

Here is a remarkable case: M. Clotzsch⁵⁷ crossed *Pinus sylvestris* and *nigricans*, *Quercus robur* and *pedunculata*, *Alnus glutinosa* and *incana*, *Ulmus campestris* and *effusa*; and the cross-fertilised seeds, as well as seeds of the pure parent-trees, were all sown at the same time and in the same place. The result was, that after an interval of eight years, the hybrids were one-third taller than the pure trees!

The facts above given refer to undoubted varieties, excepting the trees crossed by Clotzsch, which are ranked by various botanists as strongly-marked races, sub-species, or species. That true hybrids raised from entirely distinct species, though they lose in fertility, often gain in size and constitutional vigour, is certain. It would be superfluous to quote any facts; for all experimenters, Kölreuter, Gärtner, Herbert, Sageret, Lecoq, and Naudin, have been struck with the wonderful vigour, height, size, tenacity of life, precocity, and hardiness of their hybrid productions. Gärtner⁵⁸ sums up his conviction on this head in the strongest terms. Kölreuter⁵⁹ gives numerous precise measurements of the weight and height of his hybrids in his comparison with measurements of both parent-forms; and speaks with astonishment of their *statura portentosa*, their "*ambitus vastissimus ac alitudo valde conspicua*." Some exceptions to the rule in the case of very sterile hybrids have, however, been noticed by Gärtner and Herbert; but the most striking exceptions are given by Max Wichura,⁶⁰ who found that hybrid willows were generally tender in constitution, dwarf, and short-lived.

Kölreuter explains the vast increase in the size of the roots, stems, &c., of his hybrids, as the result of a sort of compensation due to their sterility, in the same way as many emasculated animals are larger than the perfect males. This view seems at first sight extremely probable, and has been accepted by various authors;⁶¹ but Gärtner⁶² has well remarked that there is much difficulty in fully admitting it; for with many hybrids there is no parallelism between the degree of their sterility and their increased size and vigour. The most striking instances of luxuriant growth have been observed with hybrids which were not sterile in any extreme degree. In the genus *Mirabilis*, certain hybrids are unusually fertile, and their extraordinary luxuriance of growth, together with

⁵⁷ Quoted in 'Bull. Bot. Soc. France,' vol. ii., 1855, p. 327.

⁵⁸ Gärtner, 'Bastarderzeugung,' s. 259, 518, 526 *et seq.*

⁵⁹ 'Fortsetzung,' 1763, s. 29; 'Dritte Fortsetzung,' s. 44, 96; 'Act. Acad. St. Petersburg,' 1782, part ii., p. 251; 'Nova Acta,' 1793, pp. 391, 394; 'Nova Acta,' 1795, pp. 316, 323.

⁶⁰ 'Die Bastardbefruchtung,' &c., 1865, s. 31, 41, 42.

⁶¹ Max Wichura fully accepts this view ('Bastardbefruchtung,' s. 43), as does the Rev. M. J. Berkeley, in 'Journal of Hort. Soc.,' Jan. 1866, p. 70.

⁶² 'Bastarderzeugung,' s. 394, 526, 528.