David, J. and R. Ramousse. Laboratoire d'Entomologie Experimentale et de Genetique, Lyon, France. Quantitative evaluation of liquid food intake by Drosophila.

It is well known that adult Drosophila can be fed with a liquid food contained in a capillary tube. This method is often used for giving them rare or dangerous chemicals. A modification of this technique has been worked out in order to get daily measures of the volume ingested. A description of the method and some indications upon the first results are given here.

Method: The essential characteristics are indicated on the figures. Two calibrated capillaries, about 2 cm length (Drummond Company) are disposed vertically through the upper surface of a cage of plastic material (9 x 6 x 5 cm), as indicated in figure A. From preliminary studies, fragments from capillaries of a volume of 50 microlitres and 10 cm long proved to be the most convenient. Thus a length of 2 mm of liquid corresponds to one microlitre.

The capillaries are held in the cage holes by pieces of rubber tubes of appropriate size (figure B). One of them contains the liquid accessible to the flies. The opening of the other, which is used as a control for evaporation, is protected by a wire-gauze. In order to prevent the liquid from flowing out the capillary, its external surface is covered with grease, around the lower opening.

In such a device, evaporation has to be reduced to a minimum if accurate measures of liquid intake are needed. Therefore, 4 or 5 such cages are placed into a large box, the bottom of which is filled with a layer of water.

As the daily liquid intake of a fly is very small, it is better to have several in each cage. Groups of five flies were most often used.

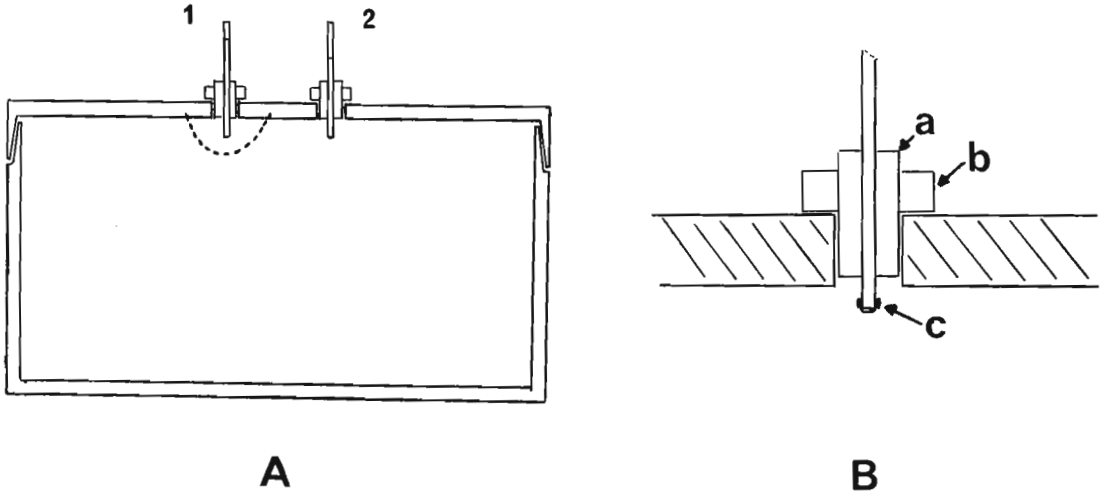

Figure A: Transversal section of an experimental cage (1: control capillary for evaporation; 2: capillary accessible to the flies).
Figure B: Detail of the insertion of a capillary (a and b: pieces of rubber tubes holding the capillary; c: grease around the lower opening).

Results: Sucrose solutions, at concentrations ranging from 4 to 14% were used as food, and 0.1% of nipagine was added to prevent bacterial development. 69 groups of flies (males or virgin females) were studied from emergence for at least 20 days.

The first striking observation is the very high variability of the results, either between successive days or between groups of flies. From a preliminary analysis, it appeared convenient to consider the average value obtained with each group of flies during 20 days as a single observation. From these data, the calculation of the mean evaporation in the control capillaries was 3.21 ± 0.18 µl and the extreme values were 0.8 and 6.95 µl.

The mean daily consumption, calculated after substracting the evaporation values and expressed as g of sucrose ingested by a fly in a day, is:

males	24.36 ± 2.26	n=25	(extreme values 5.6 and 43.6)
females	30.60 ± 2.30	n=44	(extreme values 1.6 and 75.8)
both sexes	28.34 ± 1.71	n=69	

Although the daily intake is a little higher in females than in males, the difference is is not significant, probably because of the enormous variability of the results.

It was supposed that the flies, ingesting for unknown reasons a very low quantity of sucrose, would take an insufficient amount of food and die prematurely. To check this hypothesis, the flies were divided into 3 groups, according to the amount of sucrose ingested, and the percentage of martality at 20th day was calculated as indicated below.

low consumption group	(from 1.6 to 20)	mortality percent : 29.9	n = 87
middle " "	(from 20.1 to 40)	" " : 24.2	n = 157
high " "	(from 40.1 to 75.8)	" " : 27.8	n = 54

From this it appears that there is no correlation between survival and quantity of sucrose ingested. In other experiments, where flies were fed in a usual way with a sugar-agar medium, the mortality at 20th day ranged from 12.50% to 47.50%. Thus feeding the flies with a solution in a capillary probably does not reduce longevity. However, if only water is given to flies, their mean survival is only 4 or 5 days.

Two other observations may be indicated here, although they are to be considered only as preliminary conclusions.

First, by pooling the whole data, a small, progressive decrease in sucrose ingestion was observed, from the beginning to the end of the experiment. It is therefore supposed that aging reduces food intake.

Second, the study of the influence of sucrose concentrations gave different results according to sex. In females, increased concentrations result in an increase in the quantity of sucrose ingested. In males, however, the mean daily consumption was quite stable, over the range of concentrations from 4 to 12%. Of course, such a stability corresponds to an important variation in the volume of ingested liquid.

These experiments are still in progress and various improvements are being tried in order to reduce evaporation and to improve the accessibility of the nutritive liquid to the flies.

Tsacas, L. C.N.R.S., Gif-sur-Yvette, France. Some data upon the morphology and biology of D. picta Zett.

The breeding of D. picta was carried out in 1962, from flies captured in Brittany (France). Since then, its morphology and biology have been studied in our laboratory; some of their particulars are given here.

The egg shows two pairs of filaments; the upper one is slightly shorter and more tapered at the extremity. The mature larva shows, on its terminal segment, six pairs of tubercules, plus an odd median anal tubercule: dorsals very small, dorsolaterals, ventrolaterals and ventrals very big, anals, plus one smaller median, siphonals. The anal plate (circumanalis) is narrow and elongated.

The pupa, ochraceous-yellow, is 3.4-3.7 mm long, respiratory horns not included. Horn-index is 5-8.4 mm (M = 6.1).

Wing-indexes: costal-index 3-3.53; 4th vein-index 1.23-1.61; 4c-index 0.61-0.94; 5x-index 0.87-1.14. Sterno-index 0.8-0.88. Testes almost colourless, big, with only one coil; ejaculatory sac with two diverticulae. Ovaries with 12-20 ovarioles. Spermathecae small, almost spherical. Ventral receptacle with 4-5 coils. Malpighian tubes joined in two pairs, common trunks short; the anteriors free, the posteriors united, with common lumen.

The length of the cycle, from egg-laying to hatching of the imago, is 20-29 days (M = 23) at a temperature of 20°C. It is thus decomposed: egg, 24-48 hours; larva, 7-15 days (M = 13); pupa, 5-8 days (M = 6). At a temperature of 25°C, the length of the cycle is reduced to 13-20 days.

Appropriate experiments allowed us to make the following observations: there is a very long lag between the hatching of the adult and the first egg-laying, a relatively short length of life, and a restricted fecundity (315 eggs layed during 68 days of life).

Chromosomes: metaphase plate shows 2n = 12. Those from the salivary glands show 4 long arms and 1 dot.