Malogolowkin-Cohen, Ch. Institute of Evolution, University of Haifa, Israel. Inversion polymorphism in Drosophila subobscura in Israel.

Natural populations of Drosophila subobscura from seven sites of three different biogeographic regions have been sampled in Israel in 1976 and 1977 (Malogolowkin-Cohen, 1978). Salivary glands of one F_1 larva of wild females were dissected and examined for inversion polymorphism. Samples were collected during spring from March-May when D. subobscura is abundant in the seven sites and from October-February (atumn and winter) at the Mount Carmel site only. No attempts to collect D. subobscura during the summer or winter in any site except for Mount Carmel were made. No flies were found at the Mount Carmel site during the summer months.

Twenty-six inversions and 46 heterozygous combinations have been found in Israel. This can be compared with 54 inversions and 64 gene arrangements that are known to occur in natural populations of D. subobscura (Jungen, 1968). The highest number of heterozygous combinations per population was found in Oranim (25 combinations). Number of females, average number of inversions per female, number of inversion limits for female with and without considering the A chromosome, number of inversion types, average number of heterozygote chromosomes per female and index of free recombination (IFR) are listed in Table 1.

Table 1. Site and year of sampling as well as number of females, average number of inversions per female, number of inversion limits for female with and without the A chromosome (sex chromosome), number of inversion types, average number of heterozygote chromosomes per female and index of free recombination (IFR) are listed.
S = Spring, FW = Fall-Winter, FH = Foothills, CP = Coastal Plain

Site	Year	No. of females	Average no. of inversions/♀		No. of inversion limits/♀		No. of inversion types	Average no. heterozygous chromosomes/♀		IFR
			with A	without A	with A	without A		with A	without A	
Zfat	1976 S	8	5.0	4.5	2-8	2-8	14	2.8	2.2	82.78
Zfat	1977 S	62	5.4	5.0	0-12	0-12	23	2.9	2.6	78.05
Zfat	1978 S	34	4.9	4.6	0-10	0-10	15	2.4	2.1	81.30
Carmel	1976 S	22	4.3	4.0	1-9	0-8	19	2.6	1.8	80.48
Carmel	1976-7 FW	14	4.5	4.0	1-14	0-13	21	2.5	2.3	84.10
Carmel	1977 S	40	5.8	5.4	0-13	0-12	19	2.9	2.6	78.61
Carmel	1977-8 FW	9	4.0	3.4	1-13	0-12	10	2.3	1.7	86.48
Carmel	1978 S	18	5.5	5.4	1-10	0-10	14	2.4	2.2	83.90
Q. Anavim	1977 S	14	5.5	5.1	1-13	0-12	14	3.0	2.7	78.57
Oranim (Tivon)	1977 S	28	5.2	4.9	1-13	0-12	24	2.9	2.6	81.02
Maian Zvi (FH)	1977 S	13	5.1	4.7	1-14	0-13	24	1.9	1.8	78.32
Maian Zvi (CP)	1977 S	3	5.2	4.9	2-13	2-12	19	2.6	2.3	80.30
Israel		265	5.0	4.6	0-14	0-13	24	2.6	2.2	81.15

The only previous data of D. subobscura in Israel were published in Goldschmidt (1956, 1958) and in Stumm-Zollinger and Goldschmidt (1959). Only three sites were sampled in these studies, Quiriat Anavim, Oranim, and Eilon, with differing results from the present study. Stumm-Zollinger and Goldschmidt found the Israeli populations to be marginal with IFR values of 88.8±0.6, 89.8±1.3, 89.6±0.8 respectively. Our values of IFR range from 78.61 at Carmel, spring (S) 1977 to 86.48 at the same site in the following fall-winter (F-W) 1977-1978, with the average Israeli value being 81.15. From the values published by Prevosti (1964) and Sperlich (1964), central populations of D. subobscura in France, Italy and Iberia had IFR values ranging from 78.2 to 83.8; intermediate populations in Austria, France and Switzerland had values ranging from 84.1 to 87.8; and marginal populations in Israel, Scotland and Norway had values ranging from 88.8 to 95.0. As such our new IFR values for Israeli populations fall in the central and intermediate range. In addition, the average number of heterozygous chromosomes per female (average Israeli value 2.36 for all chromosomes) is as high as values reported in Italy (Sperlich 1964) and higher than those in Norway and Austria.

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Malogolowkin-Cohen, Ch. Institute of Evolution, University of Haifa, Israel. The distribution of Drosophila subobscura in relation to other species in Israel.

In the course of trapping Drosophila subobscura Collin with the purpose of analyzing its inversion polymorphism in a population considered to be marginal in Israel by Goldschmidt (1956, 1958) we made some interesting observations related to its distribution in relation with other species found in artificial baits in four different biogeographic zones in Israel.

D. subobscura has a typical Mediterranean pattern of distribution in Israel penetrating chiefly the more humid areas of the country but does not colonize the hot and dry southern deserts. Traps were distributed according to the four biogeographic longitudinal regions of Israel, Coastal Plain, Foothills, Mountains and Rift Valley in the three mesothermal regions according to Thornthwaite's (1948) classification (Atlas of Israel, 1970, IV/3) avoiding the megathermal or high temperature zone. A total of 4006 individuals of five species of Drosophila were collected from March until the end of June in 1976 and 4888 during the same period in 1977. The species attracted to the artificial baits prepared with malted barley according to Lakovaara and col. (1969) were as follows: D. subobscura Collin, D. melanogaster Meigen, D. simulans Sturtevant, D. hydei Sturtevant, D. buskii Coquillet and D. immigrans Sturtevant. For technical reasons D. melanogaster and D. simulans were scored and analyzed under the heading of simulans group.

In general, the frequencies of the species collected changed greatly in time and according to the biogeographical regions where they were collected, as can be seen in Table 1. The most pronounced changes were exhibited by D. subobscura which decreases in frequency with the increase of temperature. Significant deviation from the 1:1 normal sex ratio was observed in the collected populations of D. subobscura and in a lower degree in D. hydei. In contrast to Shorrocks'(1975) observations the predominance of males was a constant trait of D. subobscura in the four biogeographic regions during the collecting season of 1976 and continued to be so in 1977 as may be seen in Table 2.

Table 2. Proportion of sexes of D. subobscura and of D. hydei in four geographic zones during the collecting season of 1976 and 1977 in Israel. n = total number of flies

		Biogeographic Zone							
		Coastal Plain		Foothills		Mountains		Rift Valley	
		♀	♂	♀	♂	♀	♂	♀	♂
D. subobscura	1976	n=256		n=130		n=912		n=16	
		54.70	45.30	34.0	66.0	35.0	65.0	31.25	68.75
	1977	n=115		n=130		n=380		n=38	
		19.13	80.87	36.15	63.85	22.0	78.0	29.0	71.0
D. hydei	1976	n=190		n=523		n=61		n=168	
		40.0	60.0	51.0	49.0	49.0	51.0	37.5	62.5
	1977	n=68		*		*		n=11	
		79.4	20.6	*		*		27.27	72.72

* only two individuals.