

the antagonistic state, commonly arises from a plethoric condition. On the other hand, extremely poor soil sometimes, though rarely, appears to cause doubleness: I formerly described<sup>101</sup> some completely double, bud-like, flowers produced in large numbers by stunted wild plants of *Gentiana amarella* growing on a poor chalky bank. I have also noticed a distinct tendency to doubleness in the flowers of a *Ranunculus*, Horse-chestnut, and Bladder-nut (*Ranunculus repens*, *Æsculus pavia*, and *Staphylea*), growing under very unfavourable conditions. Professor Lehmann<sup>102</sup> found several wild plants growing near a hot spring with double flowers. With respect to the cause of doubleness, which arises, as we see, under widely different circumstances, I shall presently attempt to show that the most probable view is that unnatural conditions first give a tendency to sterility, and that then, on the principle of compensation, as the reproductive organs do not perform their proper functions, they either become developed into petals, or additional petals are formed. This view has lately been supported by Mr. Laxton,<sup>103</sup> who advances the case of some common peas, which, after long-continued heavy rain, flowered a second time, and produced double flowers.

*Seedless Fruit.*—Many of our most valuable fruits, although consisting in a homological sense of widely different organs, are either quite sterile, or produce extremely few seeds. This is notoriously the case with our best pears, grapes, and figs, with the pine-apple, banana, bread-fruit, pomegranate, azarole, date-palms, and some members of the orange-tribe. Poorer varieties of these same fruits either habitually or occasionally yield seed.<sup>104</sup> Most horticulturists look at the great size and anomalous development of the fruit as the cause, and sterility as the result; but the opposite view, as we shall presently see, is more probable.

*Sterility from the excessive development of the organs of Growth or Vegetation.*—Plants which from any cause grow too luxuriantly, and produce leaves, stems, runners, suckers, tubers, bulbs, &c., in excess, sometimes do not flower, or if they flower do not yield seed. To make European vegetables under the hot climate of India yield seed, it is necessary to check their growth; and, when one-third grown, they are taken up, and their stems and tap-roots are cut or

<sup>101</sup> 'Gardener's Chronicle,' 1843, p. 628. In this article I suggested the theory above given on the doubleness of flowers. This view is adopted by Carrière, 'Production et Fix. des Variétés,' 1865, p. 67.

<sup>102</sup> Quoted by Gärtner, 'Bastardzeugung,' s. 567.

<sup>103</sup> 'Gardener's Chronicle,' 1866, p. 901.

<sup>104</sup> Lindley, 'Theory of Horticulture,' pp. 175-179; Godron, 'De l'Espèce,' tom. ii. p. 106; Pickering,

'Races of Man;' Galesio, 'Teoria della Riproduzione,' 1816, pp. 101-110. Meyen ('Reise um Erde,' Th. ii. s. 214) states that at Manilla one variety of the banana is full of seeds; and Chamisso (Hooker's 'Bot. Misc.,' vol. i. p. 310) describes a variety of the bread-fruit in the Mariana Islands with small fruit, containing seeds which are frequently perfect. Burnes, in his 'Travels in Bokhara,' remarks on the pomegranate seeding in Mazenderan, as a remarkable peculiarity.