CXI. A NOTE ON THE TEMPORARY SPONTANEOUS DISAPPEARANCE OF TYPICAL "BERIBERI" SYMPTOMS IN PIGEONS FED ON DIETS DEFICIENT IN VITAMIN B.

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It has been previously reported [Kon and Drummond, 1927] that temporary improvement of the typical nervous symptoms was observed in several "beriberi" pigeons fed on a synthetic vitamin B-free diet of the type described by Randoin and Simonnet [1924]. In view of the importance of that observation it seemed necessary to repeat those experiments on a larger number of birds. Nineteen birds were actually kept under observation. The preparation of the diet and the general care of the animals were as already described [Kon and Drummond, 1927—lot 1], with the exception that the food intake was not determined; the birds were, however, weighed three times a week. The experiment lasted 54 days, during which time 4 birds (21 %), Nos. 1, 2, 5 and 7, died without showing any characteristic acute symptoms of vitamin B-deficiency. The remaining 15 (79 %) developed unmistakeable "beriberi" symptoms in the course of 24, 39, 17, 31, 34, 20, 31, 24, 28, 17, 37, 21, 47, 38 and 28 days (pigeons Nos. 3, 4, 6, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19 and 20 respectively), the average period being 29 days. Of these birds 6 (32 %) (Nos. 4, 10, 11, 12, 14, 16) died without improving, whilst obvious spontaneous cures occurred in the remaining 9 (47 %), thus confirming the previous findings.

Owing to the demand on space it is not possible to give here a detailed history of each bird, nor to tabulate the results in a concise and clear table. The histories of three typical spontaneous cures are given below. Subsidence of the symptoms for a period of less than 48 hours was not considered a cure.

Pigeon No. 3. *Initial weight* 462 *g.*

Day of experiment	Weight (g.)	Temperature 0° C.	Remarks
24	305	38·5	Head retraction, convulsions
25	—	—	No symptoms
26	277	38·9	Acute symptoms provoked
27	—	39·8	Better, weak, no symptoms
28	267	41·0	„ „
29	—	38·6	Looks normal, eats, but picks up food with difficulty
30	280	39·4	Crop full
31	—	38·5	Acute symptoms provoked
32	—	—	Death in convulsions

Pigeon No. 6. *Initial weight* 375 *g.*

Day of experiment	Weight (g.)	Temperature 0° C.	Remarks
17	—	37·5	Emprosthotonos, convulsions, cart-wheel turning
18	265	38·0	,, ,, ,,
19	—	38·6	Much better
20	245	39·0	Looks quite normal, walks easily in the cage
21	—	40·2	,, ,, ,,
22	237	38·1	,, ,, ,,
23	—	—	,, ,, ,,
24	222	39·8	,, ,, ,,
25	—	—	,, ,, ,,
26	257	40·1	Ate, can fly in the laboratory
27	—	40·1	Looks quite normal
28	228	39·9	,, ,,
29	—	38·0	,, ,,
30	209	37·4	Very marked opisthotonos, wasted
31	—	—	Found dead in the morning

Pigeon No. 9. *Initial weight* 445 *g.*

31	—	—	Marked head retraction, convulsions
32	266	39·0	No symptoms, better
33	—	39·0	,, ,,
34	247	37·8	,, ,,
35	—	39·7	Eats greedily
36	298	40·5	Crop full
37	—	39·5	No symptoms
38	292	—	,,
39	—	38·1	Convulsions, partially paralysed
40	265	37·8	Very acute symptoms
41	—	38·5	Very acute symptoms, impaired respiration, used for another experiment in moribund condition

It was found impossible to foretell whether the symptoms would disappear spontaneously or end in the death of the animal, as sometimes even very severe initial symptoms lasting for 2–3 days eventually cleared and the birds recovered for a certain period of time (pigeons Nos. 15, 18), whereas in other cases the death of the animal suddenly followed the onset of the nervous disorder (pigeons Nos. 4, 12, 14, 16). Possibly, though not always, the fall of temperature accompanying the acute stage was more pronounced in those cases which did not recover (pigeons Nos. 11, 14, 16). It is very interesting that a second spontaneous cure was never observed, the birds either dying without marked symptoms some time after a first cure, or succumbing in a second attack, which without exception proved fatal. Two pigeons (Nos. 9 and 20) were used, after developing for the second time acute symptoms, for another experiment before death supervened; they were, however, already in a moribund condition. The second symptoms were as a rule of the most severe type, often associated with impaired respiration.

As regards the body temperature, it will be seen that in general the onset of acute symptoms is accompanied by a marked drop and that there is a corresponding increase when a spontaneous cure is manifested. There are, however, a few exceptions, *e.g.* pigeon 17. The body temperature of a "deficient" bird is the resultant of so many factors: inanition, impaired temperature regulation, daily fluctuations and last, but not least, infection [McCarrison,

1921], that it is almost impossible to account satisfactorily for all of them and gain a clear picture of the true condition of the animal.

In order to be sure that the spontaneous cures were not caused by an unknown disturbing factor present in the laboratory, a batch of 24 pigeons purchased at the same time and from the same source as the first 19 birds, was placed under observation simultaneously with them and under identical conditions except that their diet consisted of polished rice instead of the synthetic mixture. Those birds behaved absolutely normally: a large percentage (over 60 %) developed typical symptoms, but not a single spontaneous cure could be observed, the animals dying mostly in the course of 24, maximally 48, hours after the onset of the nervous disorder.

Whether the known deficiencies of polished rice—insufficient amount of salts and lack of roughage—are to be looked upon as the causative agents of the onset of immediately fatal "beriberi" symptoms or whether still another factor plays here a rôle can be decided only on the results of further investigations.

These experiments clearly demonstrate that a curative test, when pigeons fed on synthetic rations of the type here described are used, might lead to completely erroneous conclusions.

Summary.

The occurrence of temporary spontaneous cures in a large percentage of pigeons fed on a vitamin B-deficient but otherwise complete synthetic ration of the type described by Randoin and Simonnet reported in a previous communication of Kon and Drummond is fully confirmed. Pigeons fed on synthetic rations should not be used for the curative test.

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REFERENCES.

Kon and Drummond (1927). *Biochem. J.* **21**, 632.
McCarrison (1921). Studies in deficiency disease (Oxford).
Randoin and Simonnet (1924). *Compt. Rend. Soc. Chim. Biol.* **6**, 601.