

Effects of Anti - histaminic Drugs on Meiosis of  
Vicia faba and Allium cepa

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The effects of promethazine hydrochloride and chlorpheniramine maleate ( anti-histaminic drugs ) on mitosis of Vicia faba and Allium cepa roots have been studied by Shehab and Abo-El-Khier 1983'.

In completion of such study, the present investigation was undertaken to elucidate the effects of these anti-histaminic drugs on meiosis and pollen viability of Vicia faba and Allium cepa.

Materials and Methods

Vicia faba (var. Giza 1) and Allium cepa (var Giza 6 ) flower buds were treated for 3 hours with the different concentrations of the drugs (20 and 40 ppm), using a piece of cotton soaked with the drug solution. The treated flower buds were collected 24 and 48 hours after treatment ( recovery test ), at random from 20 plants for each treatment. Tap water was used for control in the same manner. Fixation of buds ( treated and non-treated ) in acetic alcohol 1 : 3 was followed by aceto-carminc squash preparations.

For determination of pollen viability, pollens which proved to be abnormal, shrunken and could not stained with aceto-carmin were considered abortive.

#### RESULTS AND DISCUSSION

The data gathered in tables 1 and 2 show that treatments with the two drugs induced a high percentage of anomalies in the two utilized plants.

It was also evident that the total percentage of anomalies has a negative correlation with concentration after the two recovery periods in treated Vicia FMCs, (Table 1).

The effect of promethazine HCl on Vicia FMCs was temporary, since the percentage of abnormalities decreased with lapse of time of recovery. On the other hand, chlorpheniramine maleate has a permanent effect on the same plant, (Table 1).

No correlation could be traced between the concentration of the used drugs and the percentage of the induced abnormal FMCs in Allium cepa plants (Table 2).

Also, no trend was observed between the percentage of anomalies and time of recovery in Allium cepa.

After 24 and 48 hours recovery, the highest percentage of abnormalities was mostly observed in the 1<sup>st</sup> division of Vicia faba and Allium cepa plants treated with the two drugs. It may be mentioned also that the highest percentage of abnormalities was mostly observed in the metaphase stages (Tables 1 & 2).

Different types of abnormalities were observed in the two treated plants. Stickiness was the most prominent abnormality in the two plants and after the two recovery periods (Figs 1 & 3 and Table 3).

Another interesting abnormality was the disturbed type ( disturbed metaphases and ana-telophases). Treatments with chlorpheniramine maleate gave a considerable percentage of this abnormality in the two plants (Fig 2 and Table 3 ). It was also evident that chlorpheniramine maleate induced multipolarity (Figs 3 & 6 and Table 3). A phenomenon may be due to the disturbance of the extrachromosomal mechanism (merokinetio ) leaving the intrachromosomal process to proceed normal, (Kabarity 1966). This phenomenon was also observed in the root tip cells of Vicia faba and Allium cepa after treatment with the same drug ( Shehab and Abc-El-Khier 1983). Amer and Farah (1976) observed multipolarity in AII and T II

of *Vicia faba* PMC's treated with " Rogor ", IPC, and " Duphar ". They concluded that these cells gave rise to an aggregate of cells instead of the usual tetrad stage.

Bridges were also observed in most treatments but in a small percentage. Most of the observed bridges were sticky ones. Another type of bridges (structural) were also met with (Fig 4), which may be the result of breakage followed by reunion of the broken ends.

In addition to the above mentioned abnormalities lagging chromosomes (Fig 3), breaks and fragments, (Figs 2 & 4) were also observed. Breaks and fragments were more obvious in the 1<sup>st</sup> division than in the 2<sup>nd</sup> one and after 24 h recovery. Dempong (1972) attributed this phenomenon to differential susceptibility of the heterochromatic regions to the chromosome breaking action of the antibiotic mitomycin C.

Despiralization, Fig 5, was observed in treated Vicia PMC's with the two drugs after 24 hour recovery only. This may be an indication that these drugs cause complete dissolution of the matrix substance (Shehab 1983).

From table 4, it was clear that the two drugs were not effective pollen sterilizers.

### SUMMARY

In this work, the effect of promethazine hydrochloride and chlorpheniramine maleate (antihistaminic drugs) on flower buds of Vicia faba and Allium cepa were studied.

Treatments with the two drugs induced a high percentage of abnormalities in Vicia faba and Allium cepa plants. Most of the abnormalities were observed in the 1<sup>st</sup> division. The highest percentage of abnormalities was mostly observed in the metaphase stages.

Different types of abnormalities were met with, stickiness, disturbed metaphases and ana-telophases, multipolarity, lagging chromosome, bridges, breaks, and fragments. Despiralization was noted in treated Vicia PMC's only.

The two drugs were not effective pollen sterilizers.

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Table 1 : Total percentage of abnormalities and their percentage in each phase in Viola faba after treatments with the two drugs.

Treatments	Total No of PMCs	No. of abn. Cells	Total abn %	1 st Division			2 nd Division		
				% abn. meta	% abn. ana	Total % abn.	% abn. meta.	% abn. ana.	Total % abn.
<b>24 hr recovery</b>									
<u>Control</u>	3789	43	1.2	1.5	1.1	1.3	1.2	0.55	0.8
<u>Promethazine HCl</u>									
20 ppm	3782	2228	58.8	66.5	47.5	61.8	94.0	21.5	51.9
40 ppm	3834	1408	36.7	46.5	42.3	46.7	26.0	11.4	20.2
<u>Chlorpheniramine maleate</u>									
20 ppm	2541	372	14.6	19.7	21.6	20.5	3.4	13.5	10.2
40 ppm	2756	308	11.2	7.2	20.1	11.0	3.9	13.4	11.4
<b>48 hr recovery</b>									
<u>Control</u>	3106	41	1.3	4.2	0	2.3	5.7	10.0	0.48
<u>Promethazine HCl</u>									
20 ppm	2878	570	20.2	14.8	1.1	11.0	55.1	6.0	28.5
40 ppm	3342	476	14.2	11.8	17.3	14.4	41.4	6.1	13.9
<u>Chlorpheniramine maleate</u>									
20 ppm	2618	998	38.1	12.6	0	10.4	81.7	23.9	44.2
40 ppm	2654	856	32.3	12.8	51.0	20.8	84.5	16.8	36.8

Table 2 : Total percentage of abnormalities and their percentage in each phase in ALLIED sera after treatments with the two drugs.

	Total % of abn.	No. of abn.	% of abn.	1st Division			2nd Division		
				% of abn.met.	% of abn.ana.	Total % of abn.	% of abn.met.	% of abn.ana.	Total % of abn.
<b>24 hour recovery</b>									
Control	2527	5	0.2	0.5	0.2	0.4	0	0	0
<b>Promethazine HCl</b>									
20 ppm	1235	318	25.7	53.8	2.6	29.4	78.9	6.7	20.4
40 ppm	2365	1265	53.5	93.1	29.3	64.1	100	8.4	34.5
<b>Chlorpheniramine maleate</b>									
20 ppm	1661	752	45.3	94.5	56.1	70.8	55.8	3.6	5.5
40 ppm	1330	288	21.7	66.9	1.9	30.5	16.7	9.4	10.8
<b>48 hour recovery</b>									
control	1161	20	1.7	4.5	0.9	2.1	3.8	0.3	1.3
<b>Promethazine HCl</b>									
20 ppm	2124	908	42.8	92.8	5.7	38.8	79.3	0	44.4
40 ppm	2439	510	35.4	84.8	1.4	51.2	19.2	3.3	7.1
<b>Chlorpheniramine maleate</b>									
20 ppm	1530	560	35.2	90.5	0.67	55.6	52.1	0.9	16.1
40 ppm	1047	531	50.7	75.3	7.41	47.8	92.5	5.7	57.5

Table 3 : Percentage of different types of abnormalities in Vicia faba and Allium after 24 and 48 hour recovery.

Treatments	24 h recovery							48 h recovery				
	stick.	Sp. dist.	Bridges	Lagging	Breaks	Desp.	Multi-Pol.	Stick.	Sp. dist.	Bridges	Lagging	Breaks
<u>Vicia faba</u>												
<u>Promethazine HCl</u>												
20 ppm	92.4	4.3	1.2	0.2	0	1.8	0	95.6	0	0.7	4.2	0.7
40 "	89.6	3.4	5.1	0.3	1.4	0.2	0	82.4	14.5	1.9	0.6	0.5
<u>Chlorpheniramine maleate</u>												
20 "	38.4	23.4	0	5.1	3.0	29.8	0.3	92.4	3.4	2.7	0.6	0.3
40 "	26.3	30.9	6.1	14.0	3.9	0	18.2	96.6	1.1	1.5	0.8	0
<u>Allium cepa</u>												
<u>Promethazine HCl</u>												
20 "	73.6	9.8	0	8.5	6.9	0	1.3	83.6	16.3	0.2	0	0.7
40 "	92.7	2.8	0.6	2.1	1.8	0	0	97.3	0.8	1.0	0.4	0.5
<u>Chlorpheniramine maleate</u>												
20 "	95.5	3.2	0	0.4	0.9	0	0	94.6	2.3	0.9	0.4	1.8
40 "	75.7	13.5	0	10.4	0.3	0	0	71.6	23.9	0.9	0.9	2.5

Table 4 : Percentage of abortiveness in PGs of Vicia faba and Allium cepa plants treated with promethazine HCl and Chlorpheniramine maleate.

Treatments	Vicia		Allium	
	24 h	48 h	24 h	48 h
Control	1.9	3.4	0.8	1.6
<u>Promethazine HCl</u>				
20 ppm	4.7	9.6	1.8	1.5
40 ppm	2.9	4.1	1.9	4.1
<u>Chlorpheniramine maleate</u>				
20 ppm	2.7	8.9	2.7	3.4
40 ppm	3.2	6.7	1.6	2.0

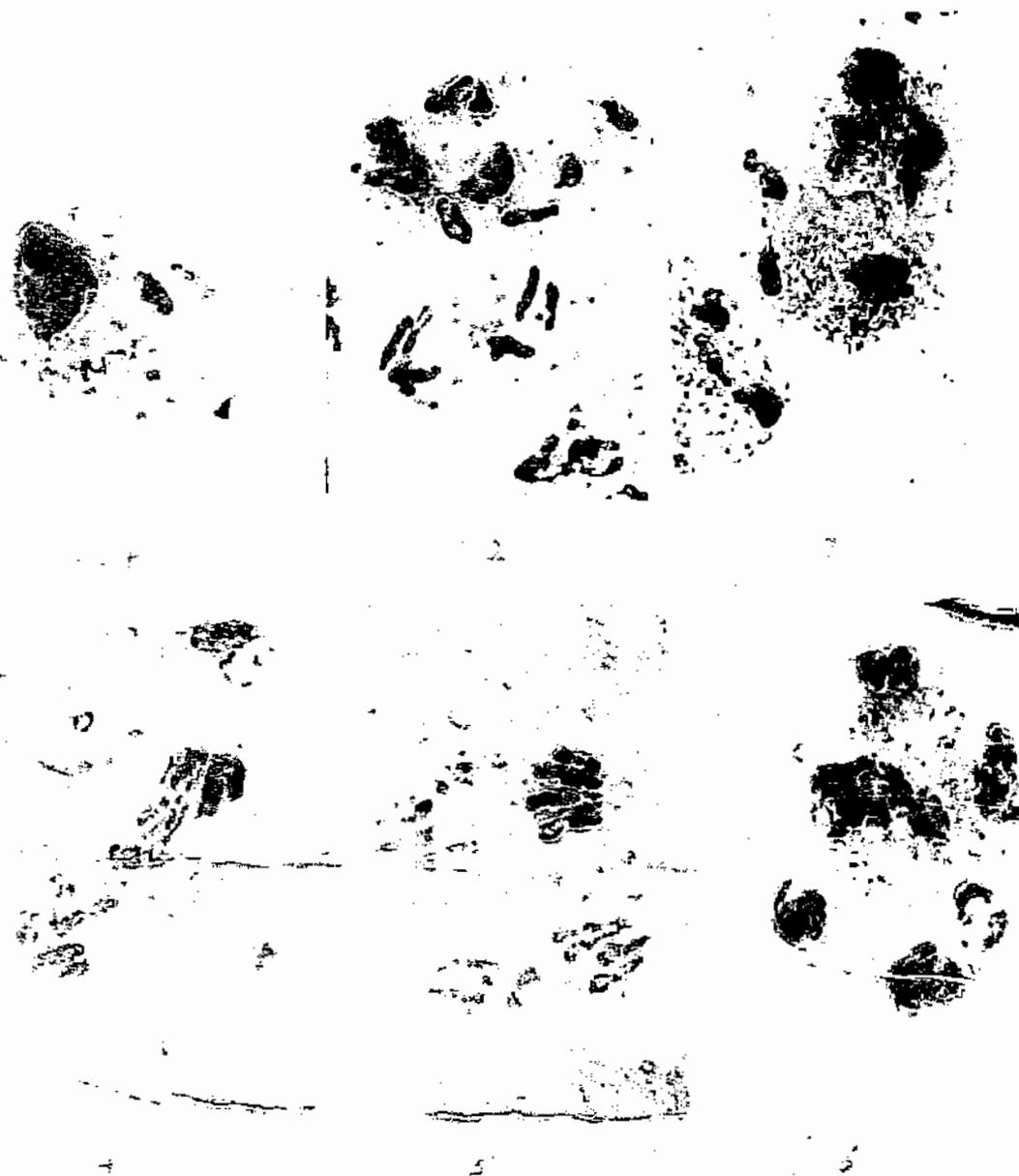


Fig 1 : Sticky metaphase I (20 ppm promethazine 48 h recovery).  
Fig 2 : Disturbed A II with fragment (40 ppm chlorph. 24 h rec.)  
Fig 3 : Sticky multipolar A II with lagging chromosome.  
(40 ppm chlorph. 24 h rec.).  
Fig 4 : A I with chromosome bridge and fragments.  
(40 ppm chlorph. 24 h rec.).  
Fig 5 : Despiralization in A II (20 ppm chlorph. 24 h rec.)  
Fig 6 : Multipolar T II (40 ppm chlorph. 24 h rec.).

