

mutilated.<sup>105</sup> So it is with hybrids; for instance, Prof. Lecoq<sup>106</sup> had three plants of *Mirabilis*, which, though they grew luxuriantly and flowered, were quite sterile; but after beating one with a stick until a few branches alone were left, these at once yielded good seed. The sugar-cane, which grows vigorously and produces a large supply of succulent stems, never, according to various observers, bears seed in the West Indies, Malaga, India, Cochin China, Mauritius, or the Malay Archipelago.<sup>107</sup> Plants which produce a large number of tubers are apt to be sterile, as occurs, to a certain extent, with the common potato; and Mr. Fortune informs me that the sweet potato (*Convolvulus batatas*) in China never, as far as he has seen, yields seed. Dr. Royle remarks<sup>108</sup> that in India the *Agave vivipara*, when grown in rich soil, invariably produces bulbs, but no seeds; whilst a poor soil and dry climate lead to an opposite result. In China, according to Mr. Fortune, an extraordinary number of little bulbs are developed in the axils of the leaves of the yam, and this plant does not bear seed. Whether in these cases, as in those of double flowers and seedless fruit, sexual sterility from changed conditions of life is the primary cause which leads to the excessive development of the organs of vegetation, is doubtful; though some evidence might be advanced in favour of this view. It is perhaps a more probable view that plants which propagate themselves largely by one method, namely by buds, have not sufficient vital power or organised matter for the other method of sexual generation.

Several distinguished botanists and good practical judges believe that long-continued propagation by cuttings, runners, tubers, bulbs, &c., independently of any excessive development of these parts, is the cause of many plants failing to produce flowers, or producing only barren flowers,—it is as if they had lost the habit of sexual generation.<sup>109</sup> That many plants when thus propagated are sterile there can be no doubt, but as to whether the long continuance of this form of propagation is the actual cause of their sterility, I will not venture, from the want of sufficient evidence, to express an opinion.

That plants may be propagated for long periods by buds, without the aid of sexual generation, we may safely infer from this being the case with many plants which must have long survived in a state of nature. As I have had occasion before to allude to this subject, I will here give such cases as I have collected. Many alpine plants

<sup>105</sup> Ingledeu, in 'Transact. of Agricult. and Hort. Soc. of India,' vol. ii.

<sup>106</sup> 'De la Fécondation,' 1862, p. 308.

<sup>107</sup> Hooker's 'Bot. Misc.,' vol. i. p. 99; Galesio, 'Teoria della Riproduzione,' p. 110. Dr. J. de Cordemoy, in 'Transact. of the R. Soc. of Mauritius' (new series), vol. vi. 1873, pp. 60-67, gives a large number of cases of plants which never seed, including

several species indigenous in Mauritius.

<sup>108</sup> 'Transact. Linn. Soc.,' vol. xvii. p. 563.

<sup>109</sup> Godron, 'De l'Espèce,' tom. ii. p. 106; Herbert on Crocus, in 'Journal of Hort. Soc.,' vol. i., 1846, p. 254: Dr. Wight, from what he has seen in India, believes in this view; 'Madras Journal of Lit. and Science,' vol. iv., 1836, p. 61.