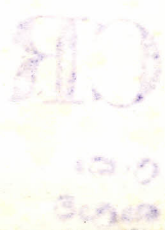


ISOLATION OF VISIBLE GENETIC MUTANTS OF  
DROSOPHILA ANANASSAE IN SRI LANKA



by

Chitra Nandanie Loku Bogahawatte



Thesis submitted in partial fulfilment of the  
requirements for the Degree of Master of Science  
of the Faculty of Applied Science, University of  
Sri Jayawardenepura, Nugegoda, Sri Lanka.

September, 1984.

128845

ABSTRACT



1. A study was carried out to isolate morphological mutants from wild populations of D. ananassae in Sri Lanka, and to estimate the mutation load in these wild populations. Seventeen mutants of spontaneous origin were isolated.
  
2. In the case of collections from the wild, ten wild male Drosophila ananassae were collected fortnightly from two places close to Colombo, namely, Gangodawil and Nawinna. They were mated individually to virgin females of a wild type laboratory stock in the ratio of one male to one female. The  $F_1$  offspring of these crosses were examined and they were allowed to intercross and the resulting  $F_2$  progeny were carefully screened for morphological deviants. When such deviants were isolated they were tested genetically to study their mode of inheritance.
  
3. From this survey, twenty seven phenotypically abnormal types were isolated. Among these, seventeen deviants were truly genetic. Three deviants proved to be phenocopies. Five other deviants which can be described as crippled leg, hooked leg, yellow body colour, arista less, and extended wing were lost before definite tests could be carried out on them.

4. Genetic tests have revealed that seven of the mutants that were isolated are inherited as recessive autosomal gene, four as recessive sex linked genes and only one as a dominant autosomal gene. The seven autosomal recessive mutants are marginal cell cross vein (mcv), marginal cell double cross vein (mdcv) wing, demi-wing (dw), reduced eye (re), brown eye (bw), hooked leg (hl), net wing (nt). The four recessive sex linked mutants are namely, marginal cell less wing (ml), semi-wing (sw), balloon semi-wing (bsw), and out wing (ot), while a single dominant autosomal mutant, namely, Curled wing (CU) was also isolated. The other five mutants, namely, contracted wing (ent), vesiculated wing (vs), notch wing (n), garnet eye (g) and dark antennae (da) were lost before complete tests could be carried out on them. From the limited results of these mutants it is clear that these are also true mutants, but due to the scanty results it is difficult to come to a conclusion regarding their mode of inheritance.

5. The following nine, described as marginal cell cross-vein (mcv) wing, marginal cell double cross-vein (mdcv), demi-wing(dw), reduced eye (re), net wing (nt), marginal cell-less wing (ml), semi-wing (sw), ballooned semi-wing (bsw) and Curled wing (CU) mutants to my knowledge have not been reported previously and are being reported for the first time.

CONTENTS

	<u>Page</u>
Memorendum	i
Contents	ii
Acknowledgement	vi
Abstract	ix
Chapter I - 1	Introduction 1
1.1	Importance of studying morpho- logical mutants of <u>Drosophila</u> 2
1.2	Importance of <u>Drosophila</u> <u>ananassae</u> as a genetical test organism for Sri Lanka 6
1.3	The genetics of <u>Drosophila</u> <u>ananassae</u> and the relevant mutants of other species of <u>Drosophila</u> and other diptera 13
1.4	Objective of the present study 57
Chapter II - 2	Materials and Methods 59
2.1	The life cycle of <u>Drosophila</u> <u>ananassae</u> 59
2.2	The morphology of the adulty fly 67
2.3	Culture of <u>Drosophila ananassae</u> 72
2.3.1	Method of Culture 72

	<u>Page</u>
2.3.2 Effect of temperature and humidity on cultures of <u>Drosophila ananassae</u>	75
2.3.3 Other problems related to culture of <u>Drosophila ananassae</u>	76
2.4 Isolation of spontaneously occurring mutants of <u>Drosophila ananassae</u>	77
2.4.1 Sampling procedure	78
2.4.2 Experimental procedure	79
Chapter III - 3 Results	
3.1 Recessive autosomal mutants	84
3.1.1 marginal cell cross-vein wing ( <u>mcv</u> )	84
3.1.2 marginal cell double cross-vein wing ( <u>mdcv</u> )	92
3.1.3 demi wing ( <u>dw</u> )	101
3.1.4 reduced eye ( <u>re</u> )	109
3.1.5 brown eye ( <u>bw</u> )	116
3.1.6 hooked leg ( <u>hl</u> )	126
3.1.7 net wing ( <u>nt</u> )	133
3.2 Recessive sex linked mutants	142
3.2.1 marginal cell-less wing ( <u>mcl</u> )	142
3.2.2 semi wing ( <u>sw</u> )	149
3.2.3 ballooned semi wing ( <u>bsw</u> )	156

	<u>Page</u>
3.2.4 cut wing ( <u>ct</u> )	162
3.3 Dominant mutant	169
3.3.1 Curled wing ( <u>Cu</u> )	169
3.4 Mutants not fully tested	175
3.4.1 contracted wing ( <u>cnt</u> )	176
3.4.2 vesiculated wing ( <u>vs</u> )	183
3.4.3 notch wing ( <u>n</u> )	190
3.4.4 garnet eye ( <u>g</u> )	194
3.4.5 dark antennae ( <u>da</u> )	197
3.5 Abnormalities lost they arose	199
Chapter IV → 4 Discussion	203
4.1 Recessive autosomal mutants	204
4.1.1 marginal cell cross-vein wing ( <u>mcv</u> )	205
4.1.2 marginal cell double cross-veins wing ( <u>mdcv</u> )	208
4.1.3 demi wing ( <u>dw</u> )	209
4.1.4 reduced eye ( <u>re</u> )	212
4.1.5 brown eye ( <u>bw</u> )	213
4.1.6 hooked leg ( <u>hl</u> )	216
4.1.7 net wing ( <u>nt</u> )	217
4.2 Recessive sex linked mutants	219
4.2.1 marginal cell-less wing ( <u>mcl</u> )	219
4.2.2 semi-wing ( <u>sw</u> )	221

	<u>Page</u>
4.2.3 ballooned semi wing ( <u>bsw</u> )	223
4.2.4 cut wing ( <u>ct</u> )	224
4.3 Dominant mutant	226
4.3.1 Curled wing ( <u>Cu</u> )	226
4.4 Other mutants	228
4.4.1 contracted wing ( <u>ent</u> )	228
4.4.2 vesiculated wing ( <u>vs</u> )	230
4.4.3 notch wing ( <u>n</u> )	231
4.4.4 garnet eye ( <u>g</u> )	233
4.4.5 dark antennae ( <u>da</u> )	234
4.5 The rate of mutation	235
Appendix	248
References	249