twenty-nine trials. Unfortunately the same thing occurs again with the trifactorial data.

These seven experiments of the first series require, as we have seen, a total of four or five thousand plants in the years 1860 and 1861. Apart from the continuation of heterozygous series they account for only 3000 in 1862 and for 1000 in 1863. The pollinations for his second series of experiments were, therefore, probably carried out in 1861. The large trifactorial experiment could not indeed have been finished had it started later, and, as the factor for white flowers first showed segregation in 1860, it is difficult to place it earlier. The bifactorial experiment took a year less, and might have been started in 1860, since the ripened seeds of 1859 had established the 3 : 1 ratios of the two factors. I shall suppose that both were initiated in 1861, and that the same is true of the important but smaller experiments devoted to determining the gametic ratios.

To 1862, then, are ascribed the fifteen doubly heterozygous plants of the bifactorial experiment, of which the 556 seeds displayed the first 9 : 3 : 3 : 1 ratio reported. All these were sown in 1863, even the thirty-two wrinkled-green seeds, which suggests that in this year space was abundant. (It was, indeed, in this same year that we have supposed Mendel to depart from his usual practice, and repeat the determination of a frequency ratio, at the expense of growing 1000 additional plants. Even with these additions the summary (Table VI) shows 1863 as less crowded than most of the other years.) The plants from these seeds, classified by the seeds they bore, exhibited independent segregation of the two factors. Mendel's classification of the 529 plants which came to maturity is shown in Table I.

TABLE I.—*Classification of Plants grown in the Bifactorial Experiment.*

| | AA. | A*a*. | *aa*. | Total. |
|---|---|---|---|---|
| BB ..... | 38 | 60 | 28 | 126 |
| B*b* ..... | 65 | 138 | 68 | 271 |
| *bb* ..... | 35 | 67 | 30 | 132 |
| Total .... | 138 | 265 | 126 | 529 |

The numbers are close to expectation at all points, but they are not very large. In relation to possible linkage, for example, they may be regarded as excluding, at the 5 per cent. level of significance, recombination fractions less than 44·9 per cent., which is not very strong negative evidence ; yet on this point also Mendel evidently felt that further

data would be superfluous, for he certainly could have obtained many more for the counting. The 138 plants, for example, recorded in the table above as being doubly heterozygous, doubtless bore over 4000 seeds segregating in the 9 : 3 : 3 : 1 ratio, and, even if the bulk of the crop were needed when green, at least ten seeds from each plant must have been allowed to ripen in order to classify the plant on which they grew.

The trifactorial experiment required 24 hybrid plants grown in 1862, which gave 639 offspring in 1863. In order to distinguish heterozygotes from homozygotes among the plants with coloured flowers progenies from at least 473 of these must have been grown. If, as in other cases, Mendel used a progeny of ten plants for such discrimination the experiment must have needed 4730 plants in 1864. Of this experiment Mendel says (p. 335) :

> "Among all the experiments this demanded the most time and trouble ",

and the extent of the third filial generation explains this remark. It was evidently on the completion of this extensive work that Mendel felt that

TABLE II.—*Classification of Plants grown in the Trifactorial Experiment.*

| | CC. | | | | Cc. | | | | *cc.* | | | | Total. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AA. | A*a*. | *aa*. | Total. | AA. | A*a*. | *aa*. | Total. | AA. | A*a*. | *aa*. | Total. | AA. | A*a*. | *aa*. | Total. |
| BB... | 8 | 14 | 8 | 30 | 22 | 38 | 25 | 85 | 14 | 18 | 10 | 42 | 44 | 70 | 43 | 157 |
| B*b* ... | 15 | 49 | 19 | 83 | 45 | 78 | 36 | 159 | 18 | 48 | 24 | 90 | 78 | 175 | 79 | 332 |
| *bb*.... | 9 | 20 | 10 | 39 | 17 | 40 | 20 | 77 | 11 | 16 | 7 | 34 | 37 | 76 | 37 | 150 |
| Total . | 32 | 83 | 37 | 152 | 84 | 156 | 81 | 321 | 43 | 82 | 41 | 166 | 159 | 321 | 159 | 639 |

his researches were ripe for publication. It may have constituted the whole of his experimental work with peas in the last year before his paper was read. Even so, probably this year saw more experimental plants than were grown in any previous year. Since the factor for coloured flowers used in this experiment obscures the cotyledon-colour of unopened seeds, not all of the vast number of seeds borne by these three generations was easily available to supplement the bifactorial and trifactorial data reported, yet even what was easily available must have been much more extensive than any data which Mendel published. Mendel's trifactorial classification of the 639 plants of the second generation is shown in Table II, which follows Mendel's notation, in which *a* stands for *wrinkled* seeds, *b* for *green* seeds, and *c* for *white flowers*.