

duction of an acid that could be eliminated un-ionized to a low degree at the pH of sweat would result in a great sparing of base. We have found comparatively large quantities of lactic acid in the sweat of these patients. From a study of the dissociation constant of lactic acid it is apparent that at the pH of sweat lactic acid is approximately 50% ionized and hence can be secreted undissociated with the consequent sparing of base, especially of potassium. At the pH of sweat the buffer action of the lactates in the presence of an equivalent amount of lactic acid is at a maximum, thus preventing the fall of the pH of the sweat to harmful levels. A patient loses 2.5-5.0 liters of fluid during a treatment, excreting 250-300 mg. of lactic acid per 100 cc., which means a total excretion of as much as 15 gm. of lactic acid. Snapper and Gruenbaum<sup>1</sup> found that athletes excrete large quantities of lactic acid during races. Lactic acid was determined by the method of Clausen.<sup>2</sup>

A patient whose temperature was raised to 106° was found to have lost approximately 4 liters of fluid, exclusive of 122 cc. of urine. Certain of the chemical constituents of the blood and sweat are given in the following table.

TABLE I.

Constituent	Blood		Sweat	
	Before	After 3 hr.	After 1 hr.	After 3 hr.
pH	7.45		4.15	4.12
CO <sub>2</sub>	61.2	57.2	12.4	13.4
Lactic acid	21	72	216	254
Na	353	316	140.8	178
K	19	21	36.9	35.5

(All quantities with the exception of pH are mg. per 100 cc.)

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### Some Differential Reactions in the Colon-Aerogenes Group of Bacteria.

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Two distinct subgroups are generally recognized in the colon-aerogenes group of bacteria: the genus *Escherichia* which grows poorly if at all on citric acid, is acid to methyl red (M.R.+), does

<sup>1</sup> Snapper, I., and Gruenbaum, A., *Bio. Zeitschr.*, 1929, **206**, 319.

<sup>2</sup> Clausen, S. W., *J. Biol. Chem.*, 1922, **52**, 263.

not produce acetyl-methyl-carbinol from glucose, (V.P.—), and is generally of fecal origin, and the genus *Aerobacter* which grows luxuriantly on citric acid, is alkaline to methyl red (M.R.—), produces acetyl-methyl-carbinol, (V.P.+ ) and is generally found in soil or on grains. Recently a number of strains have been reported which grow luxuriantly on citric acid but are negative as respects the V.P. reaction and frequently neutral or acid to methyl-red. The systematic position of these strains is in doubt.

Werkman and Gillen<sup>1</sup> have recently suggested the generic name, *Citrobacter* for bacteria producing trimethylene-glycol from glycerol, which can utilize citric acid but are V.P. negative and M.R. neutral or acid. Whether all of the strains falling in this category on the citric acid, V.P. and M.R. tests are capable of producing trimethylene-glycol is not known. The lack of a suitable, convenient, rapid and reliable test for trimethylene-glycol together with the questionable M.R. and V.P. reactions of these strains, renders the discovery of a simple differential test which will distinguish these cultures from typical *Escherichia* and *Aerobacter* highly desirable. The production of H<sub>2</sub>S from Difco proteose peptone seems to serve this purpose admirably.

In the accompanying table are shown the results of a study of 401 strains of members of the colon-aerogenes group isolated from eggs. The percentages are considered tentative, as several additional cultures are under observation, and it is possible that some impure cultures might be detected before completion of the study. Only those characteristics which show distinct and clear-cut differential value are considered here.

TABLE I.  
Some Differential Reactions in Colon-Aerogenes Group.

Genus	Escherichia		Aerobacter		?
		cloacae	aerogenes		
No. of Strains	155	80	123	43	
Character	%	Positive Reactions			
Citric Acid	0	100	100	100	
V.P.+ M.R.—	0	100	100	0*	
H <sub>2</sub> S	1	0	0	100	
Indol	97	0	60	0	
Glycerol	47	0	100	100	
Aesculin	73	34	100	0	
Salicin	71	74	100	0	
Starch	0	1	99	0	
Pectin	1	6	90	0	

\* Frequently questionable in M.R. or V.P. reactions, but generally would be recorded. V.P.—M.R.+ or (?).

<sup>1</sup> Werkman, C. H., and Gillen, G. F., *J. Bact.*, 1932, **23**, 167.

It will be noted that 155 failed to utilize citric acid and are therefore considered as of the genus *Escherichia*. The remaining 246 strains are tentatively considered as *Aerobacter* because they did utilize citric acid. Of these, 80 failed to attack glycerol and are considered *Aerobacter cloacae*. Of the remaining 166 cultures, 123 were typical for the *Aerobacter aerogenes* group as respects the citric acid, V.P., M.R. and glycerol reactions. The 43 remaining cultures differed from the latter in that the V.P. and M.R. reactions were non-correlating with growth on citric acid. These were practically the only strains which produced H<sub>2</sub>S, a characteristic which clearly differentiated them from all of the other groups under consideration. Furthermore, this group of 43 strains seems to be clearly differentiated from each of the other groups by a number of characters, as may be readily seen from the accompanying table. Generic or specific allocation is withheld pending determination of ability to produce trimethylene-glycol from glycerol.

Determinations of H<sub>2</sub>S were made with a number of different media and indicators, including iron (ferric chloride), nickel, lead, and manganese salts. Difco proteose peptone (2%) 0.1% K<sub>2</sub>HPO<sub>4</sub> in agar with iron citrate (0.05%) as the indicator was found to be very sensitive, definite tests for H<sub>2</sub>S, as indicated by blacking along the line of inoculation, being observed in as short a time as 12 hours, and very strong tests in 24 to 48 hours at 37°C.

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### Endocrine Reactions of X-Ray Sterilized Males.\*

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Investigations in the field of testicular physiology have borne out that the germinative and the endocrine systems are highly independent of each other, despite the obvious parallelism in their embryonic development. Cryptorchidism and X-ray sterilization result in many cases in complete degeneration of the germ cells, without affecting, however, the endocrine system, as evidenced by the normal development and persistence of the secondary sex characters

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