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Observations on Fowl Paralysis (Neurolymphomatosis)*

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There are many reports on transmission experiments with fowl paralysis. Some workers have found a greater incidence of paralysis in chickens inoculated with tissues from paralyzed chickens than in uninoculated controls; *e. g.*, Pappenheimer, Dunn and Seidlin¹ found paralysis in 25% of the inoculated chickens and 7% of the uninoculated controls. Similar but somewhat more successful were the transmission experiments of Dalling and Warrack.² Biely, Palmer and Asmundson³ found that the incidence of paralysis depends on inherited susceptibility, and is not conspicuously influenced by inoculation with tissues from paralyzed chickens. There is no report of a readily transmissible strain of fowl paralysis and the relation of fowl paralysis to leukemia is not clearly defined in the literature.

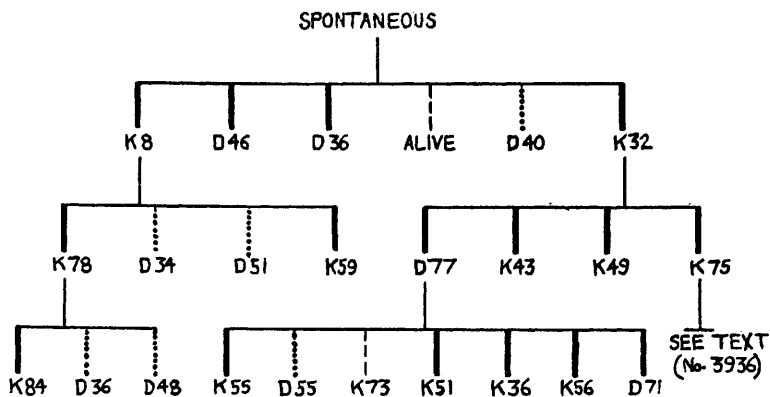


CHART 1.

| = neurolymphomatosis. -.- = inoculation unsuccessful.

-.- = died within 2 months after inoculation and showed no gross alterations characteristic of neurolymphomatosis.

D = died. K = killed. The numbers show in days the length of life after injection.

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¹ Pappenheimer, A. M., Dunn, L. C., and Seidlin, S. M., *J. Exp. Med.*, 1929, **49**, 87.

² Dalling, T., and Warrack, G. H., *Atti del V Congresso Mondiale di Pollicoltura*, 1933, No. 90.

³ Biely, J., Palmer, E., and Asmundson, V. S., *Canad. J. Res.*, 1932, **6**, 374.

Two transmissible strains of fowl paralysis have been isolated. Of one strain (Strain 5) 15 successful passages were made, of the other (Strain 6) 10 passages were made. Chart 1 shows only the results of inoculations of the first 5 passages of Strain 5.

The inoculations were made in most instances by intravenous injections of blood from paralyzed chickens, into healthy young chickens. The transmitting agent circulates in the blood of paralyzed chickens throughout the course of illness as shown by the following experiment:

No. 3946 was inoculated and showed beginning paralysis of legs and wings 42 days later. At this time three chickens were injected with 0.5 to 5 cc. of its blood. Two of these chickens developed paralysis and the third remained healthy. Eighteen days later the signs of paralysis were more conspicuous and another two chickens were injected with 0.5 to 5 cc. of blood of chicken No. 3946. Both of these chickens developed paralysis. Thirteen days later both extremities and one wing of No. 3946 were completely paralyzed, and the chicken was killed *in extremis*; two more chickens were injected with 0.5 cc. of its blood and both died with neurolymphomatosis.

Thus in contrast to common virus diseases and as with Rous sarcoma and chicken leukosis, antibodies do not seem to interfere with the circulation of the agent in the blood of the affected chickens. Nevertheless chickens that failed to develop the disease after one injection resisted repeated intravenous reinoculations.

After intraneural inoculation lymphomatous infiltrations cause great thickening of the injected nerves. After injection into the sciatic nerve the infiltrations extend distally from the site of injections. Since after intraneural injection the lesions in uninjected nerves are similar to those found after intravenous injection and the infiltrations in the nerve proximally to the site of injection are inconspicuous, it is probable that the generalized disease is produced by hematogenous and not by neural dissemination of the agent.

Neurolymphomatosis, unlike all known transmissible strains of leukosis of chickens, does not affect the bone marrow, rarely affects the liver and the spleen, and rarely causes conspicuous alteration in the number of the circulating leukocytes. Occasionally, the number of lymphocytes in the blood is increased.⁴ The highest leukocyte count observed was 140,000 and 92% of these cells were lymphocytes, mostly of small size. This leukocyte count was found

⁴ Cf. Biely, J., Palmer, V. E., and Lloyd, E. A., *Atti del V. Congresso Mondiale di Pollicoltura*, 1933, No. 89.

in the chicken from which Strain 5 took its origin. The cells that infiltrate the nerves are mainly lymphocytes of small and medium size, and the infiltration has the characteristics of a neoplasm. Moreover, neurolymphomatosis is often associated with lymphomatous infiltrations of viscera such as ovary, lung and heart, but the liver is seldom infiltrated. These characteristics differentiate neurolymphomatosis from the most common type of lymphomatosis of chickens which is associated with great enlargement of the liver caused by infiltration with large round cells like lymphocytes; this disease may be called hepatolymphomatosis. Hepatolymphomatosis is not associated with paralysis. Lymphomatosis caused by our Strain 2⁵ is characterized by the presence of numerous large basophile lymphocytes in the blood and the same large cells often infiltrate nerves and ganglia.

There are several agents that cause leukosis and their characteristics remain constant throughout numerous animal passages. To the 2 types of agents of leukosis described in previous communications⁵ a third type of agent may be added, namely that which produces neurolymphomatosis. The agent causing hepatolymphomatosis has not yet been discovered.

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Transmission of Myeloid Leukemia in Mice.*

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Myeloid leukemia, the most common type of leukemia in man, is rare in animals. A survey of this disease leaves doubt whether myeloid leukemia has ever been observed in domesticated animals (Jármai¹). It has been described in mice by Simonds,² although neither the bone marrow nor blood smears were available to him.

Myeloid leukemia was rarely found among our mice until a large number of them had been exposed to a single dose of approximately 400 r-units of X-rays or to smaller doses repeated at approximately

⁵ *J. Exp. Med.*, 1933, **58**, 253.

* This investigation has been supported by a Fund for the Study of Leukemia.

¹ Jármai, K., *Ergebn. allg. Path. u. path. Anat.*, 1934, **28**, 227.

² Simonds, J. P., *J. Canc. Res.*, 1925, **9**, 329.