Asymmetry of Chicken Thyroids[1]

THEODORE T. ODELL, Indiana University

Asymmetry of paired organs in vertebrates has been reported by several authors. Etzold (2) reported that in 18 of 19 pairs of testes of the English sparrow the left gonad was larger than the right. Riddle (3, 4, 5) concluded from his observations on male pigeons that their right testis was larger than their left. He suggested, however, that the reverse was true in fowl. Breneman (1) made an analysis of the gonad weights of 1458 male White Leghorn chickens aged 5 to 140 days. He found that the left testes have a greater mean weight than the right testes throughout this age range, thus confirming Riddle's suggestion.

These observations raised the question whether a similar asymmetry might exist in other paired organs. It was, therefore, decided to weigh left and right thyroids of chickens of different ages. This paper reports the results of these measurements.

Materials and Methods

The observations reported here were made upon 248 male single comb White Leghorn chickens. The chickens were kept in battery brooders and fed a standard balanced chick ration. At time of autopsy the left and right thyroids were removed and weighed individually to the nearest mg. on a Roller-Smith torsion balance. Data were obtained from birds of the following ages: 30, 35, 40, 60, 70, 80, 85, 90, 95, 100, 120 and 125 days.

Observations and Discussion

The mean weight of the left thyroids at each age was greater than that of the rights. This is illustrated in Figure 1. The level of significance of the difference of these mean weights at each age was determined by applying the *t* test to the figures obtained by running a paired measures analysis (6). It may be seen in Table I that the *t* test gave a high level of significance for seven of the twelve ages included. There is little doubt that the test of difference would be significant at the other five ages if the size of the sample at those ages were increased.

It should be noted that there were some right thyroids which were bigger than their corresponding left thyroids. In 21% of the birds examined the right thyroids were larger than the left thyroids.

A regression line was plotted for the weight of the left thyroids against age, and likewise for the weight of the right thyroids against

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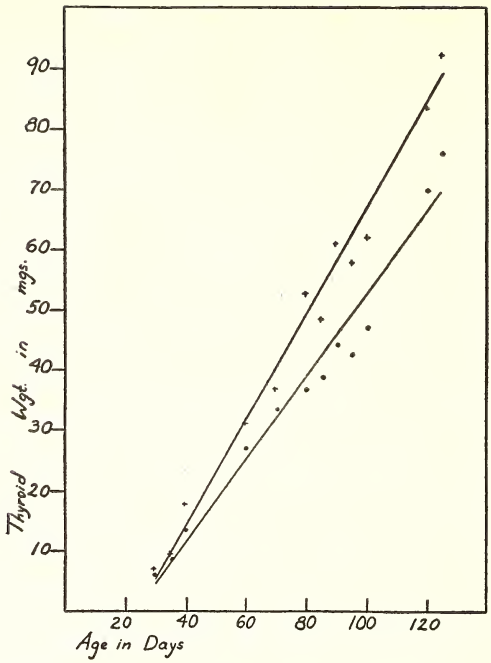

Fig. 1. Thyroid weights: Pluses represent mean weights of left thyroids. Dots represent mean weights of right thyroids. Lines represent regression lines of left and right thyroids.

age. A test between the two regression coefficients thus obtained showed that there is a significant difference (at the 1% level) in rate of growth between the left and right thyroids, the former growing at a faster rate.

In experimental work the individual organs of a pair are sometimes treated as being equivalent to each other in all respects. For example, an investigator may compare the weights of the individual glands of a pair after subjecting each to different treatments. The observations presented in this paper demonstrate that the left and right thyroids of chickens are not equivalent as regards weight and rate of growth. An error would, therefore, be introduced by considering them equal.

The reason for the observed bilateral asymmetry of chicken thyroids is not known. It might be suspected that the circulatory system is the determining factor, especially since the thyroid is one of the most highly vascularized glands in the body. However, no information is available to support this suggestion, and other possible causes can be imagined. The reversed condition of asymmetry as found on the one hand by Riddle in pigeons and on the other hand by Breneman and this author in chickens suggests the possibility of a direct but

TABLE I. Comparison of Average Weights of Left and Right Thyroids at Various Ages from 30 to 125 Days

Age	No. Animals	Average Wt. Left	Average Wt. Right	"t" test (% signif.)
30	17	7.0	6.1	6%
35	29	9.3	8.4	14%
40	16	17.6	13.4	1%
60	9	30.8	26.9	30%
70	28	36.8	33.4	11%
80	36	52.6	37.2	<1%
85	27	48.3	38.9	<1%
90	32	60.8	44.3	<1%
95	10	57.9	42.6	<1%
100	17	63.1	47.2	<1%
120	10	86.2	69.7	22%
125	17	94.2	75.9	<1%

opposite genetic determination in these two different species of birds. The resolution of this problem awaits the accumulation of further knowledge.

Summary

The left and right thyroids of 248 single comb White Leghorn male chickens aged 30 to 125 days were weighed individually on a Roller-Smith torsion balance. The average weight of the left thyroids was greater than that of the rights at all ages included. The left thyroids also had a faster rate of growth than the right thyroids. No explanation of this bilateral asymmetry is offered.

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