

lose destruction in the flasks proceeded better with neither of these compounds present.

Thus by methods probably somewhat unsuited to the material at hand but nevertheless adapted from procedures followed in soil bacteriology we have shown that there is a bacterial flora within the gut of certain individual termites which can destroy cellulose. In crude culture the action is slow. It is very possible that with media built up more closely in accordance with the environment of the intestine, this flora may appear more often and may show greater velocity in reactions produced. Our biochemical knowledge of this portion of the animal's anatomy, however, is as yet too fragmentary to proceed much farther at this moment.

4574

Duck Disease Studies I: Blood Analyses in Diseased Birds.

PAUL A. SHAW. (Introduced by C. D. Leake.)

From the Hooper Foundation for Medical Research of the University of California.

It has long been observed that ducks and other migratory birds which settle about inland marsh lands and shallow lakes reputed to contain "alkali waters" develop characteristic symptoms resulting frequently in heavy mortality. A systematic study of this disease has been proposed through the co-operation of the California Fish and Game Commission, the Hooper Foundation for Medical Research, and the Department of Pharmacology of the University of California Medical School. This report is the first of a series to be made in connection with this study.

This report deals with blood chemistry studies on diseased birds from the San Joaquin Valley district in comparison with normal healthy birds. Four blood constituents, non-protein-nitrogen, uric acid, blood sugar, and chlorides, have been studied on 13 normal and 15 diseased ducks of the pintail or sprig species (*Dafila acuta*). Blood samples were taken directly from the heart and determinations made on protein-free filtrates according to the Folin and Wu system of analysis. Rectal temperatures were obtained preliminary to taking the sample.

The results indicate an average increase of 50% in non-protein-nitrogen, and an 80% increase of uric acid, in the diseased birds. In the chlorides, computed as sodium chloride, a barely significant

average increase was noted. The range of blood sugar values was too wide to warrant comparisons. The body temperature of sick specimens averaged 3.5° F. below normal. The results on normal birds are shown in Table I and those for diseased birds in Table II. In the diseased birds there appeared to be a relationship between non-protein-nitrogen, uric acid and body temperature, the figures obtained for these constituents increasing with increase of temperature. The 2 lowest figures for non-protein-nitrogen were obtained in the sickest birds, in one case the value lying below the minimum normal. The values were highest in the birds that were apparently nearing recovery, as evidenced by their ability to walk or fly.

TABLE I. *Normal Birds.*

Bird No.	Rectal Temp. °F.	Non-Protein-Nitrogen mg./100 cc.	Sugar mg./100 cc.	Uric acid mg./100 cc.	Chlorides % NaCl
1	110	43	120	9.2	0.41
2	111	40	138	6.6	0.48
3	110	39	157	9.3	0.44
4	109.5	39	151	6.7	0.47
5	109.1	39	148	7.6	0.44
6	108.5	40	136	4.5	0.48
7	110.4	38	177	6.4	0.47
8	108.8	38	172	4.5	0.50
9	107.5	35	148	4.4	0.47
10	108	37	179	6.4	0.47
11	111	40	208	8.0	0.46
12	109.3	37	220	6.1	0.48
13	109.5	40	154	7.0	0.44
Average	109.5	39	162	6.7	0.46

TABLE II. *Diseased Birds.*

Bird No.	Rectal Temp. °F.	Non-Protein-Nitrogen mg./100 cc.	Sugar mg./100 cc.	Uric acid mg./100 cc.	Chlorides % NaCl
1	104	48	300	—	0.46
2	105	36	163	9	0.45
3	102	28	200	10	0.53
4	106	52	160	11	0.56
5	108	68	138	10	0.47
6	107	60	145	12	0.47
7	108	56	126	10	0.47
8	107	80	153	15	0.44
9	104	58	200	10.5	0.51
10	108	68	143	11	0.47
11	106	52	162	12	0.52
12	106	55	150	8.5	0.49
13	108	59	204	12	0.55
14	105	144	137	34	0.60
15	107	53	153	10	0.49
Average	106	60	170	12	0.49