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Intestinal Absorption of B. prodigiosus.*

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(Introduced by W. H. Manwaring.)

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Nedzel and Arnold[1] report experimental evidence that massive absorption of viable bacteria may take place from the normal canine intestinal contents into the blood stream, an appreciable "cyclic circulation" of their test bacteria *(B. prodigiosus)* to and from certain mucous cavities. They report that this normal "circulation" is increased as a result of the local action of egg-white.

In attempting to confirm their experimental data, we have been forced to the conclusion that while massive duodenal absorption of their test microorganisms may occasionally take place through the presumably normal intestinal mucosa, in approximately 90% of all normal dogs thus far tested by us, the intestinal absorption was much less rapid than their data would indicate. In our hands only an occasional femoral blood sample showed one or more viable microorganisms per cubic centimeter. (Table I.)

Counts approaching their femoral artery data, however, were ob-

* The prodigiosus culture used in most of these tests was kindly furnished by Dr. Arnold's laboratory.

[1] Nedzel, A. J., and Arnold, L., PROC. SOC. EXP. BIOL. AND MED., 1931, **28**, 358.

TABLE I. *Femoral Blood Samples.*

The abdomen was opened under ether anesthesia, and a small incision made in the stomach wall. Through this incision a soft catheter was passed into the duodenum and 50 cc. warm Ringer's solution containing one 24-hour agar slant of *B. prodigiosus* were injected. Blood samples were withdrawn at stated intervals from a superficial femoral artery. The table records prodigiosus counts per cc. in these samples (— = no sample). The average or composite count was obtained by disregarding Dog No. 1, which was evidently atypical.

Dog No.	Time interval in minutes after duodenal injection.												
	0	5	10	15	20	25	30	35	40	45	50	55	60
1	0	670	80	40	290	0	0	0	50	0	390	10	—
2	0	3	0	2	0	0	0	0	0	1	0	4	0
3	0	1	2	1	8	0	0	1	2	6	3	2	0
4	0	0	0	—	0	0	0	—	—	—	—	—	—
5	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	7	0	0	0	0	0	0	0
7	0	0	0	1	0	0	1	0	0	0	0	2	0
8	0	0	0	0	0	0	0	0	0	0	1	0	0
9	0	1	0	0	1	0	1	0	0	—	—	—	—
10	0	7	0	4	2	0	0	0	0	—	—	—	—
Average	0	1	0	1	1	1	0	0	0	1	1	1	0

tained from periodic or continuous blood samples withdrawn from the portal vein. (Dogs 11 to 14, Table II.) These samples were obtained by means of a glass cannula inserted into one of the portal collaterals. No very material increase in this normal portal count was observed, however, by substituting egg-white for Ringer's solution in the injection mass (Dogs 15 to 18, Table II).

We have made a few introductory tests of the effects of certain local pathological conditions on the normal duodenal absorption rate. Much to our surprise, slight mechanical abrasions to the duodenal

TABLE II. *Portal Blood Samples.*

In Dogs Nos. 11 to 14 inclusive the initial bacterial suspension was made in Ringer's solution; in Dogs Nos. 15 to 18 in egg-white.

Dog. No.	Time interval in minutes after duodenal injection.													
	0	3	6	9	12	15	18	21	24	27	30	33	36	39
11	0	132	15	525	50	80	2	0	1	0	40	—	—	—
12	0	0	0	0	0	130	9	2	0	0	—	—	—	—
13	0	0	6	0	9	300	—	—	—	—	—	—	—	—
14	0	1	511	150	0	0	0	0	0	56	0	88	—	—
15	0	3	16	—	0	1	0	0	80	0	640	—	—	—
16	0	2	58	530	6	0	4	20	340	0	0	7	—	—
17	0	0	0	8	0	0	0	0	0	30	0	0	—	—
18	0	—	—	—	0	0	—	1	380	40	0	7	67	50
Average	0	20	87	200	8	64	25	33	114	18	113	25	—	—

mucosa did not increase the usual portal count, nor were uniform changes in absorption rate produced by previous sensitization or immunization with *B. prodigiosus* or its autolysate. Work on the effects of specific immunization, however, is being continued.

A marked increase in normal duodenal absorption was noted, however, as a result of local passive congestion (mechanical obstruction of portal vein). In our short series of tests, the average

portal count rose to 12,000 *B. prodigiosus* per cc. by the end of 15 minutes. The most rapid absorption thus far recorded by us, however, was during acute anaphylactic shock (horse proteins). In one test, for example, the portal count rose within 10 minutes to over 1,000,000 viable microorganisms per cc. with over 100,000,000 colonies (agar plate) per gm. of liver emulsion at the end of the test (30 minutes).

This finding suggests a hitherto unemphasized factor in the clinical picture of anaphylaxis and related shock conditions. It also suggests a conceivable source of error in the production of specific antisera, any shock condition during immunization conceivably vitiating serum specificity.

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Reduction of Nitrates and Nitrites by Representatives of the Brucella Group.

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The Brucella group is generally believed to lack the ability to reduce nitrates. Bergey[1] characterizes both *Br. abortus* and *Br. melitensis* as being non-reducers. Duncan and Whitby[2] record similar findings. Evans,[3] Topley and Wilson[4] and Lustig and Vernoni[5] report that nitrates are occasionally reduced.

An investigation was made to determine the factors which influence nitrate reduction and the cause of reported irregularities. A medium of the following composition was used: Peptone 2 gm., beef extract 1 gm.; NaCl 3 gm.; agar 2 gm.; H_2O 1000 cc. The reaction was adjusted to pH 6.8. The semisolid consistency favors the growth of the Brucella and accentuates the zone phenomenon, particularly when inoculated with a dilute suspension of cells. The majority of the Brucella grow in limited zones 2 to 6 mm. below

[1] Bergey, "Determinative Bacteriology," 1930, **3**, 366.

[2] Duncan and Whitby, "A System of Bacteriology," 1930, **5**, 395.

[3] Evans, *J. Infect. Dis.*, 1918, **22**, 580.

[4] Topley and Wilson, "Principles of Bacteriology and Immunity," 1929, **1** 508.

[5] Lustig and Vernoni, *Handb. d. pathogenen Microorganismen*, 1928, **4**, 520.