

Proceedings of the Iowa Academy of Science

Volume 44 | Annual Issue

Article 88

1937

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Recommended Citation

Stiles, Karl A. and Watterson, Ray L. (1937) "The Effects of Mechanical Jarring upon the Embryogeny of Chick Embryos," *Proceedings of the Iowa Academy of Science*, 44(1), 203-204.

Available at: <https://scholarworks.uni.edu/pias/vol44/iss1/88>

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THE EFFECTS OF MECHANICAL JARRING UPON THE EMBRYOGENY OF CHICK EMBRYOS

KARL A. STILES AND RAY L. WATTERSON

The results of this study indicate that jarring at frequent intervals throughout the first day of incubation exerts a deleterious influence on the developing embryo. Only in one instance did an egg jarred from the fourth to the twelfth hour of incubation develop normally and hatch. Sixty per cent of the embryos thus jarred died sometime between the second and third day of incubation. The others ceased to develop between the third and eleventh day of incubation.

The most striking result of such jarring is the effect upon the extra-embryonic circulation. When a 48-hour embryo is examined following jarring from the fourth to the twelfth hour of incubation the first thing which is observed is the absence of the extensive network of vitelline arteries and veins. In its development, the vitelline circulation has progressed no farther than the blood island stage. Instead of freely moving blood cells, one sees the corpuscles trapped in the blood islands. Sometimes these islands are spherical in shape; sometimes two, three, or more are fused together forming various-shaped structures; frequently they are arranged in rows, giving evidence of the direction the blood vessels would have taken had their formation continued without interruption. Always the blood islands appear swollen and distended with plasma.

Under such conditions, vitelline circulation is impossible. There is no connection between the blood islands and no means whereby circulation could take place. In its early developmental stages the embryo is dependent upon the vitelline circulation for its oxygen supply, as well as for its nutriment. Therefore, it can be postulated that, if the vitelline circulation fails to develop, the embryo can live only until it becomes too large to receive sufficient food and oxygen by direct absorption through its surface; then it must necessarily die.

Many unusual abnormalities occurred in the embryo proper, especially in the neural tube and heart region. In most instances these embryos are so abnormal that their identification as chick

embryos would be exceedingly difficult. Whether these anomalies are the direct result of the jarring, or whether they are brought about at least in part, as a result of insufficient food and oxygen due to the non-functional vitelline circulation, is an open question.

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EFFECTS OF TEMPERATURE ON OOCYSTS OF EIMERIA (COCCIDIA, PROTOZOA)

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Unsporulated oocysts of *Eimeria nieschulzi*, *E. miyairii*, and *E. separata* were taken from the caeca of albino rats which had pure infections; unsporulated oocysts of *E. tenella* were secured from the caeca of experimentally infected chicks; unsporulated oocysts of *E. arloingi*, *E. faurei*, and *E. ninakohl-yakimovi* were obtained from fresh fecal droppings of young goats. They were concentrated by flotation in sugar solution and submitted to different temperatures (ranged 46° C. - 56° C.) and at various length of exposures in an electrically controlled water bath. The results demonstrated that unsporulated oocysts of different species of *Eimeria* do not respond to temperature in the same manner. At 50° C., for instance, total kill resulted for *E. nieschulzi* at an exposure of 4-5 minutes, for *E. miyairii* 30-38 minutes, for *E. separata* .50-1 minute, for *E. tenella* 40-55 minutes, for *E. arloingi* 100-150 minutes, for *E. faurei* 40-60 minutes, and for *E. ninakohl-yakimovi* 20-40 minutes. *E. separata* is the most delicate and *E. arloingi* is the most resistant species to the influence of temperature.

Unsporulated oocysts of *E. nieschulzi* from the caeca of experimentally infected white rats which had been fed on a diet deficient in vitamins B and G were concentrated and tested for temperature effects as above. It was found that these oocysts were much more easily killed by temperature than those from rats which had been fed on a normal diet (controls). For example, at 48° C. and at exposures of 4, 7, 10, 13, 16, and 20 minutes the mortalities of the former were 11.69 per cent, 24.04 per cent, 32.33 per cent, 44.81 per cent, 60.24 per cent, and 79.94 per cent, respectively, while those of the latter were 84.63 per cent, 95.82 per cent, 98.11 per cent, 99.91 per cent, and 100 per cent, respectively. From this