and proteins to more highly osmotically active forms in leaves and other organs. There occurs however in many tracts of the plant an accumulation of material, in which diffusion or excretion may be said to work against osmosis after the general manner illustrated by glandular action in animals. The use of the artificial cell promises results of interest in the solution of such problems.

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The bacterial content of the stomach as influenced by saliva.

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The fractional method of gastric analysis makes possible a bacteriological study of the stomach which includes not only the active cycle of digestion, but the resting phase as well. So far as could be ascertained, no quantitative bacterial studies employing this method have heretofore been reported. In fact, very little data concerning the types of bacteria in the stomach at different stages of digestion have appeared in the literature beyond the work of Cotton.¹

In a previous paper,² the writer has shown that repeated analyses on the same individual within a short period of time while the physical and mental condition remain practically unchanged—yield different curves. These curves from the same individual often vary as much from one another as the difference between the curves of different individuals. This holds true likewise for the average fasting contents. Therefore the conclusion was reached that single determinations by the Rehfuss method are not sufficient upon which to base valid conclusions since they do not take into consideration individual variations. In bacteriologic studies of fractional gastric analyses carried out repeatedly on psychotic patients and normal individuals, in only one half the instances was there any correlation between high acidity and low bacterial numbers or vice-versa. Upon close observation it be-

¹ Cotton, H. A., N. Y. Med. Journ., 1920, cxi, 672-677; 721-727; 770-775.

² Kopeloff, Nicholas, read before the Brooklyn Neurological Society, October 19, 1921 (in press).

came apparent that the amount of saliva swallowed by a patient during the two and one half hour period necessary for the complete gastric analysis by the fractional method, was of considerable significance. Only one patient, a case of profound depression, consistently showed a complete absence of bacteria on repeated analyses. Her mouth was usually exceedingly dry. The conclusion, therefore, was that the absence of saliva was the limiting factor, so far as her bacterial content was concerned.

It is manifestly impossible to completely prevent the swallowing of all saliva during the course of a fractional gastric analysis. The method finally devised, however, proved effective in reducing the swallowing of saliva to a minimum. The procedure consisted in placing an ordinary dental suction tube, which was attached to a running water vacuum pump, in the subject's mouth throughout the analysis. One c.c. of each fraction was plated in triplicate at once upon withdrawal, on both glucose meat infusion agar and lactose meat infusion agar to which brom cresol purple was added.

M. Sl.	Saliva Not Removed			Saliva Not Removed			Saliva Removed		
	Bact. Per 1 c.c.	Total Acid- ity	PĦ	Bact. Per 1 c.c.	Total Acid- ity	P _H	Bact. Per 1 c.c.	Total Acid- ity	PH
F.C	15,500	5	2.8				2	12	2.8
HR.	380	II	2.7	310	35	2.9	5	23	2.5
Ĵ	78	41	2.2	5,100	37	3.0	8	52	1.7
3	5	46	1.8	925	4I	2.8	2	70	1.4
I	60	25	2.5	2,800	28	3.0	0	71	1.3
1 1	800	18	2.7	110	36	2.2	I	42	1.5
11	215	25	2.3	95	43	1.9	I	29	1.7
11	55	6	2.7	12	45	I.8	32	12	2.0
2	110	28	2.7	5,400	10	3.7	*	2	3.0
$2\frac{1}{4}$	48,000	9	2.7	3,200	9	4.3	*		
$2\frac{1}{2}$	46,000	10	2.7	6,800	16	3.5	*		

In the table are presented the bacteriological and chemical results obtained with a psychotic patient (diagnosed manic-depressive: manic). Contrast the first two columns of bacterial numbers where saliva was not removed with the column of bacterial figures where saliva *was removed*. In the latter instance the first number is 2 and the last, which is the highest, is 32. Such a striking reduction makes the conclusion irresistible: namely, that bacterial numbers in the stomach at any one time depend

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almost entirely upon the saliva swallowed (where the bacterial content of the food may be disregarded). It would be expected that the greatest multiplication of bacteria and maximum numbers would be attained in the "interdigestive" phase, when the stomach is relatively at rest and the secretion of acid is at a minimum. Accordingly, therefore, the fasting contents should show the highest bacterial count. But such is not the case. As a matter of fact the last fractions, whether saliva be removed or not. contain a far greater number of bacteria, and this is additional evidence that the continual swallowing of saliva (which contains millions of bacteria per c.c.) is in reality the factor which determines the bacterial content of the stomach at such a time. Again, the fact that the bacterial numbers where saliva was removed. were so small as to be negligible is significant when it is noted that the secretion of acid is without much influence, *i.e.*, only 2 bacteria appear where the total acidity is as low as 12 and as high as 70. All these considerations mentioned point to the fact that the saliva is the most important single factor in influencing the bacterial content of the stomach under the conditions employed. Similar results were obtained when these tests were made on a healthy normal individual and on other manic patients having very low acidity. The most important consideration. however, is that these patients having a very low acidity would be precisely the type of subjects, therefore, in which bacteria might gain a foothold and make the stomach a focus of infection. Judging from the results when saliva is removed, such is far from being the case.

A qualitative study of the types of bacteria found in the saliva, and by the fractional method of analysis, in the stomach, serves as additional evidence in support of these findings. Consequently, when the Rehfuss method is employed, the stomach cannot be considered a focus of infection except where lesions are known to exist.