mice following the feeding of lyophilized tissue prepared from breast tumors suggests that the active influence usually transferred in the milk by nursing may be a virus.

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A PROBABLE AGENT FOR THE TRANSMISSION OF FOWL PARALYSIS

FOWL paralysis, sometimes called "range paralysis," is a disease that is widespread in this country. In many instances the toll is heavy. The disease made its appearance at this college in 1937, causing 61 deaths in a flock of 225 chickens. In 1938 a flock of 345 birds had 92 fatalities. In 1939 three flocks with a total of 439 birds had 403 fatalities.

The fatalities in 1939 occurred from May 10 to September 28. An old barn infested with "blue bugs," *Argas persicus* (Oken) (*A. miniatus* Koch), stood near the pens, and the chickens were practically all infested when the large number of fatalities occurred. This led one of the authors (Brown) to suspect the "blue bugs," or fowl ticks, as being associated with the disease. Immediately experiments were started to see if the suspicion was justifiable. The barn was torn down and the hen houses were disinfected with carbolineum.

On September 2, 1939, twelve pens heavily infested with "blue bugs" were divided into two groups of six pens each. In group I six birds with paralysis were placed in each pen on September 4. On September 9 twelve birds without paralysis were placed in the six pens with the thirty-six paralyzed birds. The paralyzed birds were removed from the pens on September 21. Twenty-one days after being placed in the pens the well birds began to show paralysis. On the thirty-first day all were down with paralysis.

The six pens of group II were thoroughly disinfected with carbolineum on September 5. Six pullets were placed in each of the six disinfected pens on September 9. These pens were disinfected again on September 12. These pens were used as controls, and no paralysis occurred after they had been occupied for 31 days.

Similar experiments to the one outlined above were repeated five times over a period of one year, with the exception that no paralyzed birds were introduced. Some were kept in pens infested with "blue bugs," while others were kept as controls in pens free from these parasites. In the pens infested with the "blue bugs" 111 birds out of 120 developed paralysis. In the control pens 1 bird out of 126 developed paralysis.

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On September 1, 1940, five hens were placed in one of the infested pens. When paralysis had appeared (September 27), one of the hens was taken to the laboratory where the young "blue bugs" were removed from the hen, treated with 50 per cent. ethyl alcohol, removed to a sterile physiological salt solution, and ground until a suspension was made of their body contents. This suspension was injected into three young birds—two cockerels and one pullet. These birds were placed in a clean pen free from "blue bugs." Between the twenty-first and the twenty-fifth day the cockerels broke down with paralysis; the pullet broke down on the twenty-ninth day. On November 1 a two-year-old hen and a pullet were injected with some of the same suspension (34 days after making it). On November 29 the pullet was prostrate. The hen was paralyzed in one leg. In the main breeding yards of the college only five chickens with paralysis have been found since September, 1939, following intensive work to prevent the recurrence of "blue bugs."

The results given here indicate that the "blue bugs," *Argas persicus,* are agents for transmitting fowl paralysis. Other parasites may be agents also, but in this preliminary report the authors have data for only the one. Further experimentation on an extensive scale is now being planned.

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BOOKS RECEIVED

ARENSON, SAUL B. *Chemical Arithmetic.* Second edition. Pp. 130. Wiley. $1.50.

CHANEY, RALPH W. and HSEN HSU HU. Carnegie Institution of Washington, *Publication No. 507; A Miocene Flora from Shantung Province, China.* Pp. 147. 57 plates. The Institution. $3.25.

CHILD, C. M. *Patterns and Problems of Development.* Pp. ix + 811. 224 figures. University of Chicago Press. $8.00.

FIESER, LOUIS F. *Experiments in Organic Chemistry.* Second edition. Pp. x + 487. 80 figures. Heath. $2.80.

GRAY, GEORGE W. *Education on an International Scale; A History of the International Education Board, 1923–1938.* Pp. xiii + 114. Illustrated. Harcourt, Brace. $2.00.

HODGE, W. V. D. *The Theory and Applications of Harmonic Integrals.* Pp. ix + 281. Cambridge University Press, Macmillan. $4.50.

HURLBURT, CORNELIUS S., JR., Editor. *Dana's Manual of Mineralogy.* Fifteenth edition, revised. Pp. x + 480. 436 figures. Wiley. $4.00.

MILLER, FREDERIC H. *Partial Differential Equations.* Pp. ix + 259. 15 figures. Wiley. $3.00.

PAVLOV, IVAN P. *Conditioned Reflexes and Psychiatry.* Translated and edited by W. HORSLEY GANTT. Pp. 199. International Publishers, New York. $4.00.

WOODRUFF, LORANDE L. *Foundations of Biology.* Sixth edition, revised. Pp. xvii + 773. 469 figures. Macmillan. $3.75.

WORTHEN, EDMUND L. *Farm Soils; Their Management and Fertilization.* Third edition, revised. Pp. xiii + 515. 226 figures. Wiley. $2.75.