

have probably preserved for us several distinct steps in the evolution of our horses and donkeys. One solid hoof on each foot gives unarmed herbivorous animals of their peculiar habits the best possible chance in the struggle for life; and so towards the development of this one hoof they have been slowly verging ever since eocene times, by the gradual enlargement of the central toe, and the gradual suppression of all the rest. They have no horns like the bison and the buffalo; but by their swiftness and sureness of foot wild horses are able easily to hold their own against all carnivorous enemies on the grassy pampas of South America, as zebras do on the great South African plateau, and onagers on the broad steppes of Central Asia.

Most people, however, do not know that *pari passu* with this development of a special form of hoof adapted to the free roaming existence of the horse tribe there has gone on a constant increase in the relative size and weight of the brain. Our comparative anatomists as a rule naturally attach most importance to the development of the bony skeleton, and especially of those parts which are most characteristic of families and genera. Psychology is a subject that interests them comparatively little. Hence we lay-readers are apt to get rather surfeited with descriptions of changes in the supra-condyloid foramen or the lateral ethmoid, about which the world at large is culpably indifferent: while we hear hardly anything as to the evidences of mental development, about which the world at large feels a much more genuine interest. As a matter of fact, in the pedigree of the horse and the donkey there is abundant proof of such progress. The brain of the evolving horse tribe goes on increasing (as we judge from the skulls) with every advance in structure through tertiary times, not only absolutely as the whole animal grows bigger, but relatively also in proportion to the other parts. Indeed, there has been a regular in-

crease in intelligence and brain-power among all the mammalia from the moment of their first appearance upon the earth till the present time.

Such an increase naturally results from the very conditions of evolution. Not only the strongest and the physically best adapted have survived in the long run, but the cleverest and the shiftiest as well. All very early mammals, discovered sparsely in the secondary formations, have extremely small and ill-developed brains. All surviving isolated archaic forms, preserved in special and long insulated areas, far from the fierce competition of higher types, as is the case with the marsupials of Australia, the low lemuroid animals of Madagascar, and the edentates of South America, have brains hardly better than these primitive species. All ancient types which still linger on as burrowers or nocturnal prowlers in the great continents, like our own moles and shrews and hedgehogs, have also a very low grade of intelligence, and a very poorly developed brain; but, as we rise toward the summit of each great specialized and differentiated line of modern mammals, we find a constant increase in intelligence and brain-power, exactly analogous to that which we can trace historically in the horse tribe. The central and least developed forms, like the rodents and still more the insectivores, are comparatively stupid and helpless; but the highly adapted creatures which represent the final outcome of the main divergent branches—such as the ungulates, the carnivores, and the quadrumana—are all remarkable for their exceptional intelligence. Of these crowning species, the horse and the donkey stand at the head of their own line, just as man stands at the head of the quadrumana, or as the elephant and the tiger stand at the head of their special genealogical trees. So that the donkey really cannot well avoid being an extremely clever brute. Not quite so clever, to be sure, as the higher monkeys and the elephants; for, as Mr. Herbert Spencer has