Duttagupta, A.K., D.Mutsuddi and M.Mutsuddi. (Das). Univ of Calcutta, India. Conservativeness in the regulation of replication in three related species of Obscura group.

The two arms of the X chromosome (XL and XR) of Drosophila pseudoobscura and D.persimilis have different phylogenetic origin. The XL is homologous to the X and XR is homologous to 3L of D.melanogaster (Sturtevant & Novitski 1941; Muller 1950). The works of Abraham & Lucchesi (1973) and Mukherjee & Chatterjee (1976) have shown that in D.pseudoobscura, both the X chromosomal arms (XL and XR) are hyperactive and early replicating. Interestingly, in the same species, Chatterjee et al. (1976) for the first time have reported that the C element (3rd chromosome) replicates earlier than the remaining autosomes in both the sexes. In our present investigation, we have examined the replicative and transcriptive behaviour of the two X chromosomal arms (XL and XR) as well as the 3rd chromosome in the other species, D.persimilis and the replicative behaviour of these three chromosomal elements (XL, XR and 3rd chromosome) in interspecific hybrids of D.persimilis and D.pseudoobscura.

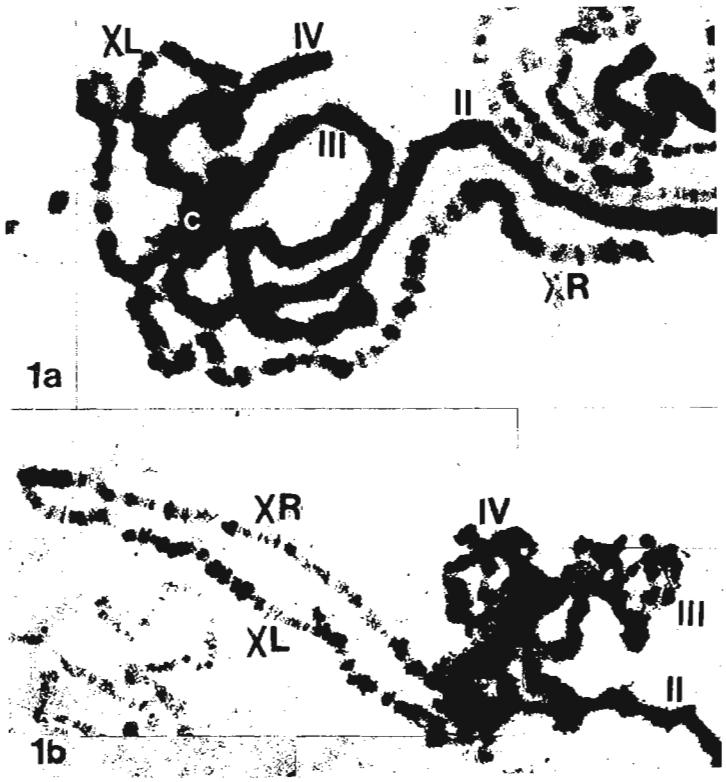

Fig. 1. Autoradiograms showing ^{3}H-TdR labelling on the two X chromosomal arms (XL and XR) in comparison to the pattern on the autosomes (a) D.persimilis male and (b) hybrid male. A = autosome.

Fig. 2. Autoradiogram showing ^{3}H-TdR labelling the XR, 3rd chromosome and 4th chromosome of D.persimilis male nucleus. 3rd chromosome representing the distinct asynchronous replication pattern with 4th chromosome.

The results of our investigation reveal, that, like that of D.pseudoobscura, both the X chromosomal arms (XL and XR) in D.persimilis are both hyperactive and early replicating in male (Fig. 1a) and the 3rd chromosome, irrespective of sex, is also characterized by its early replicating property than the remaining autosomes (Fig. 2). In the hybrid male nuclei, both the X chromosomal arms (XL and XR) as well as both the homologue of the C element, derived from persimilis and pseudoobscura, maintain their respective replicating property (Fig. 1b). Moreover, the frequency of ^{3}H-TdR labelling of each replicating unit on XL, XR and both the homologue of the C element (3rd chromosome) exactly corresponds to those of

their corresponding sites of the respective chromosomal elements of the parental species. Such autonomous 'parental' behaviour of each chromosomal arm in the hybrids and the early replicating property of the C element (3rd chromosome) in D.pseudoobscura, D.persimilis as well as in D.miranda (X_2, Das et al. 1982), as mentioned earlier (Mutsuddi et al. 1984), indicate the presence of inbuilt genetic control of replication that is conserved in individual chromosome during evolutionary process.

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Unequal diameter of the homologous chromosomal elements in the hybrids of D.mulleri and D.arizonensis.

The salivary gland chromosomes of the hybrids, produced from the cross Drosophila mulleri females to D.arizonensis males, are being investigated. In hybrid females, a certain proportion of nuclei represent a beautiful situation of coexistence of two homologue with distinct differential diameter for all the chromosomal elements in the same nucleus. While one homologue is much wider, other is distinctly thin, being almost half or about one third to that of the former. Interestingly, irrespective of diameter, the staining intensity is equal in both the homologue and they show considerable good pairing in most of the homologous sites. Study of ^{3}H-TdR labelling pattern of the salivary gland chromosomes in these hybrid females reveal that the replication pattern of all the homologous sites are similar between these two homologue (Fig. 1a-d) and to those of the corresponding sites of their respective parental species.

Fig. 1. Autoradiograms showing similar ^{3}H-TdR labelling patterns on the two homologue with differential diameter in hybrid females of D. mulleri and D. arizonensis. Such synchrony in replication cycle (a) very early terminal stage, (b) very late terminal stage; (c) and (d) represent magnified portion of (b).

w - wider homologue t = thinner homologue