

Lakovaara, S. and M. Sorsa, University of Helsinki, Finland. Distribution and the chromosomal characteristics of a newly described species, *D. (Hirtodrosophila) subarctica* Hackman.

The species in question was described from material captured in Finland in 1969 (Hackman, 1969 Notul. ent. 49: 69). Although a rather effective trapping for *Drosophilids* has been going on during the last few years in various parts of Finland, *Drosophila subarctica* has been captured only in the northernmost part of the country. Its southern line of distribution seems to be surprisingly accurate passing parallel to the Arctic Circle not more than about 20 kilometres southwards. The find locality farthest north was near to the northernmost point of Finland at Utsjoki, Kevo (69° 45' latitude). In this distributional area of *D. subarctica* the species is obviously rather common, as estimated from samples of several hundred individuals from 14 different trapping sites. Outside Finland, a find of a male individual has been made, apparently belonging to the same species from Northern Norway in Rosta (69° 00' latitude; Basden & Harnden, 1956 Trans. R. ent. Soc. London 108: 147). As yet *D. subarctica* is not known elsewhere.

The strictness of the southern line of distribution suggests that the species may need an uninterrupted illumination period of several days for its reproduction. *D. subarctica* seems

to represent a "long-day" type of insect in relation to its photoperiodic response. This hypothesis is supported by some preliminary results obtained in experimental light-box cultivations of this species.

The somatic chromosome number of *D. subarctica*, as determined from ganglion cells of third instar larvae is $2n=12$, comprising of five pairs of autosomes and a sex chromosome pair. Four pairs of the autosomes are acrocentric rod chromosomes, while one is a dot chromosome pair. The sex chromosomes are the only ones in the chromosome complement with a median centromere, the chrom-

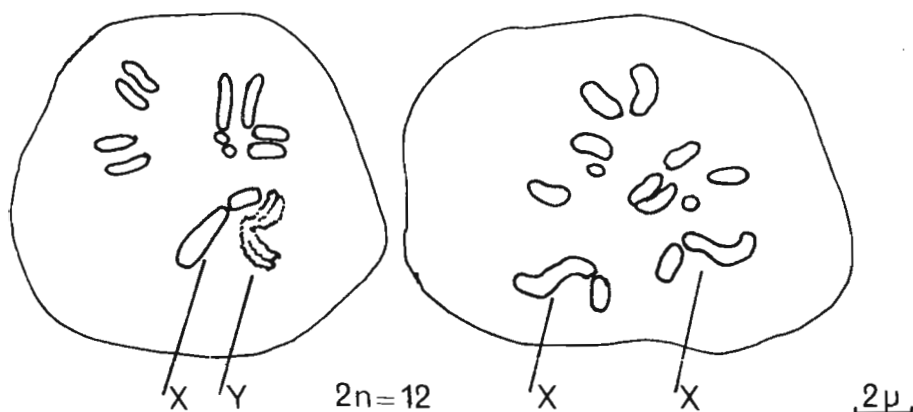


Fig. 1. Metaphase chromosomes from male and female larval ganglion cells of *Drosophila subarctica*.

osome X being submetacentric, while the primary constriction in the Y chromosome seems to be more precisely in the middle. The Y chromosome has a tendency for negative heteropycnosis in somatic metaphases of the ganglion cells. One pair of the acrocentric autosomes is slightly longer than the three other pairs.

The salivary cells of *D. subarctica* possess large nucleoli and beautiful and precisely banded polytene chromosomes. There are five giant chromosomes sticking out of the chromocentre which suggests that the Y chromosome and the short arm of the X chromosome are located in the chromocentre mass.

Ondřej, M. Institute of Experimental Botany, Prague, Czechoslovakia. Genetic effects of Edta alone and in combination with radiation.

Edta (ethylenediaminetetraacetic acid) showed synergical effect with radiation in the induction of dominant lethals in *Habrobracon juglandis*¹, and aberrations in the meiotic cells of *Tradescantia*². Edta is known to increase frequency of crossovers in *Drosophila* females³ but

no other genetic effects on *Drosophila* were studied in detail.

We investigated the effects of Edta on aberrations, mutations and crossovers. In all experiments we used the injection application of Edta in 5mM concentration. This treatment caused temporary immobility of flies, which lasted 1-2 hours. If twofold concentration was applied, the toxicity was so high, that lethality immediately after treatment exceeded 90%.

Table 1

Frequencies of dominant lethals after treatment by 5 mM Edta and X-rays in the dosis 1 500 r.

Treatment	Eggs counted	% of unhatched eggs
Control	2,018	3.0
Edta	1,236	4.4
X	1,453	39.8
Edta + X	1,932	40.4

the effect of irradiation. Large fragments in the X-chromosome were tested by mating Oregon K males to attached XX y v f females. The frequencies of y^+ , v^+ , f^+ phenotypes and their combinations in F_1 females were scored. The effect of Edta was very slight. No indications of enhancement of X-ray effect by Edta were found. Crossing over in *Drosophila* females was scored in F_1 of the cross b cn vg x Suchumi. It is given only for the region b-vg. Edta, as

Irradiation by X-rays in the dosis of 500 r was carried out before injected flies recovered from the immobilizing effect of Edta. Two-day mating scheme was used throughout the experiments. The only exception was the series with dominant lethals, where only the first brood, lasting three days, was scored.

Dominant lethals were tested in the stock Oregon K. Edta induced just a very small frequency of unhatched eggs (1.4%), but its effect was quite independent of

Table 2. Frequencies of large chromosomal fragments.

Brood	X		Edta + X		Edta	
	F_1 females	% of exceptions	F_1 females	% of exceptions	F_1 females	% of exceptions
I	3,596	0.25	3,547	0.25		
II	1,422	0.28	2,764	0.25		
III	450	0.89	1,259	0.64		
IV	434	0.00	417	0.24		
V	981	0.10	587	0.00		
VI	1,425	0.00	935	0.00	altogether	
VII	2,152	0.00	105	0.00	22,202	0.01

well as radiation, enhances strongly the frequency of crossovers, but when both agents act together, the resulting effect is rather smaller, than the sum of effects of the two agents. Crossing over in *Drosophila* males after Edta treatment was scored in F_1 of the cross dp b cn bw x Oregon K, in both spermatocytes and spermatogonia. There were 0.042% of crossovers in 16,504 individuals. Spontaneous frequency under similar conditions was 0.021%⁴. The differences between both frequencies were just on the verge of statistical significance. Edta

did not induce any sex-linked recessive lethals. In all stages of spermatogenesis we scored altogether 3792 cultures and we get 0.24% of recessive lethals. Negative results are in agreement with earlier finding of other authors⁵. In our experiments after Edta treatment we found 0.02% of mutations in the dp locus between 10,776 individuals scored; the spontaneous frequency is in the verge 0.02% - 0.04% and therefore our results are negative.

Under our experimental conditions Edta increased the frequency of crossing over in the females, induced just a very low frequency of unhatched eggs, very

low frequency of fragments of the X-chromosome and it induced a frequency of crossovers in males, which was on the verge of statistical significance. Edta never showed synergical effect with radiation; on the contrary the effect of both agents acting together was always a little bit smaller than the sum of individual effects of Edta and X-rays, acting on their own.

References: 1. La Chance, L.E., 1959, Radiation Res. 11: 218-228. 2. Delone, N.L., 1958, Biofizika 2: 717-723. 3. Levine, R.P., 1955, PNAS 41: 717-730. 4. Ondřej, M., 1968, DIS 44: 117. 5. Steffensen, D. et al., 1957, Genetics 41: 663.

Table 3. Frequency of crossovers in *Drosophila* females in the region b-vg.

	Control		Edta		X		Edta + X	
	P	s_p	P	s_p	P	s_p	P	s_p
I	10.19	0.41	10.05	0.83	15.03	0.59	15.65	0.63
II	11.82	0.39	12.85	1.06	12.52	0.60	12.15	0.54
III	9.10	0.33	13.00	0.92	12.11	0.67	11.20	0.46
IV	8.20	0.33	10.94	0.80	10.60	0.42	99.78	0.38
V	8.41	0.39	12.22	1.07	12.19	0.57	10.55	0.48
VI	7.59	0.33	11.50	0.90	8.69n0.55		9.87	0.58
VII	5.87	0.34	6.01	0.79	8.88	0.54	9.67	3.86