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Effect of colored light on average weight in *D. melanogaster* iso-female strains.

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The object of the present experiment was to study the effect of three different colored lights (white, blue, and red) on weight in iso-female lines of *D. melanogaster*.

Experimental Procedure

One vial of *D. melanogaster* was purchased from Carolina Biological Supply Company (CBSC), North Carolina in September 2009. It was grown at room temperature (19º-21ºC) using the fly medium (formula 4-24 plain) supplied by the CBSC. Several iso-female lines were derived from this strain by placing one fertile female/vial. However, only seven iso-female lines (numbered as genotype: 1, 2, 3, 4, 5, 6, and 7) were used for the experiment. The F_1's and F_2's within each strain were made. Each of the seven parental lines, the F_1's and F_2's made within each line were tested under three different colored lights (White: 25W; Blue: 25W; and Red: 25W). Eight to ten males and eight to ten females were used for the experiment under each colored light. The fly medium/vial varied from 10-12 ml. The temperature ranged from for: **white** light (20º-21ºC); **blu**e light (20º-21ºC); and **red** light (19º-20ºC). The total number of males and females were counted, recorded, and

weighed for each parental, F_1's, and F_2's progeny. The average weight per male and per female was computed for each of the parental, F_1's, and F_2's. The results for F_1's and F_2's are not discussed below as the information was missing for genotype(s) tested due to contamination.

Table 1. Average weight of seven genotypes in microgram (µg) ± 1 of *D. melanogaster* each tested under blue, white, and red lights.

a. Males Genotype	Blue (25-W) (20°C -21°C)	White (25-W) (20°C -21°C)	Red (25-W) (19°C – 20°C)
1	250.00	1400.00	1400.00
2	1400.00	1400.00	1300.00
3	1400.00	1133.00	1400.00
4	900.00	900.00	1000.00
5	950.00	1000.00	1000.00
6	1100.00	1200.00	1100.00
7	1400.00	1250.00	1400.00
Average	1057.143	1183.286	1228.571
b. Females Genotype	Blue (25-W) (20°C -21°C)	White (25-W) (20°C – 21°C)	Red (25-W) (19°C – 20°C)
1	1500.00	1900.00	1700.00
2	1750.00	2100.00	1700.00
3	1778.00	1567.00	1780.00
4	1200.00	1400.00	1450.00
5	1300.00	1420.00	1250.00
6	1700.00	1600.00	1500.00
7	1550.00	1800.00	1910.00
Average	1539.714	1683.857	1612.857

Results and Discussion

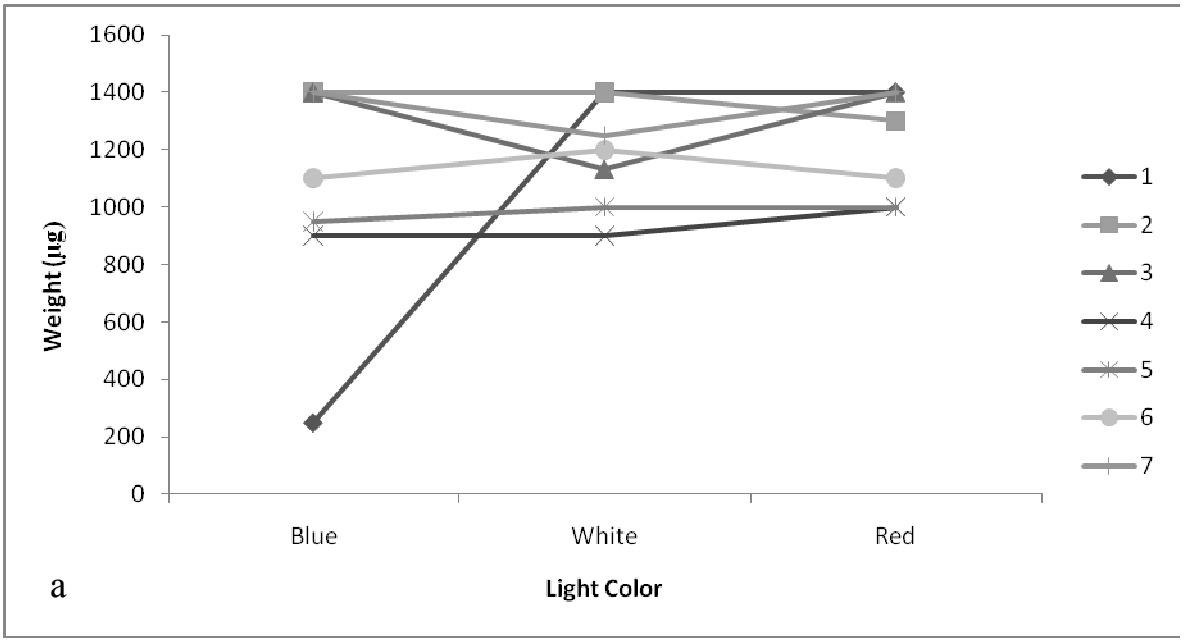
Table 1a and 1b shows the weight in microgram (µg) per male and per female for seven iso-female strains (genotypes) observed under the white, blue and red light. The average **male** weight (Table 1a) per genotype varied from 250.00 to 1400.00 µg for blue light; from 900.00 to 1400.00 µg for white light; and from 1000.00 to 1400.00 µg for red light. While for **females** (Table 1b) the average weight varied from 1200.00 to 1778.00 µg for blue light; from 1400.00 to 2100.00 µg for white light; and from 1250.00 to 1910.00 µg for red light. These data provide the information on genetic variation among genotypes tested under each light for the average weight in males as well in females.

A given genotype tested under three colored lights (Table 1a) showed a variation in weight for male (for example: for genotype 1, the weight varied from 250.00 to 1400.00 µg; while for genotype 2, it ranged from 1400.00 to 1300.00 µg), and so on. While for females (Table 1b), it varied from 1500.00 to 1900.00 for genotype 1 and for genotype 2 it ranged from 1700.00 to 2100.00 µg. These data provide the evidence for the effect of colored light on gene expression for the weight in males as well as in females studied under the experiment.

A comparison of the average weight of between male and female show that the male is always lighter than the female weight for a given iso-female line (genotype) tested under a given colored light. For example: genotype 1 show that the male weight is 250.00 µg under while the female weight is 1500.00 µg under blue light; 1400.00 µg for male weight and 1900.00 µg for female weight under white light; and 1400.00 µg for male and 1700.00 µg for female weight under red light (for other comparisons, see Table 1a for male and Table 1b for female weight). The data demonstrate that the weight is sex- dependent.

A pooled average weight for seven genotypes was also computed under each colored light. The 1- sided student paired 't' test was performed to analyze the significant difference in means between the blue and white light; between blue and red light; and between white and red light. This was done for males and females separately. The t-test observed values in case of *males,* Table 1a, and was between: blue and white 0.252; blue and red 0.169; and white and red light 0.205. While for females (Table 1b) the t-test observed values were between: blue and white 0.072; blue and red 0.185; and white and red light 0.202. The 't' table value for 6 degrees is 3.707 at a probability of 0.99 (at 0.01% level of significance). In each case, the t table value is higher than the 't' observed

value implying that the means calculated and tested for the difference between blue and white; between blue and red; and between white and red light are significantly different for males (Table 1a) and for females (Table 1b). Thus, these data suggest the significant effect of colored light on mean weight obtained from pooled seven genotypes (considered as a population) in case of males as well for females.



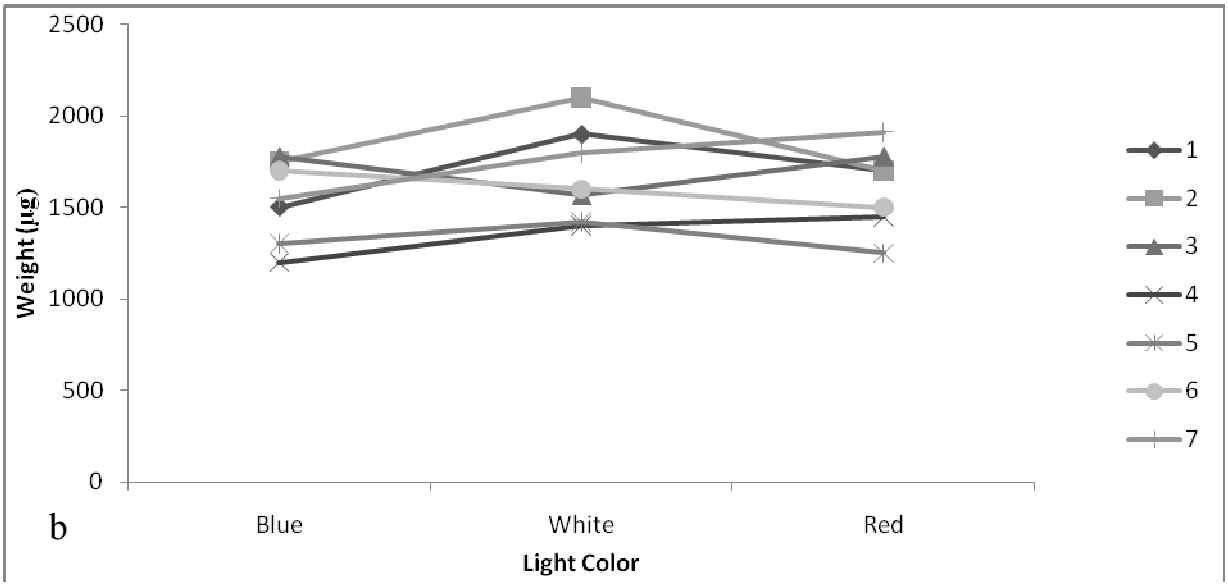


Figure 1. Norms of seven genotypes in *D. melanogaster* each tested under blue, white, and red lights (a, males; b, females).

Figure 1 shows the graphical reaction norms of seven genotypes taken from Table 1a and 1b for males and females, respectively. The norm of each genotype obtained was different under a given colored light. The same genotype tested under the three different colored lights yielded a different

phenotype. This is true for males (Figure 1a) and females (Figure 1b) showing the phenomenon of the turning "*on*" and "*off*" genes. The genotypes in case of females are more bunched together than for males tested under blue light implying that the females are better buffered than the males under blue light. It is interesting, however, to note that in case of males (Figure 1a) the genotypes 1 and 2 have a *contact/meeting* point under white light, and later forms a small and large canal when tested under red and blue light, respectively. For females (Figure 1b), genotypes 4 and 5 show the *contact* point under white light and diverges out forming a canal when tested under blue and red light. The data on point of contact and canal formation shows the phenomenon of *canalization* in males and females.

Finally, the data presented show a variation in average weight for males and for females for a given genotype when tested under different colored lights. Such a variation in weight is attributed to the difference in wavelength among colored lights in this experiment (the wavelength for ***white*** light: unfiltered incandescent bulb; for ***red*** light: long pass filter, wavelength greater than 620 nm; and for ***blue*** light: short pass filter , wavelength smaller than 650 nm as measured by Spectrograph). These data suggest the likelihood of the allele(s) for the average male weight and the average female weight may very well become fixed for colored light in time and space under a given colored light spectrum and thereby leading towards the isolation of that allele(s) (that is, it will lead towards the isolating mechanism for the light dependent gene among populations maintained under different colored lights. This, in fact, is a part of selection and the evolutionary process) where selection depends upon the individual reaction norm of a genotype and not on the mean of genotypes tested under a given colored light.

The results are not only in accordance with those published by Gupta (2009a, b) and Gupta and Lewontin (1982) in strains of *D. pseudoobscura* using temperature for the development of a phenotypic trait, but also with those well documented and published data on skin cancer caused by the exposure, in time and space, to sun as an external environmental stimulus.

Acknowledgments: Thanks to the Chair, Department of Sciences and Mathematics, Johnson C. Smith University, for providing the research facility and endorsing Dr. A. Gupta to be the research supervisor. Gratitude expressed to Mrs. Ruth Faye Richards for graphic design and appreciation to Drs. Joseph Fail, Jr. and M.T. Coolbaugh.

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Genotoxicity studies on the drug progynova on fitness of *Drosophila melanogaster*.

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Abstract

Steroids form a group of drugs in variety of therapeutics. Biologically active classes of steroids, such as estrogen, progesterone, androgen, and anabolic steroids, are among the major therapeutic drugs. In the present study, the effect of commercially available drug, namely Progynova, prescribed as a contraceptive in Hormone Replacement Therapy (HRT), such as in post menopausal treatment, containing the Estradiol hormone was used. *Drosophila melanogaster* flies were treated by adult feeding method. Three concentrations of the drug used were 50 µg, 100 µg,