Variations of Organs

My father finds that in his letter, published in your number for September 25, he did not give sufficient credit to my hypoethical explanation of how useless organs might diminish, and ultimately disappear. I therefore now send you, with his approval, the following further explanation of his meaning.

If one were to draw a vertical line on a wall, and were to measure the heights of several thousand men of the same race against this line, recording the height of each by driving in a pin, the pins would be closely clustered about a certain height, and the density of their distribution would diminish above and below.

One of the experiments of my father could be compared with this. He has noted that the density of the pins at any distance above the centre of the cluster was equal to that at a like distance below; he also found that the law of diminution of density on receding from the cluster was given by a certain mathematical expression, to which, however, I need here make no reference, as it is not of much use to us in considering the circumference of the chest; and one may assume, with some confidence, that under normal conditions, the variation of any organ in the same species may be symmetrically grouped about a centre of greatest density, as above explained.

In what follows I shall, for the sake of brevity, speak of the horns of cattle, but it will be understood that my father considers a like argument as applicable to the variations of any organs of any species in size, weight, colour, capacity for performing a function, &c.

Supposing then that a race of cattle becomes exposed to unfavourable conditions, my father's hypothesis is that, whilst the larger proportion of the cattle have their horns developed in the same degree as though they had enjoyed favourable conditions, the remainder have their horns somewhat stunted. Now, if we had made a record of the length of horn in the same species under favourable conditions, we should, as in the case of the heights of men, have a central cluster, with a symmetrical distribution of the pins above and below the cluster. According to the hypothesis, the effect of the poor conditions may be represented by the removal of a certain proportion of the pins, taken at hazard, to places lower down, whilst the rest remain in statu quo. By this process the central cluster will be shifted, with its upper edge being made slightly denser, whilst its lower edge will become less dense; and further, the density of distribution will diminish more rapidly above than below the new central cluster.

Now, if horns are useful organs, the cattle with shorter horns will be partially weeded out by natural selection, and will leave fewer offspring; and after many generations of the new conditions, the symmetry of distribution of the pins will be restored by the weeding out of some of those below the cluster, the central cluster itself remaining undisturbed.

If, on the other hand, horns are useless organs, the cattle with stunted horns have as good a chance of leaving offspring (who will inherit their peculiarity) as their long-horned brothers. Thus, after many generations of the poor conditions, the intercrossing of all the members, the symmetry of distribution will be again restored, but it will have come about through the general removal of all the pins downwards, and this will of course have shifted the central cluster.

In either case, the poor conditions produce a continuous tendency to a stunting of the nature above described, there will be two operations going on side by side—the one ever destroying the symmetry of distribution, and the other ever restoring it through the shifting of the cluster downwards.

Thus, supposing the hypothesis to be supported by facts (and my father intends to put this to the test of experiment next summer), there is a tendency for useless organs to diminish and finally disappear, besides those arising from disease and the economy of nutrition.

Down, Beckenham, Oct. 4

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