in superunstable revertants. In superunstable $ct^{n}$ mutants the MR transposon has an enhanced ability to move within the cut locus. This ability of the MR-transposon to change its orientation and position with a high frequency indicates that under certain conditions the MR-transposon may become a controlling element that regulated the genes by switching their activity.

The author is grateful to Dr. N.V. Knizhnikova for assistance and to Drs. N.F. Myasoedov and G.P. Georgiev for support and a stimulating discussion of the results.

References: Gerasimova, T.I. 1981, Molec. Gen. Genet. 184:544.

Gerasimova, T.I. Institute of Molecular Genetics, USSR Academy of Sciences, Moscow, USSR. Simultaneous reversion of two unstable alleles at the carmine and cut loci in Drosophila melanogaster.

The unstable $ct^{MR2}$ allele carrying within the cut locus a mobile element called the MR-transposon is a strong mutator which causes new unstable mutations both at the cut locus itself and in other genes (Gerasimova 1981). Among the derivatives of the $ct^{MR2}$ allele there is a double mutant with the $cm^{MR1}$ and $ct^{MR1}$ and $ct^{MRpN1}$ mutations in the X-chromosome. The $ct^{MRpN}$ mutation has a phenotypic expression that differs from $ct^{MR2}$, hence the MR-transposon occupies a different site within the cut locus. The $cm^{MR1}$ mutation was not complementary to the standard cm mutation. The $cm/cm^{MR1}$ flies had brown eyes. The homozygous stock $cm^{MR1}$ $ct^{MRpN1}$ was analyzed for reversions. The following revertants were found among 30,000 individuals: eight $cm^{MR1}ct^{+}$, two $cm^{+}ct^{MRpN1}$, two $cm^{+}ct$, one $cm^{+}ct^{+}$, four $w\ cm^{+}ct^{+}$, one $y\ cm^{+}ct^{+}$, one $y\ w\ cm^{+}ct^{+}$ and sixteen $cm^{+}ct^{+}sn$. The first two types of revertants resulted from inversions at one locus (either $cm^{MR1} \rightarrow cm^{+}$ or $ct^{MRpN1} \rightarrow ct^{+}$). $cm^{+}ct$ carried a reversion at cm and a new ct mutation other than $ct^{MRpN1}$. One $cm^{+}ct$ revertant was tested for stability. Among 9500 flies no $ct^{+}$ revertants or new ct mutations were found. Hence $cm^{+}ct$ most probably contain a deficiency at the cut locus due to an inaccurate excision of the MR transposon, i.e., $cm^{+}ct$ are double revertants ($cm^{MR1} \rightarrow cm^{+}$, $ct^{MRpN1} \rightarrow ct^{+}$). All the other revertants had reversions at both loci; in most cases the double revertants carried new mutations at y, w, and, preferentially, sn. Thus about 70% of all revertants were double. A similar kind of double reversion had earlier been discovered by M.D. Golubovsky at the clw and sn loci (1979). The double reversion of unstable mutations always raises the question of whether both loci have kept their initial location or have come closer together as a result of some rearrangements, such as, say, inversions. The cm locus occupies position 18.9 (6E6) and cut is at 20.0 (7B3-4), i.e., they are separated by 1.1 morganids or 20-22 bands. Analysis of the polytene chromosomes in $cm^{MR1}$ $ct^{MRpN1}$ mutants and in $cm^{MR1}ct^{MRpN1}/ + +$ heterozygotes did not reveal any anomalies in the 6E-7B region. An attempt was made to separate the cm and ct loci by crossing-over. For that purpose crossing-over was analysed in $+\ cm^{MR1}ct^{MRpN1}\ + +\ /y + +\ sn\ lz$ females. Among 3593 male offspring, there were 273 y cm ct, 246 y sn lz, 2 cm ct sn lz, 15 y, 4 cm sn lz, 11 y ct. The crossing-over between cm and ct was 0.5% (1.1% in the map), that between ct and sn was 0.4% (1% in the map). Thus the cm-ct-sn crossing-over was approximately halved. The fact that it was reduced to the same extent in the cm-ct region and in the ct-sn region indicates that ct is at equal distances from the cm and the sn loci. The reduced crossing-over may be a specific feature of the $cm^{MR1}/ct^{MRpN1}$ chromosome, for the crossing-over between y and cm is also reduced and amounts to 14.4% (519/3593) or 18.9 in the map.

These results suggest that both loci have most probably kept their location. Another explanation may be found in the specificity of the $cm^{MR1}$ $ct^{MRpN1}$ reversion. Different unstable ct and $ct^{+}$ alleles are characterized by different mutant transitions and different reversion frequencies, which seems to be the result of altered functions of the MR transposon: excision and transposition, change of position and orientation. These functions are altered in different ways in different alleles (Gerasimova in press). In the $cm^{MR1}$ $ct^{MRpN1}$ stock the transposon has an enhanced ability for transpositions. 71% of all revertants are the result of transposition of the MR-transposon from the cm and ct loci to other genes. In the $ct^{MR2}$ stock such transpositions occur far less frequently and account for 5 to 10% of all revertants. Double reversion itself, as has been shown for repressor protein mutations at Tn3 in E.coli enhancing Tn3 translocations in the transposition (Chow 1979).

The author is grateful to Dr. N.V. Knizhnikova for assistance and to Drs. N.F. Myasoedov and G.P. Georgiev for support and a discussion of the results.

References: Gerasimova, T.I. 1981, Mol.Gen.Genet. 184:544; Golubovsky, D.M. 1979, Genetika (Rus.) XV:1599; Gerasimova, T.I. DIS in press; Chow j. et al. 1979, Proc.Natl.Acad. Sci. USA 76:4020.

Gilbert, D.G., W.T. Starmer & M-A. Lachance.* Syracuse University, Syracuse, New York and *University of Western Ontario, London, Ontario, Canada. Drosophila collected in Southwestern Ontario.

Drosophila were collected July 17-18, 1982, from banana baits in an oak-pine forest in Pinery Provincial Park of Ontario, on the east coast of Lake Huron. These flies were plated to enumerate their yeast content, to be reported elsewhere. Collections were made at 0700 to 0900 hr in a 3000 sq. m area. The table lists species and numbers collected.

| Species | Number | Species | Number |
|---|---|---|---|
| Sap feeders: | | Fungus feeders: | |
| D. affinis | 93 | D. quinaria | 3 |
| D. athabasca | 23 | D. falleni | 31 |
| D. algonquin | 13 | D. recens | 1 |
| affinis group females | 56 | D. putrida | 9 |
| D. robusta | 17 | D. testacea | 1 |
| D. melanica | 7 | | |
| melanogaster group females | 5 | Chymomyza amoena | 12 |
| D. busckii | 1 | | |
| D. hydei | 1 | | |

Goetz, K.G. & R. Biesinger. Max-Planck-Institut f. biologische Kybernetik, Tuebingen, FRG. Wind-controlled selection of motion detectors in the eyes of D. melanogaster.

Visually induced responses such as the optomotor control of course and altitude in flies require spatial integration of motion within the retinal images. Overlooking flexibility in the optomotor system seemed to be justified as long as the flies were held in a steady-state of visual stimulation. Symptoms of flexibility in the optomotor system of Drosophila (Heisenberg & Wolf 1979; Wolf & Heisenberg 1980) and Syritta (Collett 1980a & 1980b) only appeared when the flies were allowed to control the direction and speed of the stimulus. The occasional suppression, restriction and shift of motion-attention in these flies demonstrate that they are capable of restricting spatial integration to selected areas of their motion detector networks.

Recent observations extend the notion of flexibility to properties of the optomotor control system which have been attributed, so far, to the neural hardware of these networks (Buchner, Goetz & Straub 1978; Goetz & Buchner 1978). The 'preferred directions' in the Table are the averages of the direction of maximum sensitivity of the motion detecting system associated with the altitude control response of Drosophila. The angular representation of these directions refers to the frontal (0°), and dorsal (90°), coordinates of the retinae on either side. The data were obtained under condition of steady-state stimulation. They show the influence of head wind on the preferred direction, and the absence of this influence after immobilisation of the antennae. The shift of the preferred direction is specific to the altitude control system. No such effect has been found in the course control system of Drosophila. The shift appears sufficient to compensate the expected decrease of body angle upon transition from hovering to cruising flight. This may help to maintain a vertical preferred direction for altitude control, regardless of the flying speed.

| | Preferred direction of motion (deg.) | | |
|---|---|---|---|
| Antennae | tail wind | no wind | head wind |
| free | 66 | 62 | 98 |
| fixed | 72 | 74 | 77 |