TABLE I

Cuticle thickness and number of stomata in Septoria *resistant and susceptible varieties of cowpea*

Sl. No.	Variety	Disease reaction	Cuticle thickness (μ)*	Number of stomata per microscopic field**
1.	Pusa Dofasli	S	10·9	10·8
2.	Pusa Barsati	S	8·1	10·4
3.	P_{426}	R	13·6	9·9
4.	Cream-40	R	18·6	10·8
5.	Iron	R	18·2	9·8

S = Susceptible; R = Resistant.
* Average of 10 leaves.
** Average of 25 microscopic field.

fication of a microscope. Ten such leaves were examined in each variety and averages taken.

The data presented in Table I indicate that there were no marked differences in the number of stomata between the resistant and susceptible varieties. They ranged from 9·8 to 10·8 per microscopic field. Appreciable differences in cuticle thickness in resistant and susceptible varieties were observed which might be responsible for resistance of varieties like Cream-40, Iron and P_{426}. The cuticle thickness in resistant varieties varied from 13·6–18·6 μ as compared to 8·1–10·9 μ in susceptible varieties. This, most probably[1] acted as a barrier for infection. Louis, reported that the degree of penetration of *Botrytis cinerea* was related to cuticle thickness in bean, tomato and other host plants. The same phenomenon in was reported the case of *Barbaris* spp. resistant, immune and susceptible to *Puccinia graminis*. The well developed and tough cuticle might resist the pressure exerted by the fungus thereby avoiding its entry and acted as a defensive barrier. The cuticle thickness can be one of the tools used by the breeders to mark resistant plants.

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MUTACHROMOSOMIC EFFECTS OF LANTHANUM CHLORIDE ON MAMMALIAN BONE MARROW

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LANTHANUM is known to occur in traces (0·5 μg/g) in the bones of men and animals exposed to it, though normally it is not found in the animal body. An increasing use of the element in the production of lenses, colour television tubes, mirrors and other glass products has raised a question of possible health hazards posed by it[1]. The present investigation was undertaken to observe the clastogenic effects of chronic doses of lanthanum (La^{3+}), in the form of lanthanum chloride ($LaCl_3$), on the bone marrow chromosomes of *Rattus norvegicus in vivo*.

Healthy albino rats (*Rattus norvegicus*) of average body weight, ranging from 80–100 g, were treated with different doses of lanthanum chloride ($LaCl_3$) intraperitoneally. A single dose, *i.e.*, 1/4 of the LD_{50} of the chemical was initially used[2]. The treatment was divided into two series. In the first series, a chronic dose for a period of four days was administered at 24 hr intervals in order to observe the cumulative effect. In another series, the animals were permitted to recover after exposure to the same dose for 72, 96 and 110 hours. Two replicates of the experiments were carried out. Bone marrow preparations were made following the usual flame drying schedule and stained in Giemsa. Metaphases (200) were analysed from each animal in chromosomal aberrations.

The mitotic index and the chromosomal abnormalities were compared for the different treated and control animals (Tables I and II).

Earlier information on the action of lanthanum on chromosomes is very meagre. Lanthanum trichloride has been recorded to cause an appreciable increase in mitotic index, nuclear volume, DNA and histone contents of liver cell nuclei. These observations were attributed to the increased cellular activity of the liver during regeneration treatment[3]. The present observation indicates a progressive decrease in the mitotic frequency following increased periods of treatment, as compared to the control. When the rats were permitted to recover, the mitotic frequency gradually increased to the normal level in about 5

TABLE I

Mitotic frequency in treated and control animals

Period (hr)	Total cells	Cells in metaphase	Percentage
Control	1020	59	5·8
24	1496	57	3·87
48	1524	36	2·36
72	1647	56	3·33
96	2280	37	1·62
Recovery			
72	1400	34	2·42
96	1000	39	3·90
110	1000	47	4·70

days (Table I). Thus, the effect of the chemical appears to be initially on the divisional stages, leading to a reduction in the number of cells entering the divisional cycle, following prolonged periods of treatment.

The principal aberrations recorded were the formation of diplochromatids, stickiness, clumping and pulverization of the chromosomes. A few cases of ring chromosomes were also recorded. The structural alterations included chromosome and chromatid breaks, gaps, exchange and rejoining. The effect appears to be mainly on the chromosomes and the chromatids. The frequencies of these aberrations are significantly higher in the treated cells than in the control (Table II). Apparently aberration occurs at the G_1 phase and cells bearing these alterations are lost, as indicated by the observation that the aberration frequency remains the same even after different periods of treatment. On the other hand, the number of abnormal cells drops down almost to the normal level immediately on recovery after 72 hours. Therefore, the action of this chemical obviously is on the chromosomes, leading to cell death. There is no residual effect which would permit the damaged cells to survive for the next divisional cycle. The prolonged treatment apparently causes alterations anew in the consecutive cell generations.

Clastogenic effects of lanthanum chloride were studied on the bone marrow cells of *Rattus norvegicus* by the usual flame drying technique. The action of the chemical is apparently on the G, phase and is non-cumulative in nature.

TABLE II

Clastogenic effects of lanthanum chloride on bone marrow chromosomes

Period (hr)	Total no. of metaphases	Breaks			Gaps			Exchange or rejoining	Others*	Total abnormalities
		Chromosome	Chromatid	Total	Chromosome	Chromatid	Total			
Control	200	5	2	7	1	..	1	..	2	10
24	200	10	3	13	3	1	4	6	11	34
48	200	11	3	14	2	1	3	2	13	32
72	200	8	1	9	..	..	..	4	26	39
96	200	..	..	..	..	..	..	..	47	47
Recovery for										
72	100	4	2	6	..	..	..	1	8	15
96	100	4	..	4	..	..		..	8	12
110	100	4	..	4	1	..	1	..	7	13

* Others include diplochromatids, stickiness, clumping and pulverization of chromosomes.

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