



**STUDY OF VEIN PATTERN VARIATIONS IN WINGS OF MALE AND FEMALE  
DROSOPHILA MELANOGASTER MUTANTS AND WILD TYPE**

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**ABSTRACT**

A study was conducted on the vein pattern variation in the wings of *Drosophila melanogaster* mutants under light compound microscope. The physical characteristics of veins such as number of veins, veins junction, number of notches and wing area were analysed in both male and female *Drosophila melanogaster* mutants and were recorded. Thus a conclusion was drawn that in all the mutants such as white eye, sepia eye, vestigial wing, curly wings, ebony body, yellow body, bar eye and wild type showed variations in veins junctions and wing area but showed similarity in number of notches and number of veins.

**KEYWORD:**

**INTRODUCTION**

*Drosophila melanogaster* is a small fly belonging to order Diptera which means two winged organisms. They are often called as fruit flies. Insect wings are adult outgrowth of insect exoskeleton that enable insects to fly, found on the second and third thoracic segment. The wings are strengthened by a number of longitudinal veins, which often have cross connection that form closed cells in the membranes. The wings of insect had originated only once in the Arthropod lineage and have suffered considerable variation in shape, size and patterns of cell differentiation (Kukalova-Peck, 1978; Kristeresen, 1981).]

The wings of different insects present many modification in shape, size & adaptation to variety of functions such as locomotion, defence, melanism and regulation of body temperature (Imms, 1964). The wings are strengthened by a number of longitudinal veins, which often have cross connections that form closed cells in the membranes.

The veins are most characteristic structure of the wings which serve to strengthen the wing and also enclose conducts in which the haemolymph can circulate and may carry trachea and axons (Waddington, 1940).

Uniform nomenclature of the wing vein is based on homologies and applicable to all order (Comstock and Needham, 1898). The important veins from anterior to posterior are costa (C), Subcosta (Sc), Radius (R), Media (M), Cubitus (Cu) and Anal (A) veins. Pattern of six main veins constituted the ancestral one and other patterns can

be derived either by addition or more frequently by reduction of particular vein branches (Comstock and Needham, 1899).

Some reports are also available that in *Drosophila*, variation pattern is relatively simple when compared with other insects and consists of four longitudinal veins & two short transversal cross veins.

There is no documentary evidence at present regarding the study of vein pattern variation in *Drosophila melanogaster* mutants male and female flies. Therefore, number of veins, vein junction may be used as a tool to establish a phylogenetic relationship between different species in evolutionary lineage.

**MATERIALS AND METHODS**

*Drosophila melanogaster* mutant flies were procured from Department of Zoology & Genetics, Mysore University, Mysuru and these mutant flies such as white eye, sepia eye, vestigial wings, curly wings, ebony body, yellow body, bar eye and wild type were reared under the standard laboratory conditions of temperature and humidity. The wings (Right and left) of each mutant flies were clipped off and was observed under camera fixed compound microscope and were later analysed for the various characteristic features such as vein junction's, number of veins, no. of notches by simple counting method.

The wing area was calculated by knowing the area of microscopic field in the photograph i.e.  $\pi r^2$

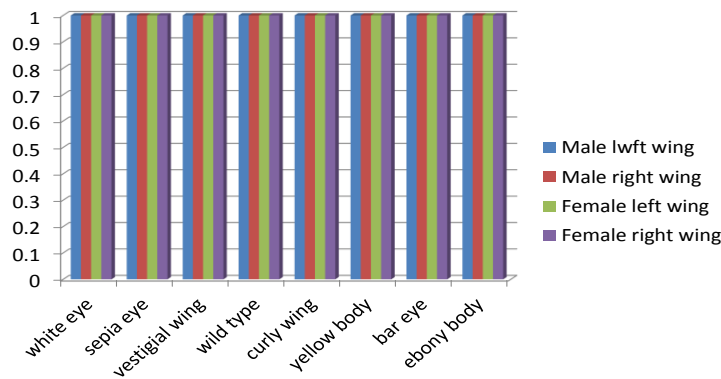
**RESULT**

The analysis of all the mutant wing (Right and left) of both male and female flies showed only 1 notches (Graph.1 & Table.1). However, the veins junction in mutant flies showed variations from number 6 to 9 whereas the constant number of 9 vein junction were observed in wild type flies and 6 vein junction in yellow body of right left wings of both male and female flies (Graph .2 & Table.2).

The no. of veins in mutant flies showed no variations in number and found to be the constant number of 5 were observed in both wild type flies and mutant flies of right left wings of both male and female flies (Graph .3 & Table.3).

Similarly, the area of the mutant wings showed variation between 1.31mm<sup>2</sup> to 0.98mm<sup>2</sup> (Graph.4 & Table.4).

**NUMBER OF NOTCHES IN D. MELANOGASTER**

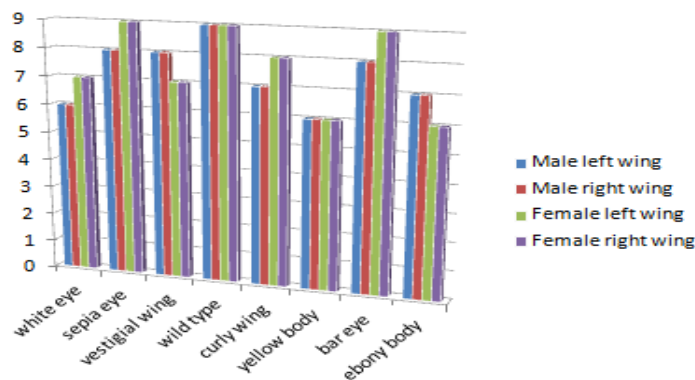


Graph 1

Table: 1 Comparison of notches in right and left wing of male and female *Drosophila melanogaster*

MUTANT TYPE	Male right wing	Male left wing	Female right wing	Female left wing
White eye	1	1	1	1
Sepia eye	1	1	1	1
Vestigial wing	1	1	1	1
Wild type	1	1	1	1
Curly wing	1	1	1	1
Yellow body	1	1	1	1
Bar eye	1	1	1	1
Ebony body	1	1	1	1

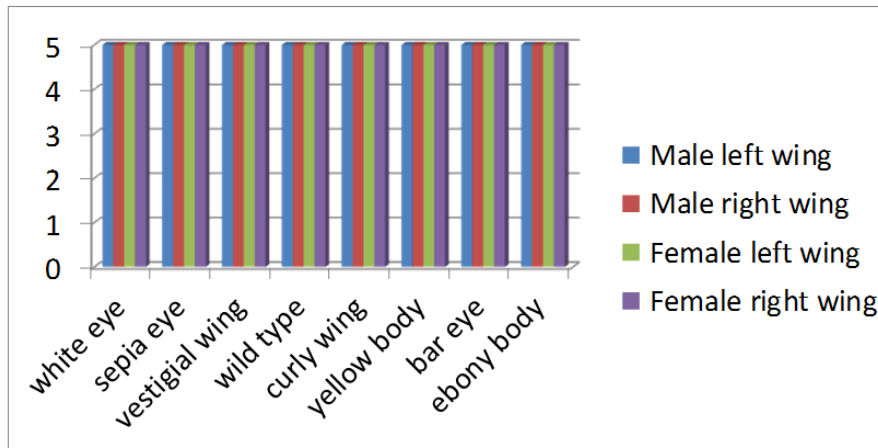
**NUMBER OF VEIN JUNCTIONS D. MELANOGASTER**



Graph 2

**Table-2 Comparison of vein junction in right and left wing of male and female *Drosophila melanogaster***

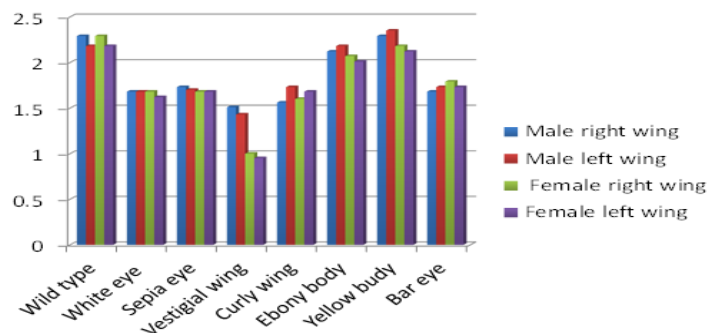
MUTANT TYPE	Male right wing	Male left wing	Female right wing	Female left wing
White eye	6	6	7	7
Sepia eye	8	8	9	9
Vestigial wing	8	8	7	7
Wild type	9	9	9	9
Curly wing	7	7	8	8
Yellow body	6	6	6	6
Bar eye	8	8	9	9
Ebony body	7	7	6	6

**NUMBER OF VEINS IN *D. MELANOGASTER***

Graph 3

**Table-3 Comparison of veins in right and left wing of male and female *Drosophila melanogaster***

MUTANT TYPE	Male right wing	Male left wing	Female right wing	Female left wing
White eye	5	5	5	5
Sepia eye	5	5	5	5
Vestigial wing	5	5	5	5
Wild type	5	5	5	5
Curly wing	5	5	5	5
Yellow body	5	5	5	5
Bar eye	5	5	5	5
Ebony body	5	5	5	5

**WING AREA - *D.MELANOGASTER* WILD TYPE AND MUTANT FLIES**

Graph 4

**Table-4 Comparison of wing area in right and left wing of male and female *Drosophila melanogaster***

MUTANT TYPE	Male right wing	Male left wing	Female right wing	Female left wing
White eye	2.29	2.18	2.29	2.18
Sepia eye	1.68	1.68	1.68	1.62
Vestigial wing	1.73	1.7	1.68	1.68
Wild type	1.51	1.43	1.0	0.95
Curly wing	1.56	1.73	1.6	1.68
Yellow body	2.12	2.18	2.07	2.01
Bar eye	2.29	2.35	2.18	2.12
Ebony body	1.68	1.76	1.79	1.73

**Figure 1****Figure 2****Figure 3**



Figure 4



Figure 5



Figure 6



Figure 7

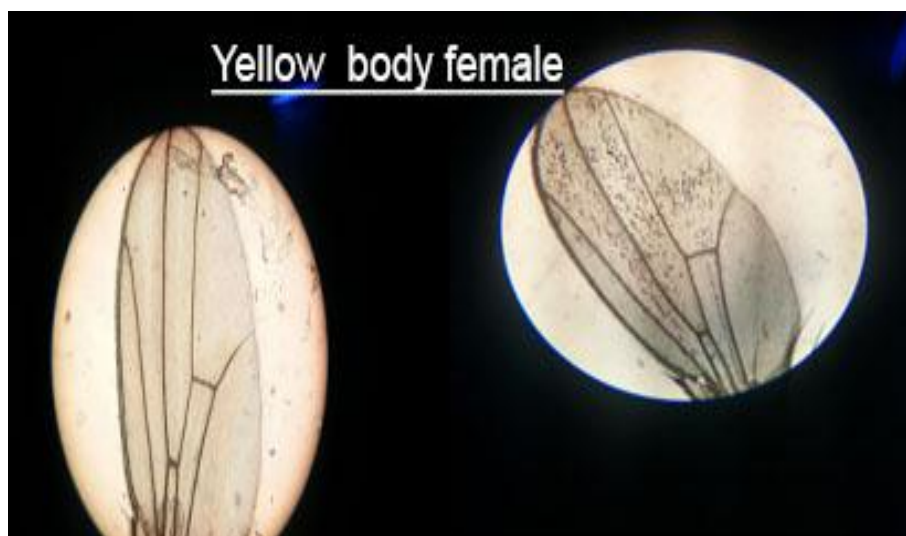


Figure 8



Figure 9



**Figure 10**



**Figure 11**





Figure 12



Figure 13

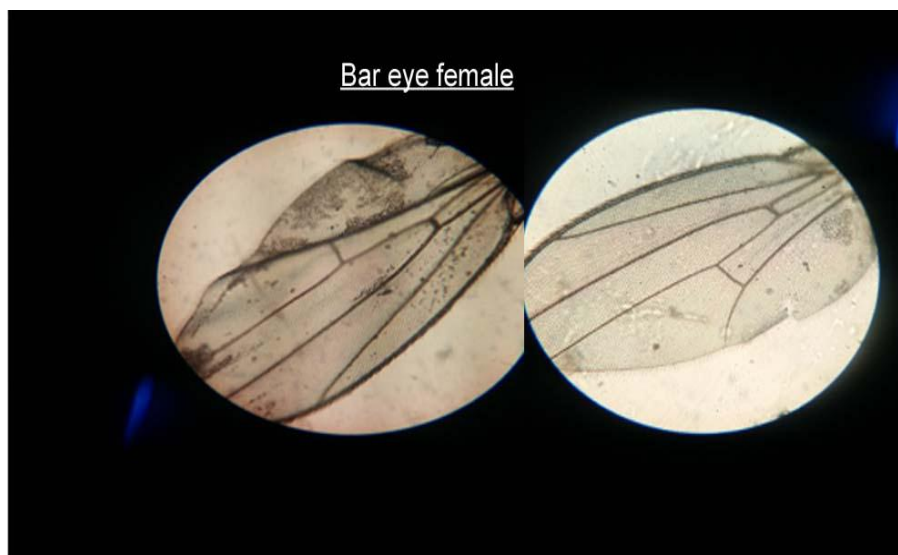


Figure 14



Figure 15

### DISCUSSION

At present majority of the work has been related to understand the developmental basis for vein pattern variations in other insect wings and a few work has been reported in *Drosophila melanogaster* mutant and it is mainly restricted to the genetic basis of wing development in *D.melanogaster* (Blair, 1935).

A remarkable characteristic of venation pattern diversity among both male and female (Right and Left) of the same order and within families were observed as reported by (IMMS, 1964).

Thus modifications during development in wings can be used as a tool for different evolutionary lineages and also for identification to the family or even genus level in many orders of insects.

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