

rinderpest, if placed in the blood of a healthy ox, increases so fast that in a short space of time "the whole mass of " blood, weighing many pounds, is infected, and every small " particle of that blood contains enough poison to give, " within less than forty-eight hours, the disease to another " animal."

The retention of free and undeveloped gemmules in the same body from early youth to old age will appear improbable, but we should remember how long seeds lie dormant in the earth and buds in the bark of a tree. Their transmission from generation to generation will appear still more improbable; but here again we should remember that many rudimentary and useless organs have been transmitted during an indefinite number of generations. We shall presently see how well the long-continued transmission of undeveloped gemmules explains many facts.

As each unit, or group of similar units, throughout the body, casts off its gemmules, and as all are contained within the smallest ovule, and within each spermatozoon or pollen-grain, and as some animals and plants produce an astonishing number of pollen-grains and ovules,<sup>48</sup> the number and minuteness of the gemmules must be something inconceivable. But considering how minute the molecules are, and how many go to the formation of the smallest granule of any ordinary substance, this difficulty with respect to the gemmules is not insuperable. From the data arrived at by Sir W. Thomson, my son George finds that a cube of  $\frac{1}{10000}$  of an inch of glass or water must consist of between 16 million millions, and 131 thousand million million molecules. No doubt the molecules of which an organism is formed are larger, from being more complex, than those of an inorganic substance, and probably

<sup>48</sup> Mr. F. Buckland found 6,867,840 eggs in a cod-fish ('Land and Water,' 1868, p. 62). An *Ascaris* produces about 64,000,000 eggs (Carpenter's 'Comp. Phys.,' 1854, p. 590). Mr. J. Scott, of the Royal Botanic Garden of Edinburgh, calculated, in the same manner as I have done for some British Orchids ('Fertilisation of Orchids,' p. 344), the number of

seeds in a capsule of an *Acropera* and found the number to be 371,250. Now this plant produces several flowers on a raceme, and many racemes during a season. In an allied genus, *Gongora*, Mr. Scott has seen twenty capsules produced on a single raceme; ten such racemes on the *Acropera* would yield above seventy-four millions of seed.