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Utilization of crop content by the Drosophila female.

In most species of flies, the crop is usually considered as a reservoir where food accumulates rapidly during feeding and then is moved progressively into the mid-gut. In laboratory Drosophila, food is usually permanently available to the flies so that the usefulness of the crop could be questioned. The problem was studied in Drosophila females which ingest a great amount of food for egg production.

Highly vigorous $F_1$ females were dissected and the state of repletion of their crop was determined by grouping them into five qualitative classes (figure 1), ranging from a crop entirely empty (class 1) to a crop full of nutrient (class 5). The experiment was made with 10-day-old flies, the daily egg production of which ranged from 50 to more than 130. For any group of flies, an index of repletion of the crop was calculated as the average value of the classes. The data obtained with two nutritive media are given in the table 1.

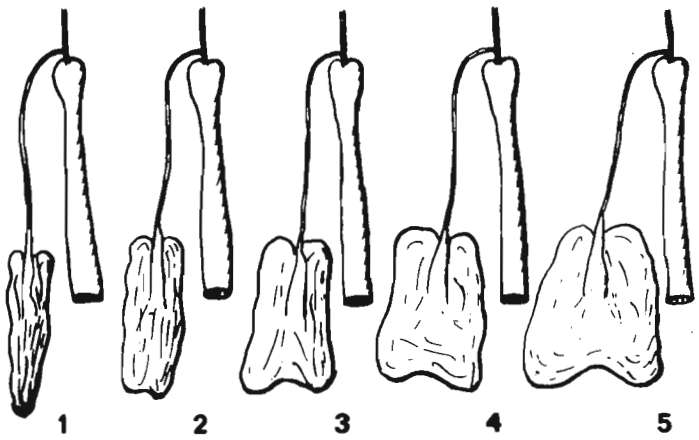


Figure: The five classes of crop repletion.

There is no significant relation between fecundity and the mean index. It is curious to see that the mean repletion of the crop is lower with the live yeast medium, which allows a higher fecundity, but the difference is not significant. Finally, the repletion of the crop is highly variable from one fly to the other. For the totality of the 173 dissected females, the frequencies distribution is the following:

| Classes | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| frequencies | 53 | 59 | 28 | 17 | 16 |

Two hypothesis may explain this high variability. First, the classes could correspond to various stages of the cycle of crop utilization: total repletion followed by a progressive emptying into the mid-gut. But in that case it is surprising that most of the females fall into the first two classes, with almost empty crops.

Second, it may be supposed that, when food is permanently present, crop utilization could be facultative: in many females, the ingested food being able to penetrate directly from the oesophagus into the mid-gut. A study of feeding behavior could help to choose between these two hypotheses.

Table I: Mean index of crop repletion in relation to daily egg production and nutrient medium

| | Daily egg production | | | | |
|---|---|---|---|---|---|
| Medium | 50 - 69 | 70 - 89 | 90 - 109 | 110 - 139 | Total |
| killed yeast | 2.77 ± 0.26 | 2.29 ± 0.13 | 2.50± 0.36 | 2.50 ± 0.64 | 2.44 ± 0.11 |
| n | 34 | 82 | 16 | 4 | 136 |
| live yeast | | 1.71 ± 0.18 | 1.85± 0.18 | 3.00 ± 1.00 | 1.92 ± 0.17 |
| n | | 7 | 27 | 3 | 37 |