David, J. and J. Merle. University of Lyon, France. A reevaluation of the duration of egg chamber stages in oogenesis of Drosophila melanogaster.

The growth of egg chambers during oogenesis of Drosophila has been divided into 14 successive stages by King, Rubinson and Smith (1), and by King (2 ; 3). Studying the frequency of each stage, these authors were able to calculate their duration. But this estimation was necessarily a very indirect one because it was based on the number of egg chambers produced daily by an ovariole, and the whole duration of egg chamber growth.

Moreover, this calculation is only possible with flies of a high vitality in an optimum physiological state, where all ovarioles are functional and without any retention of mature eggs. This is not generally the case in inbred lines kept for a long time in laboratories, although it is usually the case for highly heterozygous F_1 flies, obtained by crossing inbred lines. For physiological experiments, we generally use such F_1 flies, where chance variability is at a minimum. Studying their oogenesis, it appeared that the frequencies of egg chamber stages were not in agreement with King's data, so new studies were undertaken for a better analysis of the problem.

The daily rate of egg chamber production by an ovariole was accurately estimated in a previous paper (David and Clavel, 4). It was observed to vary from 2.0 to 2.3 per day, according to the food received by the female.

The stage frequency was estimated on mated, 4 day old females, kept at 25° in total darkness. These flies were F_1 heterozygotes from a cross between a vestigial strain and a wild strain : Champetières. Four females and five males were kept together in a glass tube where the food (axenic medium : David, 5) was renewed daily. Whole ovaries were stained by Feulgen method, then the ovarioles were separated and mounted in Canadian balsam. The mean ovariole number for both ovaries was approximately 45 but some ovarioles were lost during mounting. A total number of 1321 egg chambers, corresponding to 175 ovarioles, was examined. As the identification of certain stages is sometimes difficult, the observations were made separately by both authors of the present paper, and the data averaged.

The mean number of egg chambers per ovariole is 7.55, close to the value of 7 found by King. The growth duration of an egg chamber, from stage 1 to stage 14, is obtained by dividing the mean number of these chambers in one ovariole by their daily rate of production. According as the rate is assumed to be 2.0 or 2.3, the calculated duration varies from 3.78 to 3.28 days.

The results concerning stage frequencies are pooled in the Table. The duration of each stage was estimated by multiplying the whole growth period by each frequency. In order to facilitate the comparison with the results of King et al., the closer whole duration, that is 3.28 days, was used for the calculation.

	New data		data of King (2)	
Stages	frequency (%)	duration (hours)	frequency (%)	duration (hours)
1	12.1	9.56	13.3	9.58
2	12.1	9.56	13.3	9.58
3	12.6	9.95	13.3	9.58
4	11.6	9.16	10.6	7.62
5	3.3	2.61	2.8	2.01
6	10.7	8.45	13.3	9.58
7	11.0	8.69	13.3	9.58
8	6.6	5.21	5.2	3.74
9	7.1	5.61	1.0	0.74
10	6.5	5.13	0.3	0.22
11	0.5	0.40	0.1	0.07
12	2.4	1.90	0.1	0.07
13	1.0	0.79	0.1	0.07
14	2.5	1.98	13.3	9.58
total	100%	79h	100%	72h

From the Table it can be concluded that the main discrepancy between King's and our data concerns the stages 9 to 14 : we found that the length of vitellogenesis (stage 9 to 13) is longer, while on the other hand, the stage of mature egg (stage 14) is much shorter.

As our estimation was made on flies with high fecundity, where the relations between egg production and ovariole number were accurately analysed, it may be concluded that the new results describe the process of normal oogenesis in Drosophila melanogaster more precisely. It may be assumed that, in the flies studied by King, a partial retention of stage 14 ovocytes took place, which, as a consequence, partly inhibited the growth of the following egg chambers. Such retention is frequent in most inbred lines (David, 6) and particularly among virgin females. So, the stage distribution given by King is to be taken into consideration by workers utilizing such flies.

(1) King, R.C., Rubinson, A.C., Smith, R.F. - 1956 - Growth 20 121-157
(2) King, R.C. - 1957 - Growth 21 95-102
(3) King, R.C. - 1964 - Symp. Roy. Ent. Soc. London 2 13-25
(4) David, J., Clavel, M.F. - 1967 - D.I.S. 42 101-102
(5) David, J. - 1962 - D.I.S. 36 128
(6) David, J. - 1961 - Bull. Biol. fr. Belg. 95 521-535

This paper was submitted to Dr. R. C. King and we thank him very much for many helpful suggestions.

Tokunaga, C. Lawrence Radiation Lab., University of California, Berkeley, California. A test for functional allelism between Multiple sex comb (Msc) and the mutants Polycolmb(Pc) and Extra-sexcomb(Scx).

According to Hannah-Alava (1958, '64), the 'extra sex comb' locus consists of two sub-loci each represented by a semi-dominant mutant, Polycomb(Pc) and Extra-sexcomb(Scx) separated by 0.2-0.3 of a crossover unit. Pc and Scx are located in the third chromosome between st(44.0) and p(48.0) probably just to the left of p. They are not associated with any chromosomal aberration.

Multiple sex comb(Msc) (Tokunaga, 1966) is also located very close to p between ri(47.1) and p. It is associated with a small inversion extending from 84B to 84F.

The following crosses were made to determine whether Msc and Pc, and Msc and Scx are functionally allelic.

1. Test between Msc and Pc.

Crosses: A. Pc/TM1,Mé ri spd[1] ♀♀ x pr en; Msc/Sb ♂♂
B. Pc/T(2;3)Mé ♀♀ x pr en; Msc/Sb ♂♂

F_1 segregation (A+B)

	Msc/Pc	Msc/Mé	Pc/Sb	Mé/Sb	Total
♂♂	318	305	288	1	912
♀♀	280	290	325	0	895

The fact that Msc/Pc is viable in contrast to the lethality of Msc/Msc and Pc/Pc indicates that Msc and Pc are not functionally allelic.

2. Test between Msc and Scx.

Cross: th st Pc Scx pP ss/TM1,Mé ri ♀♀ x pr en; Msc/Sb ♂♂

F_1 segregation

	Msc/Pc Scx	Msc/Mé	Pc Scx/Sb	Mé/Sb	Total
♂♂	790	1026	1063	0	2879
♀♀	662	1099	1176	1	2938

The fact that Msc/Pc Scx is viable in contrast to the lethality of Msc/Msc and Scx/Scx indicates that Msc and Scx are not functionally allelic. It is noted however, that the viability of Msc/Pc Scx is very much reduced.

Furthermore, it is seen that the combinations Tm1, Mé/Sb and T(2;3)Mé/Sb are nearly always lethal, as reported by E. B. Lewis (1949).