III.—*On the Temperature of the Common Fowl* (*Gallus domesticus*). By
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During the last three years I have made a large number of observations on the temperature of the common fowl under different circumstances, the results of which I now beg leave to submit to the Society, with the hope that they may be considered not altogether uninteresting to the physiologist.

The fowls tried were chiefly of the pure Dorking breed. At the time they appeared to be healthy, and all in good condition. They had all the run of a field adjoining the poultry yard.

In all the trials the same thermometer was used,—each degree of which, that of Fahrenheit, was divided into ten parts, and had been warranted correct by the makers after comparison with a standard. The quantity of mercury in the bulb of the instrument was so small that in a minute or two, when introduced into the rectum of the bird, it reached the maximum; and in every instance the rectum was the part of which the temperature was ascertained, presuming it to be there the same as that of the interior of the body generally.

Though the temperature of the air was mostly noted down, as well as other circumstances likely to affect the results, I do not think it necessary to enter into minute details respecting them, partly for the sake of brevity, and partly from their not appearing to influence materially the results. I may, however, remark that the observations were mostly made, whatever the season of the year, between 10 and 11 A.M., and that in the majority of instances the birds had been kept in confinement during the night and early morning, and had not been fed since the day preceding.

1. *Of the Average Temperature.*

The total number of observations made during the whole period on birds of different sexes and different ages, varying in age from five weeks to five years, the majority from six months to two years, amounted to 163; the average temperature deducible from them was $107^{\circ}81$.

2. *Of the Temperature of the Male and Female.*

The number of males tried was 68, of females 95. The average temperature from the former was $108^{\circ}39$; from the latter, $107^{\circ}36$. The highest temperature observed in any one instance of the males was 110° —this in August, in sultry weather, when the thermometer in the shade was 81° ; the lowest was $106^{\circ}5$, whilst the highest noticed in the other sex was $109^{\circ}25$, the lowest 105° —this in a hen on the sixteenth day of her incubation.

3. *Of the Temperature of the Sexes previous to Maturity.*

The term maturity is used as implying the stage at which the female begins to lay and the male to exercise the generative faculty—in the instance of the former about the sixth or seventh month, in that of the latter a month or two earlier.

The number of both sexes tried was 31,—of males, 16 ; of females, 15,—yielding conjointly an average temperature of $108^{\circ}\cdot5$, and separately, in the instance of the males, $108^{\circ}\cdot4$; in that of the females, $108^{\circ}\cdot66$. The highest male temperature was $109^{\circ}\cdot25$, the lowest $107^{\circ}\cdot5$; whilst the highest female temperature was $109^{\circ}\cdot5$, the lowest 108° .

4. *Of the Temperature of the Mature Male.*

The temperature of the same male was taken during one year monthly, with the omission of one month. At the beginning the bird was two years old ; at the end, when three years old, it weighed nine pounds and a half. During the whole time it seemed in vigorous health. The results were the following :—

In October, . . .	$109^{\circ}\cdot5$	In May, . . .	$108^{\circ}\cdot5$
November, . . .	$109^{\circ}\cdot5$	June, . . .	$109^{\circ}\cdot5$
December, . . .	$108^{\circ}\cdot5$	July, . . .	$108^{\circ}\cdot75$
January, . . .	$108^{\circ}\cdot25$	August, . . .	$110^{\circ}\cdot00^{*}$
February, . . .	$107^{\circ}\cdot75$	September, . . .	$108^{\circ}\cdot77^{\dagger}$
April, . . .	$108^{\circ}\cdot25$		

affording an average temperature of $108^{\circ}\cdot77$.

5. *Of the Temperature of the Female whilst Laying.*

The number of females tried was 12, varying in age from six or seven months to four or five years. The average temperature reducible from them was $107^{\circ}\cdot5$; the lowest temperature noticed in any one was $105^{\circ}\cdot5$ —this in a hen five years old ; the highest, $108^{\circ}\cdot5$.

6. *Of the Temperature during Incubation.*

Of 14 sitting hens tried, the average temperature was found to be 107° ; the lowest temperature observed was 105° ; the highest, $109^{\circ}\cdot5$.

The average weight of the fowls at the beginning of sitting was 5 lbs. 13 oz. ; the average loss at the end of the process was 1 lb. 7 oz. ; the smallest loss in any one instance was 4 oz.—this in that of the fowl the temperature of which at the end was $109^{\circ}\cdot5$; the greatest, and the same in two instances, was 1 lb. 8 oz., and of both the temperature was 107° .

* Thermometer in shade, 81° .

† Moulting.

7. Of the Temperature during Moulting.

Of 10 hens undergoing this change the average temperature was $108^{\circ}44$; the highest in any one instance was $109^{\circ}5$; the lowest, 107° . It is noteworthy that the highest degree was observed in the middle stage of the process, when the surface of the abdomen was nearly destitute of feathers.

Conclusions.

The results, I would beg to remark, are offered merely as approximations as such they seem to show—

1. That the temperature of the common fowl is $107^{\circ}81$.
2. That the temperature of the sexes before maturity is comparatively high, being $108^{\circ}5$, whilst that of the two sexes at this stage varies very little.
3. That the temperature of the male, on the whole, irrespective of any particular age, is higher than that of the female, being as $108^{\circ}39$ to $107^{\circ}3$.
4. That the temperature of the fully matured male (a single instance) is $108^{\circ}77$.
5. That the temperature of the laying hen is $107^{\circ}4$.
6. That during incubation the temperature falls, and is as low as 107° .
7. And that during moulting it rises to $108^{\circ}44$.

The variations of temperature, from the highest to the lowest, noticed in the several instances, are less perhaps than might have been expected. No doubt, they were connected with peculiarities of circumstance, which very careful observation might possibly have detected,—circumstances of weather, not only as to temperature, but also as to moisture of air, degree of exposure, and varying strength of wind, not to insist on other conditions, such as the quantity of food taken, the period of fast, amount of exercise, the precise state of health. The very few observations I have made, tending at all to illustrate modifying circumstances in relation to temperature, are the following:—

A hen, seven months old, after having been confined in a basket thirty-six hours without food, the thermometer part of the time below the freezing point, was of the temperature $106^{\circ}5$.

Another of the same age, confined without food twenty-six hours, the thermometer during the time between 40° and 50° , was 107° .

An old hen, the leg of which had been broken two or three days previous to trial, and had ate little since the preceding evening, was 105° .

A fowl labouring under difficulty of breathing of some hours, was 100° .

A male bird, in full vigour, of the temperature $108^{\circ}75$, was let loose, and driven till it stopped, after four minutes,—now its temperature was found to be 109° .

On the principal results, as given in the summary, I shall comment but little. Some of them, especially the near equality of the temperature of the sexes before maturity, and the lowering of the temperature of the female at the period of laying, may be viewed as physiological problems; others, as the loss of weight during incubation, with a fall of temperature, and the contrary as to temperature during the period of moulting, seem in harmony with what might be expected according to the theory of animal heat. In the one case, there being a loss of substance of the individual in connection with diminished nutriment, without apparently a febrile disturbance of health; whilst in the other case, it would seem there was such a disturbance, with an elevation of temperature, such as is witnessed in febrile diseases.

The change of temperature that takes place in the chick on quitting the egg is remarkable, and, as it appears to me, strongly in support of that view of animal heat, in which respiration and the formation of carbonic acid by the union of oxygen with carbon, is considered its principal source. In the egg, just before hatching, the chick is of a temperature rarely exceeding 100° , and that derived more from the incubating mother than from the organic changes in progress; but no sooner is the hatching completed, and the young bird freely respire, than there is a sudden elevation of temperature. In one instance, in which I had an opportunity of watching a gosling in the hatching act, the temperature actually rose, and that suddenly, from about 100° to 106° , after the manner of a hibernating animal, such as the dormouse, in which in passing from its torpid to a state of activity without taking food, there has been, as I have noticed, a rise of temperature from 56° to $99^{\circ}5$.*

It is also remarkable how soon the young fowl, after becoming tolerably fledged and capable of securing adequate food, which would seem to be simultaneous with the consumption of the internal provisional yolk, its earliest nourishment, it attains a comparatively high temperature. Thus of 11—7 of them thirty-one days old, 4 thirty-five—the average temperature in the middle of October was $108^{\circ}73$; the lowest in any one instance 108° , the highest $109^{\circ}5$: and I have found the temperature of nestlings also comparatively high,—a young swallow, fully fledged, just after being taken from the nest on the 28th July, was 108° .

Dr William Edwards, in his very interesting work, "On the Influence of the Physical Agents on Life," has come to the conclusion that "the power of producing heat in warm-blooded animals is at its maximum at birth, and increases successively until adult age,"—a conclusion which seems to me questionable, and requiring, if admitted at all, to be received with many restrictions. Some of the results I have obtained are opposed to it, and others might be mentioned tending to invalidate it.

* See *Physiological Researches* (1863), p. 85.