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Transmission of Virus of Infectious Tracheitis in Chicken by Contaminated Egg Shell.

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An infectious disease hitherto unobserved in Palestine was reported among chicks from different poultry farms. Symptomatology resembled infectious laryngotracheitis[1]; it differed from this infection by its mild course, absence of fatalities and of any noticeable effect on development. The disease is milder in young than in old chicks.

Mucus from the trachea of infected chickens was triturated with sand, diluted with nine parts saline and divided into two parts: one was used for inoculation, the other was passed through Seitz filter and the filtrate inoculated in the same manner as the unfiltered material. The results demonstrated that the causative agent was a filterable virus. Cultures of the filtrate in a variety of media remained sterile. The virus was recovered from the lung, but not from the liver, ovary or uterus.

Infection was most readily produced by dropping infected material into the trachea, also by intraperitoneal or intrathoracic inoculation. The incubation period varied with the age of chicks and the concentration of virus. One-week-old chicks showed the first symptoms of infection after 5 days; in chicks 2 weeks old, the incubation period was 9 to 24 days; in 6-8-week chicks the incubation period varied from 11 to 42 days. The infection spread quickly by contact. The time of exposure before appearance of symptoms (8-10-week chicks) ranged from 22 to 64 days. The virus could be demonstrated in the tracheal secretion in 1:1,000,000 in unfiltered and in 1:10,000 in filtered fluid.

Experiments demonstrated that the virus was transmitted on the surface of the egg shell.

1. Eggs were obtained from the infected farm and incubated. Of 110 eggs 40 chicks hatched. After 37 days 3 chicks developed the disease and two weeks later 4 more succumbed. The experiment was carried out under strict conditions of isolation so that no contact with any other source of infection was possible. The virus was recovered from the diseased chicks.

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[1] *a.* Kernohan, G., *Univ. of Cal. Agr. Exp. Sta. Res. Bul.*, 494, 1930; *b.* Hinshaw, W. R., *Univ. of Cal. Agr. Exp. Sta. Res. Bul.*, 520, 1931; *c.* Beach, J. R., *Report of the Sixth World's Poultry Congress*, 1936; *d.* Beaudette, F. R., *Poultry Science*, 1937, **16**, 103.

2. A second lot of 105 eggs was obtained from the same source. These eggs were immersed in a 1:1000 solution of $KMnO_4$ for 15 minutes, washed with $NaHSO_3$, then with sterile water, dried and placed in incubator, which was thoroughly washed and fumigated with formaldehyde. Thirty chicks hatched and developed normally during 61 days' observation.

3. 109 eggs from the same source were incubated as above. Forty-five chicks hatched. At the end of one week 4 chicks showed symptoms and in five weeks 25 chicks developed the disease.

4. Of 104 eggs from the same infected source treated as in Exp. 2, 61 hatched. During 42 days there was no sign of infection.

5a. Eggs were obtained from an uninfected farm. These were infected by painting the shells with the mucus from the trachea of an infected chick. Of 48 eggs, 18 chicks hatched; 8 chicks showed symptoms after 5 days and 3 more by the 10th day.

5b. 50 eggs were treated as in 5a, the mucus diluted 1:10 in saline. Only 9 chicks hatched, 2 showed signs of the disease after 5 days and 3 more by the 10th day.

6. The infected mucus was diluted 1:10 in saline and the suspension sprayed on the surface of eggs from an uninfected source. Of 48 eggs 21 chicks hatched. After 18 days 3 chicks showed typical symptoms and were removed; 10 days later 3 more chicks developed the infection.

7. In the experiments with artificially infected eggs, sets of 2 eggs were removed at the time of incubation, and after 8, 14, 18, and 19 days respectively. The surface of each egg was washed with saline and 0.5 cc of the washings inoculated into the trachea of 2-4-week-old chicks; all chicks developed typical infection within 13 to 21 days. These tests show that the virus dried on the shell was infective during the entire period of incubation. No virus could be demonstrated in dead embryos from eggs artificially infected on the surface, or from eggs from an infected source.

8. Eggs whose shells were artificially infected were divided into two sets. One set was washed with saline, the other was first treated with permanganate and sulphite as above and then washed with saline. The respective saline washings were then inoculated into the trachea of 6-week-old chicks. Those receiving the control washings developed the disease in 11 days, while those receiving the washings after the eggs had been treated with permanganate remained well during a period of observation of 33 days.

9. These experiments were repeated under farm conditions. In the infected farm untreated eggs always yielded about 3-5% infected

chicks. Of 2140 eggs washed with permanganate (average hatch 66%) no infections were noted during 4-6 weeks. However, as soon as these chicks came into contact with existing flocks, the disease spread rapidly among them. When chicks hatched under the same conditions were kept away from infected stock they developed without infection.

10. A total of 26,636 eggs washed with permanganate and sulphite gave an average hatch of 69.1%, showing that treatment has no damaging effect on eggs.

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Comparative Effects of Horse Serum, Horse Serum Albumin and Horse Serum Globulin in Experimental Shock.*

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Previous reports have been made regarding the effects of the intravenous administration of bovine serum albumin to man[1] and to lower animals.[2] The present communication is concerned with the intravenous use of horse serum, horse serum albumin, and horse serum globulin as blood replacement fluids in experimental shock.

Materials. Normal horse serum from healthy horses was used. The albumin and globulin fractions were separated from the horse serum by the method which we have described previously.[1] From analysis, the whole serum contained 9.2 g % of total proteins, 4.0 g % of albumin and 5.2 g % of globulin. After separation, the horse serum albumin solution contained, from analysis, 3.7 g % of albumin. The serum globulin solution contained 5.4 g % of globulin. The experimental animals were healthy dogs weighing from 3.2 kg to 6.8 kg.

* Since the completion of this investigation on bovine and horse serum albumin, our attention has been drawn to two preliminary reports of work along similar lines. No details of methods used or data are given in these reports.[3,4]

1 Davis, H. A., Eaton, A. G., and Williamson, J., PROC. SOC. EXP. BIOL. AND MED., 1942, **49**, 96.

2 Davis, H. A., Eaton, A. G., PROC. SOC. EXP. BIOL. AND MED., 1942, **49**, 20.

3 Janeway, C. A., and Beeson, P. B., *J. Clin. Invest.*, 1941, **20**, 435.

4 Keys, A., Taylor, H. L., and Savage, G. M., *J. A. M. A.*, 1941, **117**, 62.