

Krimbas, C.B. and M. Loukas. Agricultural College of Athens, Greece. Chromosomal homologies among four *Drosophila* species.

The following table gives the chromosomal homologies among four species of the *Sophophora* subgenus of *Drosophila*: *D. subobscura*, *D. pseudoobscura* (both of the *obscura* group), *D. melanogaster* and *D. willistoni*.

General symbol	<i>D. subobscura</i>	<i>D. pseudoobscura</i>	<i>D. melanogaster</i>	<i>D. willistoni</i>
A	A	XL	X	XL
B	J	XR	3L	XR
C	U	4	2L	2
D	E	3	2R	2
E	O	2	3R	3
F	dot	5	4	?

These homologies have been established by mapping visible mutants considered homologous. At least two good maps of visible markers are available for *D. subobscura*, one for the A (Spurway 1945; Bird 1946, 1947) and one for the O chromosome (Koske and Maynard-Smith 1954). Similar maps for *D. pseudoobscura* are given by Sturtevant and Tan (1937) and others (for a review see Patterson and Stone 1952, Dobzhansky and Powell 1975, Anderson and Norman 1977) and for *D. willistoni* by Spassky and Dobzhansky (1950). The maps of *D. willistoni* contain rather few markers except for the X chromosome.

The use of biochemical markers, as well as visible landmarks on the giant chromosomes, have confirmed these homologies (Patterson and Stone 1952, Hipsch 1952, Buzzati-Traverso and Scossiroli 1955, Sondhi 1957, Loukas, Krimbas, Mavragani-Tsipidou and Kastritsis 1979).

The order of the genes in the X chromosome (element A) is completely different in the four species (see Table 42 of Patterson and Stone 1952, Bird 1946, Spassky and Dobzhansky 1950). For 10 homologous markers at least six inversions are needed to obtain the gene order of *subobscura* from that of *pseudoobscura* and with more markers this number of inversions as well as of transpositions would undoubtedly increase. Thus it is worth noting that for such distant species as *D. melanogaster* and *D. subobscura* a relatively small number of rearrangements is needed for obtaining the gene order of the O chromosome of *subobscura* from the corresponding one of *melanogaster*. Let us consider the following loci as homologous: Aph, aliest=Est-3, Odh, ma, cu, Xdh, ME, Ao,  $ss^a=ar$ , Dl=Va, H=Ba, cd=ch, Lap, Acph. The *melanogaster* gene order is (3L arm): centromere - Aph - aliest - Odh - ma - cu - Xdh - ME - Ao -  $ss^a$  - Dl - H - cd - Lap - Acph; whereas the *subobscura* one is for the O chromosome: centromere - Va - ar - Odh - cu - Ba - Ao - ME - Xdh - ch - Lap - Acph (the genes ma, Aph and Est-3 are located on chromosome J). The data concerning *D. melanogaster* have been compiled by Cavener (1977) except for ME (Franklin and Rumball 1971) and those concerning *D. subobscura* are taken from Loukas et al. (1979). A first inversion including Odh and ma and a second pericentric (3L-ma) are postulated. In this way ma, Aph and Est-3 could be placed on the 3L arm (homologous to J). Furthermore we can explain the great resemblance of the centromere end of 3L with that of the O chromosome. Three more overlapping inversions are needed to establish the gene order of *subobscura* (one of the segment Odh-Dl, a second of the segment Odh-Ao and a third of the segment Ba-Xdh). The three distant genes of *subobscura* (ch, Lap, Acph) are in the same order as in *D. melanogaster*. For some 13 markers this seems to be a remarkably small number of inversions needed. Unfortunately we cannot try the same for the other species since the number of homologous mapped genes is indeed small.

References: Anderson, W.W. and R.A. Norman 1977, DIS 52:11-12; Bird, B.J. 1946, DIS 20:84; Bird, B.J. 1947, DIS 21:83; Buzzati-Traverso, A.A. and R.E. Scossiroli 1955, Adv. Genet. 7:47-92; Cavener, D.R. 1977, DIS 52:120-121; Dobzhansky, Th. and J.R. Powell 1975, in Handbook of Genetics, vol. 3 (Ch. 20) ed. by R.C. King, Plenum Press NY, 537-587; Franklin, I.R. and W. Rumball 1971, DIS 47:37; Hipsch, R. 1952, DIS 26:106; Koske, Th. and J. Maynard-Smith 1954, J. Genet. 52:521-541; Loukas, M., C.B. Krimbas, P. Mavragani-Tsipidou and C.D. Kastritsis, The Journal of Heredity, 70:17-26; Patterson, J.T. and W.S. Stone 1952, Evolution in the genus *Drosophila*, McMillan NY, p. 610; Sondhi, K.C. 1957, DIS 31:162; Spassky, B. and Th. Dobzhansky 1950, Heredity 4:201-215; Spurway, H. 1945, J. Genet. 46:268-286; Sturtevant, A.H. and C. C. Tan 1937, J. Genet. 34:415-432.