

Studies On the Biodiversity of Few Species of *Drosophila* Collected from Manas Gangotri, Mysore

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Abstract—*Drosophila* is one of the most valuable organisms in biological research and has served as a primary model organism for over a century. The unique advantages of *Drosophila* have made it possible to uncover fundamental principles of genetics, molecular biology, adaptation, and evolution. While *Drosophila* has been extensively used to address many problems concerned with the basic molecular, developmental, and evolutionary organisms to study ecology and behavior, as little attempt has been made so far, the present study was undertaken to analyze the biodiversity, sex ratio, and distribution of flies with reference to their size, sexual behavior and remating ability of the flies. The specimens were collected from the University Garden at the Manasagangotri campus in Mysore.

I. INTRODUCTION

It is nearly impossible to list the sheer volume of scientific breakthroughs attributed to *Drosophila*. Historically, it was predominantly used in genetics to discover patterns of inheritance, sex linkage, and chromosomal mutations. Over time, these mutations were localized to specific chromosomes, facilitating groundbreaking discoveries regarding gene-protein interactions. More recently, *Drosophila* has become an indispensable tool in developmental biology, helping researchers trace how complex multicellular organisms arise from a relatively simple fertilized egg. Additionally, *Drosophila* is widely used to address fundamental questions in ecological and evolutionary genetics. Many intricacies concerning the relationship between ambient ecological factors and population fluctuations have been successfully modeled using this genus (Begon et al., 1996; Bizzo and Sene, 1982; Brncic et al., 1985; Gupta and Ray-Chaudhuri, 1970a, 1970b). Review of literature reveals that there are about 220 species of *Drosophila* distributed throughout the world (Wheeler 1986). These include the cosmopolitan, widespread and endemic species.

Additional new species are constantly being described and the total size of the genus must be at least more than 2,500 species (Wheeler 1986).

II. MATERIALS AND METHODS

The *Drosophila* flies collected from the university garden, Manasagangotri campus were used in the present study. The collections were made by bottle trapping methods. For this purpose, milk bottles of 250 ml capacity containing a smashed ripe banana sprayed were used. The bottles containing the bait were tied to the branches of tree in cool shaded places of the university garden. The bottles with bait were tied to twigs of small bushes at about 2 ½ feet above the ground and were left open for one day. The flies that were attracted by the bait and gathered inside the bottles were collected during the early morning by putting cotton plug on to the transferred to the bottles containing fresh wheat cream agar medium supplemented by yeast. They were then brought to the laboratory, isolated, categorized, sexed and identified. The males were directly used for identification. An identification of females in *Drosophila* is difficult; the individual females were kept separately in separate food vials and allowed to produce the progeny. The males of F1 progeny of these gravid female (iso-females line) were used for identification.

Categorization into respective taxonomic groups was executed using parameters suggested by Bock (1971), Patterson and Stone (1952), Sturtevant (1921, 1927), and Throckmorton (1962). The primary morphological parameters employed to decipher the species included:

- Color and size of the imagoes (adults)
- Number and nature of arisal branches
- Arrangement and nature of acrostichal hairs

- Wing length and its associated indices
- Presence or absence of a sex comb (as well as the number of rows and teeth per row when present)

After categorization, the females were placed individually in vials containing food. The iso-female line (the F1 progeny of these wild caught females) obtained from them were used for confirmation of the species, analysis of body size and sexual behavior.

III. RESULTS

The list of species of *Drosophila* collected from the university garden is provided in Table 1, the species collected, their respective subgenera, the number of males and females of each species collected, their sex ratio are provided in this table. Out of the 13 species collected, 6 belongs to the subgenus *Sophophora*, 3 belonged to *Drosophila*, three species to subgenus *Scaptodrosophila* and one of another related genus *Phorticella*. A total 564 individual were collected out of 28 traps belonging to different species. Out of these 345 (61.16%) belonged to subgenus *Sophophora*, 138

Scaptodrosophila. There were 55 (9.74%) flies belonging to the genus *phorticella* which also belongs to the family *Drosophilidae*. Among the species collected, *D. malerkotiana* represents the most dominant species because it represents 48.22 %/ (272 flies) of the total catch *D. brindavani* and *D. nigra* were represented in least numbers.

Based on the number of males and females collected, the sex ratio was calculated for different species. Among the species collected *D. bipectinata*, *D. rajasekari*, *D. anomelani*, *D. jambulina*, *D. gangotrii*, *D. neonasuta*, *D. nigra*, *D. varietas* and *phorticella* showed sex ratio imbalance in favor of females while others showed imbalance in favor of males. The difference in sex ratio was subjected to statistical analysis through chi square test. The result showed that the sex ratio difference of *D. bipectinata*, *D. gangotrii* and *D. nausta* are significant. Although the sex ratio of individual species showed imbalance, the overall sex ratio for the entire genus *Drosophila* was 1:1

Table1. Showing the species of *Drosophila* collected from university garden, Manasagangotri, Mysore.

Sl.No	Species	Males	Females	Total	Sex Ratio	Chai square
A	Subgenus: <i>Sophophora</i>					
1.	<i>D. bipectinata</i>	6	18	24	1:3	6.000*
2	<i>D. melarkotiana</i>	144	128	272	1:0.89	0.940
3	<i>D. rajashekari</i>	9	10	19	1:1.1	0.026
4	<i>D. anomelani</i>	6	9	15	1:1.5	0.600
5	<i>D. jambulina</i>	2	5	7	1:2.5	1.286
6	<i>D. gangotri</i>	1	7	8	1:7	4.500*
	TOTAL	168	177	345	1:1.05	0.235
	Subgenus <i>Drosophila</i>					
7	<i>D. nasuta</i>	75	47	122	1:0.63	6.426*
8	<i>D. neonasuta</i>	6	8	14	1:1.33	0.286
9	<i>D. immigrans</i>	1	1	2	1:1	0.000
	Sub genus: <i>Scaptodrosophila</i>					
10.	<i>D. brindravani</i>	3	1	4	1:0.33	1.000
11.	<i>D. nigra</i>	1	3	4	1:3	1.000
12	<i>D. varietas</i>	7	11	18	1:1.59	0.727
	TOTAL	11	15	26	1:1.36	0.615
	Genus: <i>Phorticella</i>					
13	<i>Phorticella striata</i>	23	32	55	1:1.39	1.473
	TOTAL	116	103	219	1:0.89	0.772
	GRAND TOTAL	284	280	564	1:1	0.028

* P value significant at 0.05 level

IV. DISCUSSION

Eco –distributional analysis of *Drosophila* implies that biodiversity of *Drosophila* of the given locality and also principles underlying adaptive radiation and certain mechanism involved in speciation (Wheeler 1986). Many people have already demonstrated the biodiversity of *Drosophila* in different ecogeographic areas of India (Bizzo and Sene 1982; Hegde et al 2001). The present study of the author is another testimony for the richness and biodiversity of *Drosophila*. The author had notices lot of diversity of university garden and was able to collect 546 flies belonging to 13 species from four spots of the university garden.

The collection was made by bottle trapping method (Hegde et al 2001). The collected flies were brought to the laboratory, isolated categorized, sexed and identified following the procedure of Bock (1971), Patterson and Stone (1952), Strutevant (1921,1927) and Throckmorton (1962). The species collected, their number, sex etc were recorded.

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