

## Modified Respiratory Movements During Egg Laying in the Hen

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During some experimental work on the chicken, *Gallus domesticus*, a definite pattern of irregular breathing movements was noticed. A hen, placed in a cabinet<sup>1</sup> preparatory to raising the external temperature, exhibited irregular respiratory rhythm. The hen was subjected to an external temperature of 32°C. The cloacal temperature had increased 0.25°C. above the normal temperature, *i.e.*, the temperature of the cloaca before the application of the external heat.

The normal record of the respiratory movements of the hen is quite similar to that of other vertebrates, the inspiration requiring the greater portion of the time for the respiratory cycle. In Fig. 1, A, the

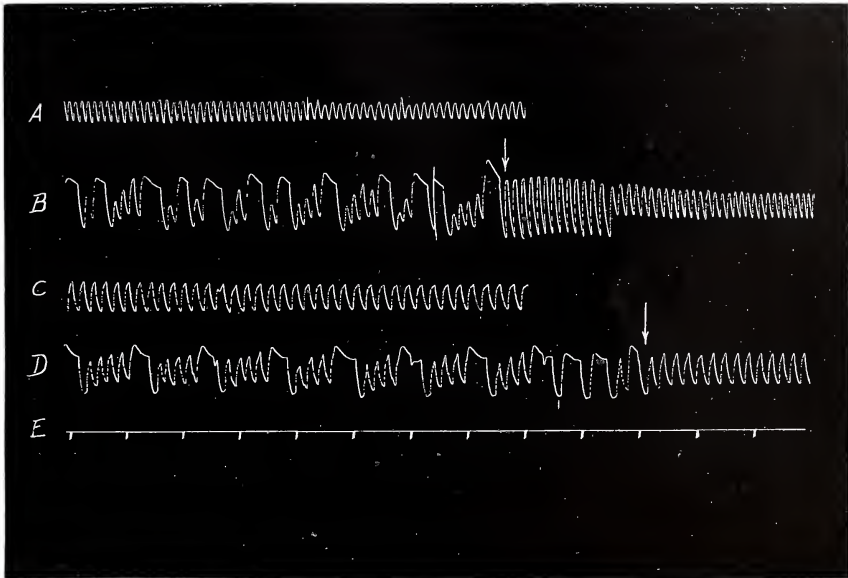


Fig. 1. Respiratory movements during egg laying in the hen. The down stroke of the tambour indicates inspiration.

- A. Normal respirations of first hen (40 to 50 per min.).
- B. Irregular respiratory movements during egg laying. The arrow indicates time of deposition of egg.
- C. Normal respirations of second hen (28 per min.).
- D. Irregular respiratory movements during egg laying. The arrow indicates time of deposition of egg.
- E. Time intervals, 10 sec.

<sup>1</sup>Hiestand, W. A., and W. C. Randall, 1939. An apparatus for raising the body temperature of small animals. *Amer. Mid. Natur.* 22:214.

respiratory rate was 40 to 50 per minute and is quite normal for a hen under the increased environmental temperature.

The irregular respiratory rhythm, as shown in Fig. 1, B, was interesting in that following a series of uniform movements apnea occurred at the end of certain expirations. A protrusion of the abdomen indicated the appearance of an egg. As soon as the egg was deposited, as indicated by the arrow, the breathing became regular but was dyspneic during the next 20 seconds after which the amplitude became normal.

Several days later, at the beginning of another experiment, the same type of respiratory movements was observed. This recording (Fig. 1, D) was made at room temperature and is so similar to that made at the higher temperature that the two recordings are presented as representing the character of the breathing movements of a hen while laying an egg. The normal respiratory rate of this hen was 28 per minute.

Both records show essentially the same peculiarities in respiratory rhythm, namely, alternate periods of eupnea and apnea, the latter phase occurring at the end of an expiration and persisting for approximately 3 to 4 seconds. In record 1, B, the dyspneic respiration following expulsion of the egg might be made accountable by an accumulation of an excess of  $\text{CO}_2$  during the previous period or by the increase in body temperature of the bird in the fever cabinet. The former explanation is the more probable since high body temperature ordinarily causes an increased rate rather than an increased amplitude of respiratory movements in chickens.

An analysis of the modified respiration of the hen during egg laying indicates that periodic held expirations either facilitate mechanically the passage of the egg through the distal portion of the genital tract or occurs as a result of mechanical conditions induced by the passage of the egg.