminated state with an atypical strain of *C. renalis*. It was isolated bacteria-free by a modification of the capillary migration of Stone and Reynolds.[9] The pH of strain D was essentially the same as that of Strain A. Counts were made every 24 hr. Maximum numbers occurred between pH 6.1 and 6.3 at 96 hr with a count of approximately 4 million organisms per cc. Final pH was 5.4.

[9] Stone, W., and Reynolds, F., *Science*, 1939, **90**, 91.

Strain D + Corynebacterium renalis. Maximum numbers occurred between pH 5.7 and 5.9 at 48 hr with a count of approximately 3 million organisms per cc. (Fig. 5). Two sets of controls were run, one set being uninoculated, the other with *Corynebacterium renalis*. Both sets of controls changed their pH from 7.2 to 6.8. This bacterium apparently grows in close association with *T. foetus* as the flagellates multiply more rapidly in its presence than in bacteria-free cultures. This acceleration is difficult to explain. There may be a change in the medium due to the hydrolyses of proteins and carbohydrates by the bacterium, but the nature of this is not known.

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Impedance Changes Induced in the Brain by Electric Stimulation.

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The extensive application of electric stimulation of the brain, not only experimentally but also for therapeutic purposes as in the so-called electric shock treatment of certain psychoses, makes it desirable to get a more intimate knowledge of the effects of electric stimuli and the subsequent excitation upon the state of the cells of the central nervous system. It is known that excitation of peripheral nerves is associated with decrease in D.C. resistance (Hermann,[1] Ebbecke[2]) and A.C. impedance (Lullies,[3] Cole and Curtis[4]) respectively. Since such changes may be able to throw some light upon the state of the cellular surface films (Gildemeister),[5] it seemed of interest to ascertain whether similar effects are demonstrable in the central nervous system.

For the measurement of the impedance a Wheatstone bridge arrangement energized with A.C. of from 500 to 6000 cycles was used as previously described. (Spiegel and Spiegel-Adolf).[6] Quick determinations of the balance were facilitated by a 5-stage amplifier connected not only to a telephone receiver but also to an "electric eye" so that the minimum could be detected by visual as well as by acoustic observations.

In the first series of experiments on cats under superficial ether anesthesia the electrodes were platinum wires coated with platinum black, inserted into the brain substance as in previous experiments (Spiegel and Spiegel-Adolf)[6] or platinum-Ringer electrodes placed with the smallest possible

[1] Hermann, L., *Pflueger's Arch. f. d. ges. Physiol.*, 1872, **6**, 560; 1873, **7**, 349.

[2] Ebbecke, U., *Pflueger's Arch. ges. Physiol.*, 1922, **195**, 555.

[3] Lullies, H., *Pflueger's Arch. ges. Physiol.*, 1930, **225**, 69, 87.

[4] Cole, K. S., and Curtis, H. J., *J. Gen. Physiol.*, 1939, **22**, 649.

[5] Gildemeister, M., in *Handb. d. norm. u. pathol. Physiol.*, edit, by Bethe, 1928, **8**, II, 657.

[6] Spiegel, E., and Spiegel-Adolf, M., *Am. J. Psychiat.*, 1936, **92**, 1145; *J. Nerv. and Ment. Dis.*, 1939, **90**, 188.