selected by a random manner as controls and half were subjected to 72 thermal shock cycles. The 80 teeth to be shocked were placed in a wire basket and alternately shifted from boiling water to ice water containing much finely cracked ice. Emphasis was placed on producing rapid temperature change in the teeth. The teeth were allowed to come to temperature and after 1 min were transferred rapidly to the other temperature bath. The control teeth were boiled for ¾ hr but were heated and cooled slowly to avoid thermal shock. A test was then made of the resistance of the two groups of teeth to fracturing. After sacrificing a few teeth to explore suitable crushing tests, a final comparison of the teeth was begun. A flat-bottomed 6-lb lead weight block was dropped from a height of 7 in. onto individual teeth as they lay on a hard concrete floor. The drop tests were done in alternating groups of 10 teeth from each large group. Of the control group, 11 out of the 50 broke; of the group given the 72 shock cycles, 21 of the 50 tested broke. The results suggest that thermal shock may promote cracks in teeth. Further work on this aspect of dental effects is indicated.

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Trisomics in Barley

To date relatively few reports have been published on trisomics in common barley, *Hordeum aesitivum* Hall. ($2n = 14$). In his comprehensive review "Cytology and genetics of barley," Luther Smith [*Botan. Rev.* **17,** 1 (1951)] cites only three references dealing with trisomics. A series of trisomics would be extremely valuable in cytogenetic studies of barley. So far none of the seven linkage groups has been definitely identified with a particular chromosome. By means of trisomic inheritance studies, it should be possible to associate genes and linkage groups with specific chromosomes.

Trisomic plants were found in the progeny of three triploid barley plants obtained in the F_2 of intervarietal colchicine-treated F_1 hybrids. The parents of triploid 453-11 were an awnless and a hulless type of an unknown variety name, while triploids 1963-4 and 2223-5 were from a cross between Wong and Herta. Except for partial sterility, the triploids resembled normal diploid sibs in general morphological characters. One triploid was found in the progeny of an F_1 plant that also produced diploids and tetraploids. It probably originated from the union of a haploid with a diploid gamete of the same plant. The other two triploids were found in the progeny of different F_1 plants in which no tetraploids were observed. They were probably derived from intercrossing of wholly diploid plants with plants having tetraploid tillers, since the treated generation was grown in confined greenhouse beds.

Table 1. Fertility of triploids.

Triploid plant	No. of florets	No. of seeds	Fertility (%)
453-11	155	15	9.7
1963-4	509	63	12.4
2223-5	360	41	11.4
Total	1024	119	Avg. 11.6

The fertility of the triploids under open pollination in the field is given in Table 1. A total of 119 seeds was produced for an average fertility of 11.6 percent. Table 2 gives the chromosome constitution of 25 mature plants obtained from 61 of the 119 seeds sown in pots in the greenhouse. Nine diploids, 13 trisomics, and three other chromosomal variants were cytologically identified. The latter three plants included one with 14 chromosomes and a large centric fragment capable of forming a heteromorphic trivalent with two normal homologues, one with 15 chromosomes and an acentric fragment, and a third plant with 16 chromosomes. Since the 16-chromosome plant was identified by mitotic counts of somatic anther tissue, it was not possible to determine whether it was doubly trisomic or tetrasomic.

All trisomic plants and the three other variants were partially self-fertile. The fertility of the trisomics, including a few heads pollinated with normal pollen of diploids, ranged from 20.4 to 66.7 percent. The fertility of the three plants having 14 chromosomes and a centric fragment, 15 chromosomes and an acentric fragment, and 16 chromosomes was 50.7, 37.6, and 23.7 percent, respectively.

Since the trisomic plants were derived from highly heterozygous material, it was not possible to attribute any morphological characteristics to the trisomic condition. However, it is possible that one or more constant morphological characteristics will be observed in the trisomic progeny of the original trisomic plants that are presently being grown in the field. Positive identification of the chromosome involved in each of the trisomic lines may be possible by one or a combination of the following methods: (i) study the morphology of the mitotic chromosome complement of each trisomic line; (ii) backcross each trisomic line to a pure diploid in order to attain homozygosity and then observe the phenotypic effects of the extra chromosome; (iii) cross each homozygous line to the

Table 2. Chromosomal constitution of triploid progeny.

Triploid plant	No. of seeds sown	No. of mature plants		
		Diploid	Trisomic	Other
453-11	11	0	0	0
1963-4	33	8	7	1
2223-5	17	1	6	2
Total	61	9	13	3

seven available linkage testers and make identification on the basis of trisomic ratios.

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Inverse Relationship between the Water Content of Seeds and Their Sensitivity to X-rays

It was early established in radiobiological investigations that seeds with a high water content were more susceptible to x-rays than seeds with a low water content (*1*). A similar relationship has been demonstrated for the ascospores of *Aspergillus terreus* (*2*). These and other such studies have been taken to support the contention that, in addition to being affected by the direct absorption of energy from ionizing radiations, sensitive sites are affected indirectly through the chemical action of active radicals produced in the presence of water (*3*).

If the role of water in the sensitizing of a system to x-radiation is in a large part due to chemical events incited through radical production, it would seem reasonable to assume that in any biological system in which the water content could be varied over rather wide limits, the radiosensitivity of the system would increase with increasing water content. This should be true at least until such time as an optimum production of radical species that could contribute to injury had been produced.

To test this assumption (*4*) seeds were soaked at 3°C for various periods of time from 1½ to 24 hr. Their sensitivity to x-rays, as determined by seedling heights at 7 days, was then compared with that of unsoaked seed. It was found that their water content could be increased from 7 percent of their total weight in the unsoaked seeds to about 20 percent in the soaked seeds before there was an increase in their radiosensitivity. The steeping time required to increase their water content to this level was from 1½ to 3 hr. Increasing the water content of the seeds above 20 percent resulted in a striking increase in radiosensitivity.

These experiments were suggestive of the possibility that water content *per se* may not be responsible for the increased radiosensitivity of seeds with a high water content in comparison with seeds having a low water content. However, it was realized that because of the short periods of soaking required to raise the water content of the seeds to 20 percent, the water may not have been "effectively" distributed in the seed. For this reason it was decided to increase the water content of seeds by permitting them to reach weight equilibrium in desiccators over salt solutions with different vapor pressures. Using this procedure it was possible to obtain the following water contents of different lots of seed: 7, 9, 13, 16, and 24 percent.

When seeds with these water contents were subjected to x-rays it was found that there was an inverse relationship between the water content of the seeds and their radiosensitivity (Fig. 1). This relationship held true for doses of 10,000, 20,000, 30,000, 40,000, and 50,000 r.

It should be pointed out that the seeds with 24 percent water only maintained equal viability to seeds with 7 percent water for a period of about 14 days. However, during the course of these investigations seedling growth studies indicated that the viability of the other seeds used in the study was not affected by the storage conditions.

The question arises whether or not the decreased radiosensitivity that was observed when the water content of the seeds was increased from 7 percent to about 20 percent was due to the physical presence of additional water in the seed or resulted from some other factor(s), possibly those associated with increased metabolic activity. The experimental evidence suggests that the phenomenon observed is directly related to the water content of the seeds, because when seeds with about 16 percent water were desiccated over dry $CaCl_2$, until they contained about 7 percent water, their radiosensitivity increased.

If the modifications in radiosensitivity reported here can be validly attributed to variations in water con-

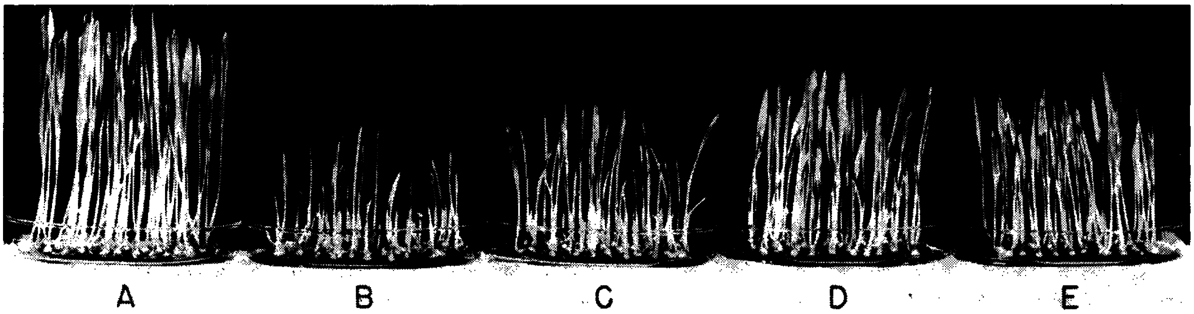

Fig. 1. Seven-day-old seedlings from seeds that reached weight equilibrium at the following relative humidities and were then subjected to 20,000 r of x-rays: (*A*) Control (no treatment); (*B*) 0.0; (*C*) 32.2; (*D*) 52.0; (*E*) 75.0.