

been kept during many centuries closely confined, emerge from their cocoons with their wings distorted, incapable of flight, often greatly reduced in size, or even, according to Quatrefages, quite rudimentary. This condition of the wings may be largely owing to the same kind of monstrosity which often affects wild Lepidoptera when artificially reared from the cocoon; or it may be in part due to an inherent tendency, which is common to the females of many Bombycidæ, to have their wings in a more or less rudimentary state; but part of the effect may be attributed to long-continued disuse.

From the foregoing facts there can be no doubt that with our anciently domesticated animals, certain bones have increased or decreased in size and weight owing to increased or decreased use; but they have not been modified, as shown in the earlier chapters, in shape or structure. With animals living a free life and occasionally exposed to severe competition the reduction would tend to be greater, as it would be an advantage to them to have the development of every superfluous part saved. With highly-fed domesticated animals, on the other hand, there seems to be no economy of growth, nor any tendency to the elimination of superfluous details. But to this subject I shall recur.

Turning now to more general observations, Nathusius has shown that with the improved races of the pig, the shortened legs and snout, the form of the articular condyles of the occiput, and the position of the jaws with the upper canine teeth projecting in a most anomalous manner in front of the lower canines, may be attributed to these parts not having been fully exercised. For the highly-cultivated races do not travel in search of food, nor root up the ground with their ringed muzzles.<sup>22</sup> These modifications of structure, which are all strictly inherited, characterise several improved breeds, so that they cannot have been derived from any single domestic stock. With respect to cattle, Professor Tanner has remarked that the lungs and liver in the improved breeds "are found to be considerably reduced in size when compared "with those possessed by animals having perfect liberty;"<sup>23</sup>

<sup>22</sup> Nathusius, 'Die Racen des Schweines,' 1860, s. 53, 57; 'Vorstudien . . . Schweineschädel,' 1864, s. 103, 130, 133. Prof. Lucae supports and extends the conclusions of Von

Nathusius: 'Der Schädel des Maskenschweines,' 1870.

<sup>23</sup> 'Journal of Agriculture of Highland Soc.,' July, 1860, p. 321.