their resonance frequencies are close to the maximum of the thermal neutron spectrum of a normal nuclear pile. Further the increase in scattering due to increase in wavelength enhances the intensity of each reflection.

As the signal-to-noise ratio (due to incoherent scattering) in these crystals of large molecules is expected to be low, one has to explore the possibility of measuring the intensity of a large number of reflections simultaneously (like the Phillips-technique[13]). One must also think of extending such unconventional methods as spark-chamber techniques for the measurement of intensities to neutron diffraction.

In view of the immense potentialities of the new method for solving very large structures, it may be worthwhile developing experimental methods for measuring the intensities.

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EXPRESSION AND STABILITY OF AN INDUCED MUTATION FOR EAR BRANCHING IN BREAD WHEAT

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A MUTANT with adventitious branching in the ears simulating that found in nature in *T. turgidum* var. *mirabile* Korn ($2n = 28$) was isolated in 1957 in the M_2 progeny of *T. æstivum* var. N.P. 797 ($2n = 42$) treated with 10 μC. per seed of S^{35}. When originally isolated, the mutant had ears in which the upper part was normal and a few of the lower notches of the rachis produced a pair of spikelets placed side by side and arranged at right angles to those of the normally placed single spikelets above. The mutant had about 15% pollen sterility and 30% seed sterility and gave rise to plants with both normal and branched ears, when seeds were sown from open pollinated heads. The proportion of plants with branched ears in open-pollinated progenies ranged from 9 to 54% in different years. Plants with normal ears isolated in the progeny of the branched ear mutant also produced plants with the mutant ear phenotype, the percentage of such plants varying from 4 to 16 in different progenies. On selfing, the branched ear mutant bred true and in succeeding generations the penetrance of this gene showed remarkable enhancement. During 1964-65, the progenies of selected plants had ears with branches at nearly all the rachis nodes (Fig. 1). The secondary ears, however, varied in number, length and development in the different tillers of the same plant, the maximum expression of this character being usually found in the mother shoot and the first two to three tillers.

Meiosis was regular in the true breeding branched ear mutant, the mean number of chiasmata per bivalent at M_1 being 2·3, a value similar to that of control. On an average, the ears of the mutant had, during 1964-65, 87·6 spikelets per ear, the comparable value in the parent strain, N.P. 797, being 36. The mutant had the same maturity period as N.P. 797 but was, however, dwarf (an average height of 97·9 cm. in contrast to 126·5 cm. of normal N.P. 797). The dwarf nature was always associated with the ear branching habit, the plants with normal ears in the progeny of the open-pollinated branched ear mutant being always tall. The variety N.P. 797 is apically awnletted but branched ear mutants with both the parental type of awning as well as well-developed awns were isolated. Both these types of mutants have the dwarf habit.

dwarfing gene present in Sonora 63 is different from that of the N.P. 797 branched ear mutant and that a deletion may be responsible for the coincident dwarfing and ear branching found in the N.P. 797 mutant. Differential transmission of the deletion in the pollen and egg cells may cause disturbance in the observed phenotypic ratios.

Plants with branched ears have so far been reported in *Triticum* mostly in derivatives of interspecific or inter-generic crosses.[1,2] Unlike the branched types isolated by Sharman[1] in the *T. æstivum* × *T. turgidum* hybrid, the N.P. 797 branched type was stable, the expression being

FIG. 1. Whole ear and ear without spikelets of (left) N.P. 797 and (right) branched ear mutant of N.P. 797.

Crosses were made in 1963 between the branched ear mutant and Sonora 63, a spring wheat variety with a single gene for dwarfing. The F_1 plants had normal ears and tall habit. There was a prominent heteromorphic bivalent at M-I in the F_1 plants. In the F_2, segregation occurred for ear branching and plant height. About 9% of the F_2 population had branched heads and all plants with ear branching were also dwarf. This suggests that the "Norin"

environment-independent. The dwarf-*cum*-branched ear mutant of N.P. 797 hence offers distinct possibilities for the release for commercial cultivation in the near future of a branched wheat variety capable of giving high yields under favourable agronomic conditions.

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