AN EXPERIMENTAL STUDY ON THE VIRUS OF FOWL-PEST.

I. ON THE SUSCEPTIBILITY OF THE PIGEON.

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(Received for Publication November 3, 1929)

INTRODUCTION.

A number of descriptions concerning the susceptibility of the pigeon to the virus of fowl-pest has been given by several authors, but our present knowledge is still beyond determination. OSTERTAG and BUGGE, and HERTHL (1904) considered that it is unable to infect artificially pigeons by the inoculation of the virus, and SCHEUERLEN and BUHL believed that pigeons, as a rule, resist the natural, and frequently also the artificial infection. Therefore, these authors have claimed to utilize the unsusceptibility of this bird to the virus of this disease for the purpose of the differentiation from fowl-cholera. On the other hand, LODE and GRUBER, and CENTANNI succeeded in infecting young pigeons by repeated injections of large quantities of the virus, MAGGIORE and VALENTI by injecting virulent blood only after previous starvation; FREESE, however, produced the disease by cohabitation with affected chickens.

OSTERTAG and WOLFFHUGEL (1903), and C. DEPPERICH could not succeed in infecting especially old pigeons while KLEIN and MOLLER obtained variable results in infecting young pigeons by artificial inoculation of the virus. Meanwhile HALASZ found that by successive passages of the virus through the fowl it became infectious to pigeons, but the virus derived from such infected birds was no more infectious to fowls. Moreover, according to KRUMWEIDE, GERBER and PROVOST infection to the pigeon by subcutaneous inoculation of the virus in a dose of 0.00000001c.c. was successful.

These various informations drew our attention toward the subject concerning the susceptibility of pigeons to the virus of fowl-pest.

This country had fortunately been quite free from the disease, till the first case was reported a few years ago. Since several cases of this disease have been found, practical researches for this plague became necessary to find how to successfully eradicate the disease.

As to the pathogenicity of the virus for the pigeon, the writers conducted following experiments to ascertain whether the infection of the pigeon with the virus (three strains) derived from the affected hen would be possible.

As regards the distribution of the virus in the body of the infected fowl our knowledge is still far from determination, though several considerations concerning this subject were published by many authors. Our experiments showed that the positive results *in vivo* could be artificially obtained by inoculating the brain taken from the dead or dying diseased fowl, but not always with the liver, spleen, kidney, testicle or blood, etc.

Moreover, the subcutaneous inoculation of the brain into the hen in a dose of 0.000001 gram caused the disease without exception. Therefore, emulsion of the brain in 50% glycerin-salt solution or in sterilized distilled water in 1 to 10 was employed in our experiments.

INOCULATION EXPERIMENTS.

1. Feeding experiment.

The infection through the alimentary canal has often been proved by feeding healthy chickens with the virus; it is probable that the natural infection is caused mostly by the droppings and nasal exudate of affected birds, and also by the blood of killed chickens and by the organs of those dead from the disease, which are taken with the food by healthy ones. However, transmission of the disease to pigeons by feeding has not yet been successfully proved; the writers succeeded in transmitting the disease to the birds by feeding a larger amount of the brain (0.5gr.), but not with a smaller quantity (0.00001gr.) of the same material sufficient

to produce the disease by the subcutaneous injection. Besides the dose, it was found that the infectivity of the virus for the birds depends upon the kind of fluids used for the preparation of the emulsion.

As the preservative of the virus 50% glycerin-salt solution (Price's glycerin) seemed to be better than sterilized distilled water.

Feeding experiments with other organs, especially liver and testicles which have been considered to be virulent, gave negative results.

The period of incubation in the case of feeding appeared to be 2 or 3 days longer than in the case of subcutaneous injection of the same amount of virus, but in both cases there were no differences in symptoms and course of the disease.

2. Co-habitation experiment.

Several investigators rarely succeeded in infecting healthy chickens by co-habitation with the affected. The same attempt was carried out to prove whether the infection would be successful by keeping pigeons for three months or more with affected birds in the same cage. The affected birds used for this experiment were artificially infected by the subcutaneous injection of the virus, so that healthy ones always co-habitated from the beginning of the disease. However, as the artificially infected animals usually die in 3 to 7 days after a period of incubation extending to 3 to 6 days, the period of actual co-habitation was not longer than 2 weeks. These experiments gave no positive result, all the pigeon manifesting no signs of the disease.

3. Instillation into conjunctival sac.

The transmission of the disease to chickens was successful by instillation of the virus into the conjunctival sac; the same experiments with pigeons which has not been reported, were carried out. For this purpose a number of pigeons were used, and a drop of the 50% glycerin-salt brain emulsion was instilled into the conjunctival sac, with positive results.

4. Cloacal injection and cutaneous inoculation.

In pigeons infection by cloacal injection of the virus (brain emulsion) was successful in a single case. 0.5c.c. of the virulent

material was introduced into the cloaca with a pipette.

The application of the virus to the scarified skin produced the disease in two out of three pigeons. In one case, the virus was rubbed on a part of the back from which the feather was taken away, and in the other cases, on the slight scratches around its bill. Such a single application caused the perfect infection.

The results of these experiments seemed to indicate the way of the natural infection of this disease in chickens. The virus may occasionally enter the body through injuries of the skin. The period of incubation in this case is longer than in the case of the direct injection of the virus into the tissue, but there was no difference in the course of the disease.

DISTRIBUTION OF THE VIRUS.

KLEIN reported that the blood of the diseased fowls, as well as of artificially infected pigeons, was infectious only at the beginning of the affection. On the other hand, the virus remained highly infective in the brain and spinal cord even after death.

DOER and PICK (1915) also demonstrated that the blood of the pigeons injected with blood serum or red blood corpuscles of the affected fowl was not infectious to fowls longer than 24 hours, and no existence of the virus in other organs was also experimentally recognized in most cases. From these facts it will be seen that the virus emigrates soon after injection from the blood into the nervous cellular elements as a result of its specific affinity for the nervous cell plasma. In order to ascertain this point, a series of experiments in connection with the distribution of the virus in the artificially infected pigeons was carried out, and the following results were obtained:

From the brain, liver, spleen and kidney, a piece of each was taken and weighed, and emulsified with 50% glycerin-salt solution in a proportion of 1:10, and diluted emulsions were used. As to the testicle, the both were taken and emulsified with 4 times glycerin-salt solution. As the cornea and lenticular body were difficult to emulsify, they were inoculated into subcutis after repeated washing with physiological salt solution. The blood used for the injection was taken from wing vein at the approach of

death, and blood serum and red corpuscles were separated in the usual manner.

Material	Dilution	Dose	Result
Brain	$\begin{cases} 1:10000 \\ 1:100000 \end{cases}$	0.1	$\begin{matrix} + \\ - \end{matrix}$
Liver	$\begin{cases} 1:1000 \\ 1:10000 \end{cases}$	"	$\begin{matrix} + \\ - \end{matrix}$
Spleen	$\begin{cases} 1:1000 \\ 1:10000 \end{cases}$	"	$\begin{matrix} + \\ - \end{matrix}$
Kidney	$\begin{cases} 1:1000 \\ 1:10000 \end{cases}$	"	$\begin{matrix} + \\ - \end{matrix}$
Testicle	$\begin{cases} 1:4 \\ 1:40 \end{cases}$	"	$\begin{matrix} + \\ - \end{matrix}$
Cornea	—	0.02gr.	—
Lenticular body	—	0.04gr.	—
Blood $\begin{cases} \text{Blood cell} \\ \text{Serum} \end{cases}$	$\begin{matrix} 1:500 \\ 1:500 \end{matrix}$	0.1	$\begin{matrix} - \\ - \end{matrix}$

According to the results of these experiments the virus seems not to be equally distributed in the organs of the affected pigeons, its virulence being proved very high in brain, less in liver, kidney and spleen, the least in testicle and no trace of the virus in cornea and lenticular body. The virus was not demonstrated in blood at the end of the disease at least.

PREDISPOSITION FOR THE SUSCEPTIBILITY.

As seen from the results of artificial inoculation into pigeons the absolute resistance of pigeons to the artificial infection could not be demonstrated, contrary to the statement of HERTEL, OSTERTAG and others. But the possibility of infection seems to depend in some degree upon age and body weight. Of course, as it was very difficult to know the exact age of pigeons, the birds were simply divided into young or old. Young or old pigeons usually possess a certain degree of resistance to the infection, but in positive cases, they died in 15 days in average or survived. On the other hand, one to two years old pigeons wei-

ghing about 300gr. were most susceptible and the course of disease was comparatively short—four or six days. Therefore, it will be seen that the susceptibility of the pigeons differs with the age, young and old pigeons being less susceptible while the one weighing about 300gr. most susceptible. The relation between the body weight and the course of disease in the pigeons was tabulated as follows (0.1c.c. of 50% glycerin-salt emulsion of brain (1:10) was used):

Body weight (gr.)	No. of birds used	Body weight (gr.)			Course of disease		
		Mix.	Min.	Average.	Mix.	Min.	Average.
200—250	7	250	210	238	38	5	15
251—299	8	290	255	272	10	4	6.4
300—350	10	345	300	329.5	21	6	11
251—400	1	—	—	360	—	—	9

SUCCESSIVE PASSAGES OF THE VIRUS.

Since the successful infection of pigeons has been demonstrated, it has been considered to be very interesting to investigate whether such virus would be successively transmissible from the pigeon to the pigeon, and whether, if it were the case, this successively transmitted virus would always be infectious to chicken or not. However, up to the present time any experiment relating to the successive passages of the virus through the pigeons has not been attempted. For this purpose, the first virus (emulsion of the brain from the affected fowl) was used, which was fatal to the pigeon. 0.01 gr. of the virus was inoculated subcutaneously at the breast.

In the first series, ten pigeons were used one after another for the passage of the virus, every case developing typical symptoms, but the 11th transmission with the material from the 10th generation failed. This failure is probably due to the weak virulence of the virus used, because the 10th pigeon died in 68 days after the infection.

In the second series, 22 birds were successively infected with positive results, but the possibility of further transmission is not

yet settled.

During these successive passages of the virus through pigeons, some noticeable fact concerning the course of the disease was observed. Until the 6th generation the infected bird, as a rule, died from the 7th to the 9th day, but in the further generations the course seemed to be more or less shortened, the death occurring in 5 to 6 days. The period of incubation was almost constant, the symptoms appearing in from 4 to 6 days.

Although the same virus was not inoculated into chickens in every case, it has often been proved that the virus passed through pigeons, as a rule, produced the disease in chickens inoculated.

The results of the successive passages were tabulated as follows :

Generation	First Series				Second Series			
	Body weight of the pigeon.	Period of incub.	Course of the dis.	Result	Body weight of the pigeon.	Period of incub.	Course of the dis.	Result
1	275	5	7	Positive	320	5	9	Positive
2	270	4	5	"	330	6	9	"
3	260	8	10	"	310	8	8	"
4	310	17	21	"	360	7	9	"
5	300	6	7	"	360	6	7	"
6	230	6	7	"	310	6	8	"
7	335	6	8	"	240	4	5	"
8	265	6	7	"	320	5	6	"
9	330	10	11	"	290	4	5	"
10	345	—	68	"	300	6	7	"
11	300	—	—	Alive	300	4	5	"
12					250	5	6	"
13					300	5	5	"
14					330	4	5	"
15					320	5	6	"
16					360	6	6	"
17					260	5	7	"

18					240	4	5	Positive
19					310	5	6	"
20					285	6	6	"
21					290	6	6	"
22					300	4	5	"

SYMPTOMS.

The pigeons showed depression and loss of appetite, sitting in a crouching position and drooping the head. The plumage was ruffled and the wings were hanging. In the meantime the eyelids were usually closed, tears accumulating under them, the conjunctiva being swollen. On pressing the nose a mucous secrete was often discharged from the openings. The patients periodically shook their heads. Then as the disease progresses, peculiar nervous symptoms in addition to irregularity in gait were manifested by tonic-clonic spasms, involuntary movements, fluttering of the wings and increased reflex irritability. At about the same time the disturbances in the equilibrium were shown by staggering and wabbling gait, sometimes by circular movement of the head. Towards the end of the disease, the infected birds held their heads turned toward the back. Respiration was very laboured, and finally paralysis appeared propagating from the extremities to the head. In rare cases profuse diarrhea was observed.

THE CHANGES IN THE BLOOD OF THE DISEASED PIGEON.

In the artificially infected pigeons the death usually occurred within a week after the appearance of the symptoms, with a few exception. As seen in above table, the transmission of the virus to pigeons appears to be fatal in the positive cases. Therefore, it seems not to be practicable to utilize the resistance of pigeons to differentiate fowl-pest from fowl cholera.

In the proceeding of several experiments shown above, we have had opportunities to examine the circulating blood taken from 25 infected birds, and some differences in blood cell count were found between these two diseases.

As regards the number of different blood cells in healthy pigeons there are not so many descriptions.

CARL KLIENEBERGER u. WALTER CARL (1913) calculated the blood cells in 1.0c.c. of circulating blood from six normal pigeons with results shown in the following table :

No. of pigeon	Haemoglobin	Erythrocyte	Leucocyte	Lymphocyte (small)	Lymphocyte (large)	Pseudo-eosinophilic leucocyte
1	80	407	29711	28	8.5	56
2	97	389.5	15580	64.5	12.5	20
3	95	378	30240	73.5	17.5	6.5
4	96	383.3	31430	14.5	21.0	62.5
5	96	453.5	10430	37.5	8.5	50.5
7	95	422	24900	36.5	12.0	49.5
Average	93	405.55	10430 31430	42.0	13.5	41.0

We had also opportunities to examine the blood of 25 healthy pigeons before the inoculation of the virus, and the following results were obtained.

No. of pigeon	Body weight	Haemoglobin	Erythrocyte	Leucocyte	Lymphocyte (small)	Lymphocyte (large)	Pseudo-eosinophilic leucocyte
1	280	123	393	48000	30.6	21.1	17.1
2	340	115	322	36000	31.6	39.8	31.5
3	300	112	375	20000	66.7	29.5	2.3
4	320	110	380	22000	50.4	23.3	24.0
5	330	95	326	20000	45.6	28.4	26.0
6	330	110	351	16000	32.0	34.5	33.5
7	340	107	291	16200	21.1	22.9	55.3
8	300	115	353	12000	46.6	36.0	18.0
9	300	105	286	22000	34.5	33.2	32.5
10	255	120	305	18000	34.8	29.3	35.9
11	275	120	325	26000	26.9	32.9	39.7
12	320	115	311	18000	44.7	24.1	29.8

13	300	118	277	14300	35.5	26.6	35.0
14	340	115	291	34000	26.6	37.0	37.0
15	320	105	283	22000	35.4	38.6	24.1
16	330	116	339	26000	41.7	23.1	34.7
17	310	113	335	18500	31.0	22.7	44.3
18	330	113	342	28000	16.1	12.4	67.9
19	300	110	323	30000	27.4	20.4	52.0
20	350	118	312	20000	27.6	32.1	33.8
21	300	—	347	30000	31.5	33.8	34.7
22	320	—	317	14000	43.9	14.4	41.7
23	320	—	335	20000	36.2	26.5	37.3
24	300	—	350	26000	18.0	30.3	51.7
25	300	—	395	18000	15.4	19.5	64.3
Average	312.4	112.75	330	23000	34.05	27.57	36.14

All the pigeons developed the typical disease after the injection of the virus and in each case the blood was examined every day. As there were no marked differences in numerical changes, a brief description of a few cases will be given.

Pigeon, No. 11. inoculated subcutaneously with 0.2gr. of the brain (Chiba strain).

Date	Body weight	Body temperature	Erythrocyte	Leucocyte	Lymphocyte (small)	Lymphocyte (large)	Pseudo-eosinophilic leucocyte
Feb. 25	300	40.1	361	27400	28.0	36.0	40.0
26	270	42.1	379	18500	32.0	29.0	39.0
27	265	41.4	371	25600	22.5	25.7	50.0
28	260	40.1	408	28880	8.0	17.8	74.0

(Period of incubation, 2 days; course, 2 days.)

The erythrocyte count showed no change, and there was no remarkable increase in the number of leucocytes. But the number of lymphocytes decreased with the progress of the disease, reaching even half to one-third the normal number. On the contrary, the number of pseudo-eosinophilic leucocytes increased till the approach

of the death, showing about double the normal number.

Pigeon. No. 13. injected in the same manner as No. 11.

Date	Body weight	Body temperature	Erythrocyte	Leucocyte	Lymphocyte (small)	Lymphocyte (large)	Pseudo-eosinophilic leucocyte
Mar. 6	305	40.0	360	19440	17.0	23.0	56.0
7	270	40.4	360	23210	13.0	13.0	70.0
8	260	40.7	371	19510	9.0	9.0	82.0
9	255	40.6	349	28520	6.0	18.0	75.0
10	250	40.8	392	29010	15.0	14.0	72.0
11		37.6					

(Period of incubation, 3 days; course, 2 days.)

The total number of leucocytes showed some degree of changes but the lymphocytes decreased in number day by day. The pseudo-eosinophilic leucocytes began to show a sudden increase even in the 1st day and increased more and more till the end of the disease.

Pigeon. No. 19. inoculated subcutaneously with 0.2gr. of the brain (Fukuda strain).

Date	Body weight	Body temperature	Erythrocyte	Leucocyte	Lymphocyte (small)	Lymphocyte (large)	Pseudo-eosinophilic leucocyte
Mar. 11	330	41.0	465	14000	46.0	31.5	21.0
12	315	42.0	439	28000	32.0	14.5	50.0
13	310	40.6	371	32000	15.5	12.0	71.0
14	300	41.2	316	56000	18.8	10.0	69.0
15	330	40.8	322	12000	12.5	16.0	70.0
16	—	—	—	—	23.0	10.0	67.0

(Period of incubation, 4 days; course, 1 day.)

In this case the erythrocyte count showed the gradual decrease till the death of the bird, and the temporary increase in the total number of leucocytes continued until the appearance of symptom, but no more. The number of lymphocytes decreased gradually, reaching half the normal number. On the contrary, the remarkable

increase of the pseudo-eosinophilic leucocytes was also observed till the approach of death even in this case.

From our observation on the changes in the blood of the pigeons infected with the virus it was found that the differential leucocyte count showed, within 3 or 4 days before the appearance of symptoms, a remarkable difference in percentages of various leucocytes compared with those in normal cases; increase of pseudo-eosinophilic leucocytes reached more than 2—3 times numbers before infection, while the number of lymphocytes decreased.

On the other hand, the observations on the blood of three pigeons artificially infected with *Bac. avisepticus* were shown in the following table. The strain used was "W" strain and 1/1000000 loopful of an agar culture was injected subcutaneously.

Pigeon. No. 1.

Date	Erythrocyte	Leucocyte	Lymphocyte (small)	Lymphocyte (large)	Pseudo-eosinophilic leucocyte
Mar. 23	400	32400	27	34	33
24	362	31000	15	62	20
25	330	40000	16	72	19
26	312	24000	19	70	12

The erythrocyte count showed some decrease but not so much. The lymphocytes increased in number till the end of the disease. On the contrary, the pseudo-eosinophilic leucocyte began to show a gradual decrease in number from the second day after the injection, reaching to one-third at the end of the disease.

Pigeon. No. 3.

Date	Erythrocyte	Leucocyte	Lymphocyte (small)	Lymphocyte (large)	Pseudo-eosinophilic leucocyte
Mar. 23	360	23000	30.1	41	46
24	372	32100	23.4	71	37
25	245	25000	23.4	68	31
26	420	26800	24.2	76	28
27	372	23600	19.8	81	30

The chief changes in the blood of two series of the pigeons, the one being infected with the virus of fowl-pest, and the other with the culture of *B. aviepticus*, are simply tabulated as follows:

Disease	Lymphocyte	Pseudoeosinophilic L.
Fowl-pest	Decreased	Increased
Fowl cholera	Increased	Decreased

Moreover, these changes were observed, as a rule, in every case even in the earlier stage. Thereby these opposite changes between both diseases will probably be appreciated for the differential diagnosis, the pigeon being used for inoculation experiments.

SUMMARY.

The results obtained from our experiments on the susceptibility of pigeons to the virus of fowl-pest, and some observations on the infected animals are briefly summarized as follows:

1. The transmission of the disease to pigeons was successful by feeding a large amount of the virus, instillation into conjunctival sac, application to the scarified skin, or by cloacal injection, but not by the co-habitation of pigeons with affected fowls or pigeons.
2. The virus seems not to be equally distributed in the organs of the affected pigeons, its virulence being proved very high in brain, less in liver, kidney and spleen, the least in testicle and no trace of the virus in cornea.
3. The susceptibility of the pigeon differs with the age, young and old pigeons being less susceptible while the one weighing about 300gr. most susceptible.
4. The successive passages of the virus through the pigeon is possible, and the virus passed through pigeons is able to produce the disease in chickens.
5. Our observations on the changes in the blood of the diseased pigeons showed that within 3 to 4 days before the appearance of symptoms the pseudo-eosinophilic leucocytes increased reaching more than 2—3 times the numbers in normal cases while the number of lymphocytes decreased.

LITERATURES.

1. FREESE: *Centralbl. f. Bakt., Referate*. Bd. 43, 1909. s. 740.
2. SCHEURLIN & BUHL: *Berl. Tierärztl. Wochenschr.*, 1601. Nr. 24
3. Lode & Gruber: *Centralbl. f. Bakt.*, I. Abt., Bd. 30, Nr. 16
4. Depperich: *Fortschr. d. Veterinärhyg.*, 4, S. 217.
5. Hertel: *Arb. a. d. Kais. Ges. Amte.* Bd. 20, 1904. S. 453.
6. Kraus & Doerr: *Centralbl. f. Bakt.*, Orig. Bd. 46, Heft 8.
7. Doerr & Pick: *Ditto.* Bd. 76, 1915. S. 487.
8. Centanni: *Ditto.* Bd. 31, 1902. S. 182.
9. Prowazek: *Centralbl. f. Bakt., Referate*. Bd. 42, 1909. S. 465.
10. Klein: *Ditto.* Bd. 38, 1906. S. 767.
11. Rosenthal: *Ditto.* Bd. 39, 1907. S. 193.
12. Ostertag & Wolfhügel: *Ditto.* Bd. 32, 1903. S. 623.
13. Maggiora & Valenti: *Zeitschr. f. Hyg. u. Inf.*, Bd. 42, 1903. S. 623.
14. Kleine & Moellers: *Centralbl. f. Bakt.*, Orig. Bd. 49, 1905. S. 545.
15. Kolle & Wassermann: *Handb. der Pathog. Mikro.* Bd. VI, S. 280.
16. Huttyra & Marek: *Spezielle Path. und Therap. der Haust.* 6. Auf. S. 244.
17. Ward & Gallagher: *Disease of Domesticated Birds*. p. 81
18. *Journ. Amer. Med. Ass.*, Vol. 2, 1925. p. 146—206.
19. 右田百太郎: 中央獣醫會雜誌 第38輯 7卷 大正14年

鶏べすと病毒ニ關スル實驗的研究

I. 鳩ニ對スル病原性ニ就テ

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(大 正 15 年 11 月 3 日 受 付)

鶏べすと病毒ノ鳩ニ對スル病原性ニ關シテハ數多ノ學者ニ依テ實驗報告セラル、モノ少カラズト雖モ其ノ結果ハ區々ニシテ一致シ難シ本邦ニ於ケル本病ノ侵入ハ何レノ時カ不明ニ存スレドモ一昨年來余等モ數例ノ本病類似ノ症狀ヲ以テ斃レシモノニ就テ檢索シタル結果其ノ鶏べすとナリシヲ確ムルニ到レリ依テ3系ノ病毒ニ基キ先ヅ先人ノ文獻ニ徵シ鳩ニ對スル病原性ニ就キ實驗ヲ重ネタルニ大要次ノ如キ結果ヲ得タリ

1. 本病毒ノ大量餌食、點眼、皮膚接種、排泄腔内接種ハ鳩ニ本病ノ人工的感染ヲ成功スルモ本病ニ罹レル鶏又ハ鳩トノ同居ハ感染セシムルヲ得ズ
2. 感染鳩体内ニ於ケル病毒ノ分布ハ一樣ナラザルモノ、如ク腦ニ於テ最も多ク肝、腎、脾之ニ亞ギ睪丸ニ於テハ最も少ク角膜ニアリテハ本病毒ノ痕跡ナシ
3. 鳩ノ本病毒ニ對スル感受性ハ年齡ニヨリテ強弱アリ幼老鳩ハ感原性乏シク孵化後 1—2 年(體重大約 300 瓦)ノモノハ最も感染性ニ富ムヲ認ム
4. 前項ニ示スガ如キ鳩ノ撰擇ニヨレバ本病毒ノ連續的鳩體通過ハ實驗的ニ難シトセズ且ツ鳩體通過毒ハ鶏ニ對スル發病性ヲ失ハズ
5. 鳩ノ本病感染經過中ニ認ラル、血像ノ變化ハ特異ニシテ發症前兩三日以内ニ假性好えおじん性白血球ノ増數(常數ノ約2—3倍)ヲ示スニ反シ淋巴球ハ減少ス然ルニ鶏これら感染鳩ニアリテハ全ク之ニ反スルヲ認ム

以上ノ總括ヨリ察スルニ嘗テおすてゐた一ぐ及ぶつげ一、へるてる、しよいえるん及びゆーる等ノ鳩ハ本病毒ニ對スル感受性ナシト斷定セル結果ニ一致シ難ク從テ鶏これらトノ鑑別上鳩ノ本病毒不感染ノ應用ハ意義ナキモノト信ズ寧ロ余等ノ認メタルガ如ク鳩ニ於ケル血像ノ變化ハ兩者鑑別ヲ確實ナラシムル一助トスルヲ得ベシ

(自抄)