for both would almost certainly inherit different characters from their distinct progenitors; and organisms already differing would vary in a different manner. Natural selection cannot possibly produce any modification in a species exclusively for the good of another species: throughout nature one species incessantly takes advantage of, and profits by, the structures of others. But natural selection often produces structures for the direct injury of other animals, as in the fang of the adder, and in the ovipositor of the ichneumon, by which its eggs are deposited in the living bodies of other insects. Natural selection will never produce in a being any structure more injurious than beneficial to that being, for natural selection acts solely by and for the good of each.

Species at any one period are not indefinitely variable, and are not linked together by a multitude of intermediate gradations, partly because the process of natural selection is always very slow, and at any one time acts only on a few forms; and partly because the very process of natural selection implies the continued supplanting and extinction of preceding and intermediate gradations. An intermediate variety usually exists in less numbers than the two forms which it connects; consequently the latter two during the course of further modification, from existing in greater number, will have a great advantage over the less numerous intermediate variety, and will thus generally succeed in supplanting and exterminating it. Natural selection will modify the structure of the young in relation to the parent, and of the parent in relation to the young. In social animals it will adapt the structure of each individual for the benefit of the whole community, if the community profits by the selected change. In two beings widely remote from each other in the natural scale, organs serving for the same purpose and in external appearance closely similar may have been separately and independently formed; but when such organs are closely examined, essential differences in their structure can almost always be detected; and this naturally follows from the principle of natural selection. On the other hand, the common rule throughout nature is infinite diversity of structure for gaining the same end; and this again naturally follows from the same great principle.

As Huxley and Haeckel have shown, the only feasible manner of arranging the animal kingdom is in a number of diverging or branching lines, like the boughs and twigs of a tree. Starting from the amœba and its kindred, which are are neither animal nor vegetal in character, we encounter two diverging lines of development represented respectively—according to Hackel—by those protists with harder envelopes which are the predecessors of the vegetable kingdom, and those with the softer envelopes which are the forerunners of the more mobile animal type of organization. Confining our attention to animals, we meet first with the cœlenterata, including sponges, corals, and medusæ, characterized by the union of masses of amœba-like units, with but little specialization of structure or of function. Beside these lowly forms, but not immediately above any one of them, we find echinoderms starting off in one direction, worms or annuloida in a second, and molluscoida in a third. Following the first road, we stop short at echinoderms. But in the second, we find annuloid worms succeeded by articulata, or true annulosa, which re-diverge in sundry directions, reaching the greatest divergence from the primitive forms in the crabs, spiders, and ants. On the third road, we find the mulluscoid worms, diverging into mollusks, and, as some think, into vertebrates. Through the bryozoa we are gradually led to the true mollusk, while the tunicata, of which the ascidian or "pitcher" is the most familiar form, leads, as is held by some naturalists, directly to the vertebrates. By others, however, the vertebrates are regarded, not as being derived from the molluscoida, but as constituting a fourth independent divergence from the primitive forms; the four great kingdoms of the animal world, the radiata, articulata, mollusca, and vertebrata, being separate offshoots from the original basis of animal life.

Now, from first to last, the farther we trace any one line of development, the more widely we find it diverging from other lines which originated in the same point. The higher insects and crustaceans are not at all like worms; but the myriapoda, the lower crustaceans, and the caterpillars of higher insects, are like worms. Viewed at the upper end of the scale, the mollusks are widely different from the vertebrates: viewed at the lower end, the difference almost vanishes. In the man and the oak we get perhaps the widest possible amount of divergence between organisms; yet, at the bottom of the animal and vegetable kingdoms, we find creatures like the amœba and protococcus, which cannot be classified as either animal or vegetal, because they are as much one as the other. The monotremata, of all mammals the least remote from reptiles and birds, are at the same time the oldest. Far back, in secondary times, we find lizards strongly resembling fishes, and other saurian creatures which differ little from birds.

The embryonic development of organisms furnishes a strong proof of the genetic connection of races and species, and the derivative descent of higher from lower forms. At the outset the germs of all animals are exactly like each other; but in the process of development each germ acquires first the differential characteristics of the sub-kingdom to which it belongs, then successively, the characteristics of its class, order, family, genus, species, and race. For example, the germ-cell of a man is not only indistinguishable from the germ cell of a dog, a chicken, or a tortoise, but it is like the adult form of an amœba or a protococcus, which are nothing but simple cells. Four weeks after conception, the embryos of the man and dog can hardly be distinguished from each other, but have become perceptibly different from the corresponding embryos of the chicken and the tortoise. At eight weeks a few points of difference between the dog and man become perceptible; *the tail is shorter in the human embryo*, for one thing; but these differences are less striking than those which separate the two mammals on the one hand from the reptile and birds on the other. At a later stage the human embryo becomes still more unlike the dog, acquiring characteristics peculiar to the order of primates to which man belongs. Lastly the fœtus of civilized man, at seven months, is entirely human in appearance, but still has not thoroughly acquired the physical attributes which distinguish the civilized man from the Australian or the negro.

Not only is this principle exemplified in the vertebrates, but in the other animal kingdoms as well,—in the radiates, mollusks, and articulates. The higher species of each during their embryonic development, successively resemble the lower orders of their type of animality. An insect passes through phases wherein it can scarcely be distinguished from a worm: echinoderms in their earlier stages resemble the adult acaliphs (jelly-fish) and also polyps (corals, sea anemones, etc.); in short, as Agassiz tells us, every animal belonging to any of the higher groups, during the transformation by which it reaches the adult stage, passes through modified conditions, in each of which it resembles some being of its own type of the animal kingdom.

The facts of morphology are equally significant. Why, unless through common inheritance, should all the vertebrata be constructed on the same type? Structurally considered, man, elephant, mouse, ostrich, humming-bird, tortoise, snake, frog, crocodile, halibut, herring, and shark, are but different modifications of one common form. What can be more curious than that the hand of a man, formed for grasping, that of a mole for digging, the leg of a horse, the paddle of the porpoise, and the wing of the bat, should all be constructed on the same pattern, and should include similar bones, in the same relative situations? Externally there is but little resemblance between the human hand and the hoof of a horse; yet anatomy shows that the horse's hoof is made up of claws or fingers firmly soldered together. Turning to the annulosa, we find that all insects and crustaceans—dragon-flies and mosquitoes as well as crabs and shrimps—are composed of just twenty segments. What can be the meaning of this community of structure among these hundreds of thousands of species filling the air, burrowing in the earth, swimming in the water, creeping about among the sea-weed, and having such enormous differences of size, outline, and substance, that no community would be suspected between them? Why, under the down-covered body of the moth and under the hard wing-cases of the beetle, should there be discovered the same number of divisions as in the calcareous frame-