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 (mcl), semi-wing (sw), balloon semi-wing (bsw), and cut wing (ct), while a single dominant autosomal mutant, namely, Curled wing (CU) was also isolated. The other five mutants, namely, contracted wing (cnt), 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 (mcl), 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.

6. The marginal cellcross-vein wing (mcv) is an abnormality of wing venation in that there is an extra cross vein in between the longitudinal veins L_1 and L_2 in addition to the four normal cross veins of the wild type. The second of these mutants, marginal cell double cross-vein (mdcv) wing arose from the culture of marginal cell cross-vein (mcv) wing and was also observed once from the F_2 progeny of a wild collected male. Except for the presence of an additional cross-vein, this mutant is very similar to the marginal cell cross vein wing (mcv) mutant. In the demi-wing (dw) mutant the wing length is reduced to about half of the normal, while the breadth is about the same. Wing venation is visible but irregular. The fourth mutant is an abnormality of eye size which is smaller in size and is bar-like than that of the wild type! The net wing (nt) mutant arose from the culture of hooked leg (hl) mutant in which the wings have a net work of extra veins at the tips of the wings. The normal wings have five longitudinal veins and four cross-veins. The sixth mutant of these series, named marginal cell-less wing (mcl), is where the marginal cell of the wing seems to be completly snipped off. In the semi-wing (sw) mutant the wing length varies from half to two thirds of the normal wing length. The ballooned semi wing (bsw), arose from a culture of the semi-wing (sw) mutant. It is very similar to semi-wing (sw) except for the presence of a bubble (like a

balloon) in the middle of the wing. The ninth mutant is an abnormality of wing shape in which about two thirds of the wings are curled upward.

7. The brown eye (bw), hooked leg (hl) and cut wing (ct) mutants have been reported previously in D. ananassae. As tests for allelism with previously recorded mutants have not been carried out it is difficult to say whether the mutants isolated in this study are the same as that described by other workers, although I have assigned the same symbols for them. The brown eye (bw)is orange in newly emerged adults and changes to brown about a day after emergence. The hooked leg (hl) mutant in which the tarsal segments are abnormal in shape and are deformed giving the appearence of a hook, arose from a culture of the reduced eye (re) mutant. Cut wing (ct) is an abnormality of the wing in where the wings appear cut at the edges. The mode of inheritance of the other five mutants described as contracted wing (cnt), vesiculated wing (vs), notch wing (n) , garnet eye (g) and dark antennae (da) have not been fully determined.

8. This is the first study of mutants of D. ananassae from Sri Lanka. The recovery of heterozygous mutation from wild population of D. ananassae in Sri Lanka (Colombo)

have been used by me to also detect the mutation frequency in these populations. I have obtained a frequency of 0.29 mutation/individual. If the five abnormalities that was lost before complete tests could be carried out on them are also considered as true mutants and if the are also included in the estimation then the mutation frequency becomes 0.32 mutation/individual. Spencer obtained a value (obtained also for D. ananassae in a Pacific Island) of 0.63 per individual (VandeHey, 1964). Similar frequencies for other Drosophila species, particularly, D. melanogaster, D. hydei, D. simulans, D. americana, and D. texana, are much higher and are 0.7, 2.38, 0.7, 1.69, 1.32 respectively.

9. This project was started with the hope of building up mutant stocks of D. ananassae from which special tester stocks could be build up for the more sophisticated tests for the detection of mutations and for further studies on them. This work was also carried out with the hope of obtaining a true picture of the spontaneous mutant load in D. ananassae in Sri Lanka. The mutant types thus collected could also be used for demonstrating Mendelian inheritance in practical classes for undergraduate students, and also for use in future mutagenicity testing studies.