however, the pair-production peaks and the Compton distributions are not separated but appear simultaneously in the pulse – height distribution.

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[1] Johansson, S. A. E., *Nature*, **165**, 396 (1950). *Arkiv för Fysik*, **2**, No. 18 (1950).
[2] McIntyre, J. A., and Hofstadter, R., *Phys. Rev.*, **78**, 617 (1950).
[3] Pringle, R. W., Roulston, K. J., and Standil, S., *Phys. Rev.*, **78**, 627 (1950).
[4] Hofstadter, R., and McIntyre, J. A., *Bull. Amer. Phys. Soc.*, **25**, 16 (1950).

Haploid Plants of *Solanum demissum*

THE wild hexaploid ($2n = 72$) species *Solanum demissum* Lindl. has been widely used in breeding for blight (*Phytophthora infestans*) resistance in potatoes. Crossed with cultivated *S. tuberosum* varieties (tetraploids with a chromosome number of $2n = 48$) it gives pentaploid ($2n = 60$) hybrids which can be back-crossed by *S. tuberosum*. An alternative method of breeding has been suggested by Black[1]. This consists of crossing *S. demissum* with a diploid ($2n = 24$) species such as *S. Rybinii* to get a tetraploid ($2n = 48$) F_1 hybrid, which is then crossed with *S. tuberosum* varieties. This latter method appears to have much to recommend it, particularly as Thomas[2] states that, in the hybrid *S. demissum* × *S. Rybinii* and in the triple hybrid (*S. demissum* × *S. Rybinii*) × *S. tuberosum*, "chromosome differentiation between these related species is not sufficient to affect pairing to any extent". This presumably means that, at least in the triple hybrid, about twenty-four bivalents are formed at meiosis.

As part of the potato-breeding programme at the Cambridge Plant Breeding Institute, crosses were made between *S. demissum* and diploids such as *S. Rybinii*, and between *S. demissum* and *S. tuberosum*, in order to compare the two methods of breeding. As is shown in the accompanying table, in addition to the normal tetraploid ($2n = 48$) F_1 hybrids, there were obtained plants with chromosome numbers of 60 and 36 from the cross *S. demissum* × diploid. The plants with 60 chromosomes are due to the functioning of diploid (24 chromosome) *S. Rybinii* gametes. The plants with 36 chromosomes are haploid *S. demissum*. They were typically small plants and had smaller and narrower leaflets than normal *S. demissum*. They also remained in the rosette stage much longer than the true F_1 hybrids, and the one plant which has flowered had much smaller flowers than found in normal *S. demissum*. Another haploid *S. demissum* was obtained in the cross of this species with *S. toralapanum* ($2n = 24$).

Meiosis has been examined in one of the *S. demissum* haploids. It is, of course, what Darlington[3] would call a polyhaploid, having three sets of 12 chromosomes each, and it is not, therefore, surprising that a preliminary examination of 19 cells at first metaphase showed on an average a frequency of 4·74 bivalents per cell. The detailed observations were one cell with 2 bivalents, six cells with 3, three cells with 4, two cells with 5, four cells with 6 and three cells with 8 bivalents.

Cross	No. of plants with a chromosome number of 36	48	60
S. demissum × *S. Rybinii* (H.W.H.)	2	10	1
S. demissum × *S. Rybinii* (G.S.B.)	—	4	3
S. demissum × *S. toralapanum* (G.S.B.)	1	2	—
S. demissum × *S. tuberosum* (H.W.H.)	—	—	14

Distant hybridization is a recognized way of obtaining haploids, and it is therefore of interest to note that Dr. K. S. Dodds (see the following communication) has also obtained haploid *S. demissum* plants from hybridizations similar to those reported above.

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[1] Black, W., *Proc. Roy. Soc. Edinb.*, B, **63**, 290 (1949).
[2] Thomas, P. T., Thirty-sixth Annual Report, John Innes Horticultural Institution, 11 (1945).
[3] Darlington, C. D., "Recent Advances in Cytology" (2nd edit., J. and A. Churchill, Ltd., London, 1937).

Polyhaploids of *Solanum demissum*

Solanum demissum Lindl. ($2n = 72$) has been used at the Commonwealth Potato Collection as the maternal parent in various crosses with cultivated and wild diploid species ($2n = 24$) of *Solanum*. The results to date are given in the accompanying table.

Male parent	Number of hybrids	Chromosome numbers
Cultivated species		
S. stenotomum Juz. et Buk.	2	48 (1); 36 (1)
S. goniocalyx Juz. et Buk.	1	48 (1)
S. Phureja Juz. et Buk.	1	48 (1)
S. Ascasabii Hawkes	2	48 (1); 39 (1)
S. Rybinii Juz. et Buk.	9	48 (7); 60 (2)
Wild species		
S. Garcicæ Juz. et Buk.	1	60 (1)
S. Parodii Juz. et Buk.	1	48 (1)
S. platypterum Hawkes	1	48 (1)
S. Ballsii Hawkes	1	48 (1)
S. Soukupii Hawkes	1	48 (1)
S. toralapanum Cárdenas et Hawkes	6	48 (6)

The three pentaploids that occur probably arose by the functioning of unreduced gametes from the male parents.

Two plants are parthenogenetic polyhaploids of *S. demissum*, one with $2n = 36$ and the other with $2n = 39$. They are quite vigorous but are less robust than their maternal parents, and the leaves and flowers are reduced in size. Dr. Margaret A. Keay finds that each polyhaploid behaves to *Phytophthora infestans* as does the particular line of *S. demissum* from which it originated; the balanced one is a complete resister, and the unbalanced one an *AC* resister.

The unbalanced polyhaploid does not form more bivalents at meiosis than the balanced one, despite the fact that it must be disomic for the three extra chromosomes; the former showed a range of 1–8 bivalents (mean bivalents per nucleus = 4·7; 14 cells) and the latter, one of 3–8 bivalents (mean bivalents per nucleus = 5·6; 9 cells). Thus both hybrids give evidence of some intra-haploid homology of their chromosomes.

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