THE EGGS OF THE HOUSE SPARROW

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INTRODUCTION

This paper summarises the characteristics of House Sparrow eggs from Christchurch, New Zealand.

LAYING AND INCUBATION

Eggs are laid at daily intervals, between dusk and five a.m. Incubation normally begins with the penultimate egg, but some birds incubate sporadically before this. Without visiting nests very frequently an accurate "incubation period" cannot be determined. Thus the exactly expressed means and ranges in the literature must be treated with suspicion. The range within which the true incubation period must lie was determined for 68 clutches. These show the mean period to be about 12 days and the range to be from $10\frac{3}{4}$ to 16 days. A possible variation one day either side of this range must be mentioned, as daily visits, though fixing laying time, allow the true hatching time to be almost one day less than the observed one. Eggs begin to float in water at between 6 and 10 days of incubation: this can be used as an approximate guide to the time they have been incubated. Summers-Smith, quoting Cramp's analysis of British Trust for Ornithology records, gives the average period as 12 days with a range of 9 to 18.

CLUTCH SIZE

109 clutches were distributed as follows:

2 (1), 3 (23), 4 (71), 5 (14). The mean clutch size is 3.90 ± 0.058*. Summers-Smith (1963), quotes Cramp's result of an average clutch size of 4.1 in Britain and mentions clutches of six and seven, and he writes for the United States: "the average clutch size lies in the range 4.5 to 5, significantly larger than that in Britain." The Christchurch mean would seem significantly smaller than either.

COLOUR

There appears to be no difference between the colour of New Zealand eggs and that shown in the various plates and descriptions of British eggs. The number, size and colour of the spots is characteristic for the one female, even in successive clutches. Normally the last egg has fewer spots and sometimes the penultimate egg is intermediate in colour.

SHAPE

Data from 225 eggs.

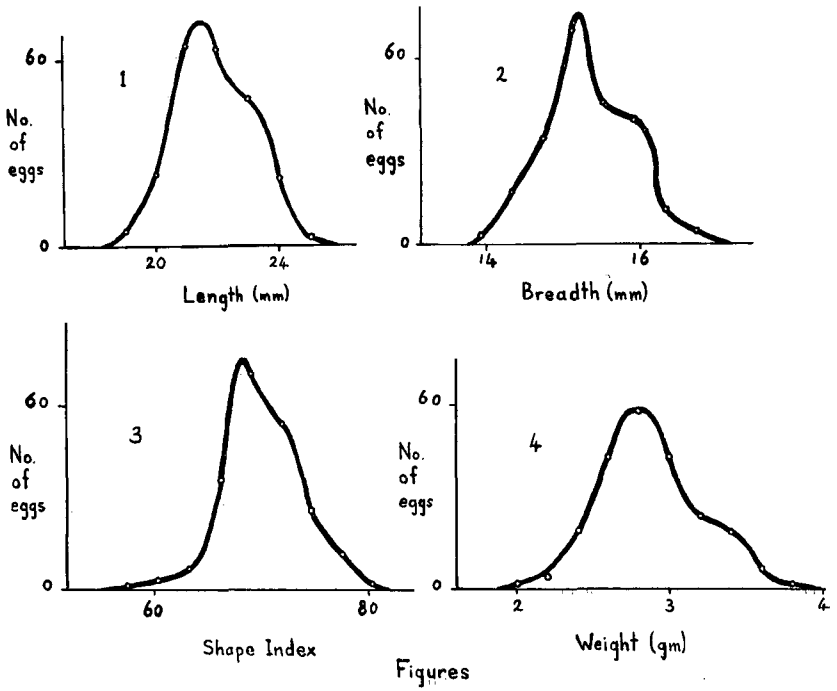
The mean breadth is 15.3 ± 0.038 mm, and the range is 13.8-16.7.

The mean length is 21.9 ± 0.080 mm, and the range is 18.7-25.0.

The shape index of the eggs (breadth expressed as a percentage of length) has a mean value of 69.8 ± 0.24 and ranges from 56 to 80. Summers-Smith (1963) gives the British ranges in breadth and length as 14.5 - 16.0 mm and 19.7 - 25.3 mm, and gives the mean egg as 15.7 x 22.5 mm. These dimensions seem significantly larger than the Christchurch ones.

* The ranges quoted in this paper are the standard errors of the means. There is a 95% confidence that the mean of the whole population lies within twice this range.

Length, breadth, weight and shape show distinctly similar bimodal distributions (see Figs. 1 - 4). Kendeigh, Kramer and Hamerstrom (1956) have found that the House Wren shows an increase in egg weight with breeding age, while Coulson (1962) shows a change in shape with breeding age in the Kittiwake. Perhaps a similar process is at work in Sparrows, with modes representing different age groups of breeding females. Thus first-year birds could lay eggs averaging 15.2 x 21.5 mm, 2.8 gm, and a shape index of 67, and older ones eggs averaging 16.0 x 23.2, 3.4 gm and a shape index of 73. I have insufficient data as yet to test this.



Figures

WEIGHT AND VOLUME

Data from 217 eggs weighed when fresh.

The mean egg weight was 2.88 ± 0.022 gm and the range was 1.94 - 3.85 gm. I have used fresh weight as an index of egg volume, as the volume of such small eggs cannot be determined by a quick, practical method. As it will often prove impossible to weight fresh eggs accurately a formula:

$$w_o = 0.543 b^2 l$$

. . . where w_o = fresh weight, b = breadth and l = length

can be used. This was derived from known dimensions and fresh weights of 217 eggs and is accurate to the nearest 0.1 gm. The usual formula is:

$V = kb^2 l$ . . . . where V = volume for which Stonehouse (1963) gives a range of k 0.500 - 0.515 and a mean of 0.512. These values were determined for larger eggs than those of the Sparrow. To convert the first formula to the second the relationship:

$$\text{s.g.} = \frac{w_o}{V}$$

is used. The specific gravity (s.g.) of 12 eggs was determined by floatation tests during incubation. The results obtained give a range within which the true specific gravity must lie. Thus if an egg of fresh weight 3.00 gm is found to sink when weighing 2.82 gm and float when weighing 2.80 gm its s.g. (when fresh) is in the range $\frac{3.00}{2.82} - \frac{3.00}{2.80}$. All the ranges determined included the value 1.07 and three critical ones may be cited: 1.065 - 1.075, 1.07 - 1.08, 1.04 - 1.07. Taking 1.07 as the s.g. the constant (k) becomes: $\frac{0.543}{1.07} = 0.508$ which falls into the range given by Stonehouse for larger eggs. Little error would result in using his mean value of 0.512 for Sparrow eggs.

DAILY LOSS OF WEIGHT

From 43 eggs weighed daily during incubation.

The eggs were weighed to the nearest 0.01 gm and showed a daily loss between about 0.01 and 0.05 gm. This varied as follows: before incubation a loss of 0.013 ± 0.0018 gm, during incubation 0.032 ± 0.0011 gm, and immediately before hatching 0.070 ± 0.0055 gm. The differences between these means are all statistically significant ($p < 0.05$). The variation in weight lost would be due to variations in the evaporating power of the air (humidity, wind speed, temperature), the increase on the onset of incubation would be due to the increased temperature, and the increase with the duration of incubation could be due to the respiration of the embryo (loss of CO_2) also increasing. The porosity of the shell is an unknown and could also affect the loss in weight if it varied.

THANKS

I am indebted to Dr. B. Stonehouse and Mr. G. A. Tunnicliffe for advice, criticism and encouragement and to Jim Hilton for allowing me to use some 40 egg measurements taken by him.

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