Influence of Partial-body X-irradiation upon the Tissue Mast Cell

Treatment	Days after exposure	Irradiated Area				Shielded Area			
		Mesentery		Skin		Cheek Pouch		Skin	
		No. typical cells*	No. phagocytes**	No. typical cells	No. phagocytes	No. typical cells	No. phagocytes	No. typical cells	No. phagocytes
I. Rat									
600 r	1/6			565	19			507	6
	2			265	155			384	9
1200 r	1/6			396	23			346	4
	2			324	114			349	10
Control				410	4				
II. Hamster									
600 r	3	236	20	318	53	825	14		
	7	246	41	401	16	1205	20		
1200 r	3	298	131	272	64	612	22		
Control		329	9	404	6	569	15		

* No. of cells per 2·028 mm². Average of 4–6 animals/group.
** Fibroblasts and macrophages containing metachromatic material. Also includes a small number of abnormal mast cells.

rather than to some general systemic effect. This finding does not obviate the possibility that the adrenal-pituitary system may add to the irradiation effect.

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Résumé

Diverses hormones sexuelles et pituitaires étaient sans effet sur les labrocytes du mésentère et de la peau du rat. L'irradiation partielle du rat et du hamster provoquait des altérations signifiques dans les tissus irradiés mais était sans effet dans les tissus non irradiés.

[17] With assistance of SALLY T. EGAN.

Haploidy Induced by Radiations in Wheat

Devising suitable techniques for the production of haploids in crop plants has long been an important ambition of plant breeders. For this purpose, delayed pollination, distant hybridization, use of irradiated pollen, and use of different hormones to stimulate parthenogenetic development of seeds have all been tried with varying degrees of success in different crop plants. The frequency of occurrence of haploids was found to be increased by X-ray treatment of pollen in *Triticum monococcum* ($2n=14$) by KATAYAMA[1], and in *T. dicoccum* and *T. persicum* ($2n = 28$) by YEFEIKIN and VASILJEV[2]. KIHARA[3] and SMITH[4] raised the frequency of haploid formation from about 1% to 20% by delaying pollination until 6 or more days after emasculation. During the course of our study on the induction of mutations in bread wheat (*Triticum aestivum* L.; $2n = 42$) by the use of different radiations, we found several haploid plants in some of the irradiated progenies and our observations are summarized in this report.

Treatments found effective in inducing haploidy in bread wheat

Radiation	Dose	Stage of treatment
X-rays	5500 r	Irradiation of inflorescences 2 to 3 days prior to anthesis
S^{35}	10 μc/seed	Soaking dry seeds or germinated seedlings for 48 h
P^{32}	10 μc/seed	Soaking dry seeds or germinated seedlings for 48 h
P^{32}	25 and 50 μc/8 lb of soil	Application of P^{32} to soil in pots prior to the initiation of microsporogenesis in the main tiller

Seeds and seedlings of the bread wheat variety N. P. 809 were treated with different doses of X-rays, P^{32} and S^{35} and the second generation progenies were screened for the occurrence of haploids. The X-ray treatments given were (a) irradiation of dry seeds with 11 000, 16 000, or 22 000 r; (b) irradiation of inflorescences of pot grown plants with 5200 r two to three days prior to anthesis, and (c) irradiation of inflorescences with 5200 r 3–4 days after anthesis. Among these, only the treatment of inflorescences prior to anthesis was effective in inducing haploidy. When the earheads were irradiated 3–4 days after anthesis, a large proportion of the seedlings from the X-rayed earheads had twin and triple embryos. No haploid was found among them and cleavage embryony is apparently responsible for the occurrence of the twin and triple seedlings. Haploids occurred more frequently in the progenies of P^{32} and S^{35} treated plants. The different treatments which gave rise to haploid plants in the second generation are described in the table.

It seems likely that owing to the chromosome structural changes induced by the radiation treatments, a certain

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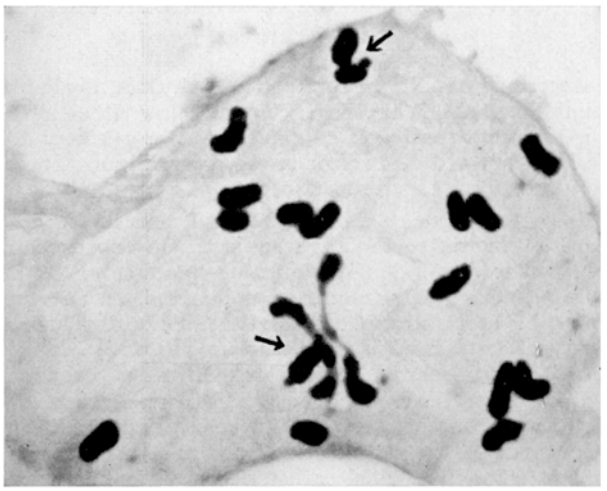
[3] H. KIHARA, Bot. Mag. (Tokyo) *54*, 174 (1940).
[4] L. SMITH, J. agric. Sci. *73*, 291 (1946).

percentage of germinable pollen contained nonfunctional male gametes. The stimulus of pollination provided by such pollen might have induced the parthenogenetic development of the egg cell. The highest frequency of haploids (12 haploids among 9600 plants) occurred when P^{32} was applied to pots at the rate of 50 μc/8 lb of soil just prior to the initiation of microsporogenesis in the main tiller. PERSON[5] also found haploid plants in the progeny of the wheat variety Thatcher treated with P^{32}. The application of internal sources of radiations such as radioisotopes at a suitable stage in the reproductive development of plants may thus prove to be a promising method of inducing haploidy. The optimum dosage and stage of treatment may vary from crop to crop and would have to be worked out separately for each plant species. When X-rays or Cobalt 60 γ rays are used for irradiation, the best results may be obtained when inflorescences are irradiated at the end of microsporogenesis and prior to the completion of the mitotic divisions in the pollen grain.



PMC of a haploid N. P. 809 plant showing 17 univalents and 2 bivalents. Several univalents show s-s associations. Sat. I univalent is attached at the distal end to a bivalent. Sat. II chromosome is also marked by an arrow (magnification × 1400).

An interesting feature of meiosis in haploid plants of *T. aestivum* (technically these are 'poly-haploids') is the occurrence of side to side (s–s), end to end (e–e), and end to side (e–s) associations among univalents or univalents and bivalents besides the formation of regular bivalents. PERSON[5] concluded from a quantitative statistical analysis of the relationship between the number of bivalents and the frequency of occurrence of s–s and e–e associations, that e–e associations arise from accidents in positioning while s–s pairs are caused by chromosome homology. RILEY and CHAPMAN[6] have, on the other hand, expressed the view that s–s, e–e, and e–s associations may all have a similar origin, heterochromatic attraction being the probable causal factor. During a critical study of the types of chromosome associations found in the haploid plants obtained by us, we observed that only localized and specific regions of chromosomes are involved in these associations. Using the satellited chromosomes as markers, it was found that Sat. I chromosome (the longer of the two satellited chromosomes present in the haploid complement of bread wheat) was associated with the other univalents only at the distal region. The associations in which this chromosome was involved were thus always of the e–e or e–s type (Fig.). Sat. II chromosome was not involved in any e–e association. This type of specificity of the associated chromosome segments would support the view of RILEY and CHAPMAN[6] that heterochromatic affinity or some similar cause may be the factor governing the different types of secondary associations observed in poly-haploids of bread wheat.

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Zusammenfassung

Bestrahlung von Weizenähren (*Triticum aestivum* L. Varietät N.P. 809) mit X-Strahlen (5200 r) kurz vor dem Blühen sowie geeignete Behandlung von Topfpflanzen oder Karyopsen der gleichen Pflanze mit P^{32} oder S^{35} erzeugen haploide Formen.

Reversibility of a Facilitatory Action of Reserpine on the Central Nervous System, by Methylamphetamine

Reserpine has been shown to possess a facilitatory action on the maximal tonic-extensor seizure response evoked by electrical- or Metrazol stimulation[1]. This action can be antagonized by various anticonvulsants which augment the depressive action of Reserpine[2]. As Methylamphetamine is an effective antagonist of the sedative action of Reserpine[3], it seemed of interest to determine whether it

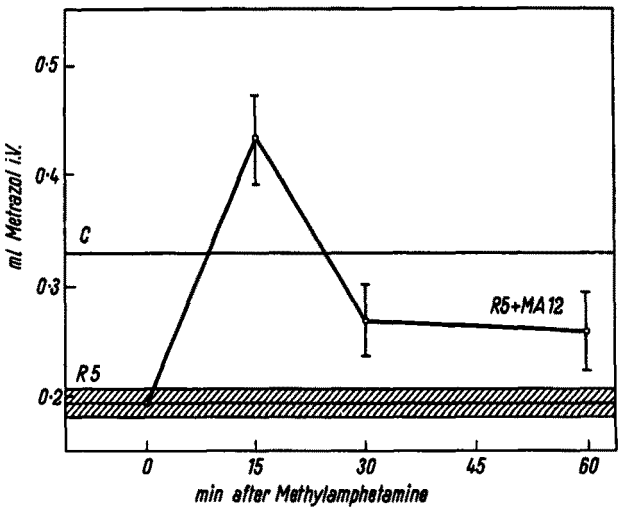

Fig. 1.—*Mean threshold (± s.e.m.) for tonic-extensor seizures on mice induced by Metrazol.* Lines parallel with abscissa indicate average of controls (*C*; $n = 39$), and threshold, 150 min after injection of Reserpin 5 mg/kg (*R5*; $n = 28$); *R5 + MA12* = Reserpin 5 mg/kg, 150 min later Methylamphetamin 12 mg/kg; at various intervals after the latter the Metrazol test followed (for each point $n = 10$). Control values indicated a double peaked frequency distribution.

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