continue multiplying without being modified by their union with free gemmules of any kind, is probable from such cases as that of the spur of a cock which grew to an enormous size when grafted into the ear of an ox. How far units are modified during their normal growth by absorbing peculiar nutriment from the surrounding tissues, independently of their union with gemmules of a distinct nature, is another doubtful point.[51] We shall appreciate this difficulty by calling to mind what complex yet symmetrical growths the cells of plants yield when inoculated by the poison of a gall-insect. With animals various polypoid excrescences and tumours are generally admitted[52] to be the direct product, through proliferation, of normal cells which have become abnormal. In the regular growth and repair of bones, the tissues undergo, as Virchow remarks,[53] a whole series of permutations and substitutions. "The cartilage cells may "be converted by a direct transformation into marrow-cells, "and continue as such; or they may first be converted into "osseous and then into medullary tissue; or lastly, they may "first be converted into marrow and then into bone. So "variable are the permutations of these tissues, in themselves "so nearly allied, and yet in their external appearance so "completely distinct." But as these tissues thus change their nature at any age, without any obvious change in their nutrition, we must suppose in accordance with our hypothesis that gemmules derived from one kind of tissue combine with the cells of another kind, and cause the successive modifications.

We have good reason to believe that several gemmules are requisite for the development of one and the same unit or cell; for we cannot otherwise understand the insufficiency of a single or even of two or three pollen-grains or spermatozoa. But we are far from knowing whether the gemmules of all the units are free and separate from one another, or whether some are from the first united into small aggregates.

[51] Dr. Ross refers to this subject in his 'Graft Theory of Disease,' 1872, p. 53.

[52] Virchow, 'Cellular Pathology,' trans. by Dr. Chance, 1860, pp. 60, 162, 245, 441, 454.

[53] Ibid., pp. 412–426.