

radiation and of their secondary maxima have been observed (see Fig. 2). According to our theory, the ultra-violet part *F-G* of curve *c* is significant for the black body radiation and not *D-E* as used at present. This is in agreement with the conclusion by Anger⁴ that the ultra-violet colour index is more significant than the yellow one for certain *B*-type stars.

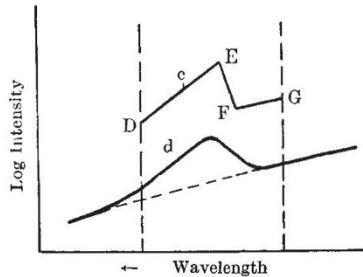


FIG. 2. Stellar energy curves. *c* = curve observed, *d* = complete curve.

Sudden changes in the spectra of a nova or a nebula may be interpreted by sudden changes in the continuous electron radiation (due to variations of the number and speed of free electrons, such as are actually observed in the emission from the sun), whereas the true temperature radiation of the nova or the nebula remains constant.

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¹ D. Barbier, D. Chalange, É. Vasy, *C.R.*, 201, 128 (1935).
² W. H. Wright, Lick Obs. Publ., 14, II. A. Brill, Publ. Astrophys. Obs. Potsdam, 23, 70 (1914).
³ W. M. Cohn, *Z. Phys.*, 75, 544 (1932). *Astron. Nachr.*, 245, 378 (1932). W. Finkelnburg, *Astrophys. J.*, 80, 313 (1934).
⁴ C. J. Anger, Harvard Coll. Obs. Bull., 882 (1931).

A Case of 50 per cent Crossing-over in the Male *Drosophila*

WHILE engaged in experiments on the possible effects of ultra-violet irradiation on crossing-over between black and vestigial in the second chromosome of *Drosophila melanogaster*, two stocks, *black-long* (*bbVV*) and *grey-vestigial* (*BBvv*) (obtained from Prof. Tammes, director of the Genetics Institute of the State University at Groningen), were crossed and the offspring allowed to interbreed in order to obtain double-recessives as from the *F*₃ onwards for back-crosses.

However, to my surprise, I noticed that all four classes were already represented in the *F*₂. Immediately more crosses were made, the *F*₁ allowed to interbreed, and the *F*₂ counted. The class frequencies were :

3175 *BV*, 1759 *bV*, 1193 *Bv*, 356 *bv*.

In the *F*₂ of every cross made, without exception all four phenotypes were represented. This naturally suggested crossing-over in the males involved in these crosses.

Assuming an equal crossing-over frequency for either sex, the crossing-over value must be calculated from the combination (1 *BV* + *n bv* + *n Bv* + 1 *bv*)².

The phenotypes $\frac{BV + bv}{bV + Bv}$ would be represented by,

$$\frac{2n^2 + 4n + 4}{2(n^2 + 2n)}. \text{ Let } \frac{BV + bv}{bV + Bv} = y; \text{ then } n \text{ would be } \sqrt{\frac{y+1}{y-1}} - 1. \text{ From our data, } y = 3531/2952, \text{ and}$$

therefore $n = 2.346$. Hence the crossing-over value $100/(1 + n) = 29.8$ per cent.

This value is radically different from the standard value of 17 per cent.

At this stage, double recessives were on hand, and I consequently back-crossed a few heterozygous *F*₁ males (*BbVv*) to double recessive females (*bbvv*). The following phenotypes were obtained: 40 *BV*, 38 *bV*, 43 *Bv*, 39 *bv*, the viability of the cultures being very bad. Clearly the crossing-over value in this case is 50 per cent approximately.

Again, but this time assuming 50 per cent crossing-over in the male, we calculated the data obtained after inbreeding the *F*₁. The zygotes in this case will result from the combination of (1 *BV* + *n bV* + *n Bv* + 1 *bv*) eggs × (*z BV* + *z bV* + *z Bv* + *z bv*) sperms. Evidently $2z = n + 1$.

$$\text{Now } \frac{BV + bv}{bV + Bv} \text{ phenotypes} = \frac{2n + 3}{2n + 1}$$

$$\text{that is, } \frac{3531}{2952} \text{ (our data)} = \frac{2n + 3}{2n + 1}$$

and $n = 4.6$ approximately.

Hence the crossing-over value $100/(1 + n) = 17.8$ per cent, which agrees fairly well with the standard value of 17 per cent. This, it will be noted, represents the crossing-over frequency in the female.

If we have interpreted our data correctly, we would like to state at the same time that this high frequency of crossing-over in the males involved in our crosses was not caused by ultra-violet irradiation, for not only the flies treated but also the controls and those allowed to interbreed under normal conditions showed the phenomenon in question. Some other explanation (for example, of chromosomal mutation) must be offered.

We may endorse the statement, made by Dr. Daigorô Moriwaki¹, that "The opinion that there is no crossing-over in the male of *Drosophila* has been losing ground in recent years".

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¹ Daigorô Moriwaki, "Crossing-over in the Male of *Drosophila virilis* Induced by Heat and X-Rays", *Proc. Imp. Acad., Tôkyô*, 11, 242.

The Organism of European Foul-brood of Bees

Streptococcus apis was first isolated and briefly described by Maassen¹. This organism occurred in most of the cases of 'European foul-brood' (*Gutartige Faulbrut*) of bees which he studied. White² and Borchert³, both of whom described this species, found that the cultures studied by them coagulated milk with subsequent digestion of the casein, and liquefied gelatin. Similar information with respect to this species is given by Bergy⁴. Curiously enough, no differences among various strains of this organism have been recorded.

During a number of experiments on the production of 'European foul-brood', I had occasion to study in detail ten strains of *Streptococcus apis* which were isolated by me from affected larvae from a number of different cases of this disease^{5,6}. It was found that these cultures could be divided into two groups, one of which caused the rapid and complete liquefaction of gelatin and coagulated and peptonised the casein