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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)

K. CHANG

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

experiment it is shown that by elimination of vitamins B and G in the diet, the resistance to heat of this protozoan parasite of the white rat is considerably lowered.

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EFFECTS OF ULTRA-VIOLET LIGHT ON DIAPAUSE
AND POSTDIAPAUSE GRASSHOPPER EGGS
(ORTHOPTERA)

MALCOLM RAY

In the irradiation of *Melanoplus differentialis* eggs, the entire spectrum of a quartz mercury vapor arc was utilized with the energy input and the distance from the lamp to the eggs kept constant. The dosages were controlled by varying the length of exposure. The eggs were irradiated on moist paper, under quartz plates and at constant temperature. Oxygen consumption and percentage of hatching was determined.

By the use of light-sensitive material (lithopone) it was found that neither the chorion nor the cuticle of the egg nor the exuviae would transmit ultra violet light. This being true the effects herein described must be due to some type of secondary irradiation of one or the other of these layers rather than to the action of the primary waves directly on the egg.

It was found and confirmed several times that at any stage of development of the eggs the chorion completely prevents any action of the ultra violet light at exposures up to four hours daily during the entire development. Longer exposures have not been tried.

Effects of daily exposures for 18 to 21 days on dechorionated, postdiapause eggs are: exposures of five seconds and 15 seconds seem to have no effect; exposures of one minute permit eight per cent hatch and of five minutes permit two per cent hatch; exposures longer than five minutes completely inhibit hatching.

Effects of single irradiations, at the beginning of postdiapause development, on dechorionated eggs are: exposures of less than 15 minutes have no measurable effect; exposures of one-half to four hours produce a retardation in development and a killing effect roughly proportional to the length of exposure but even the