THE

PRINCIPAL FORMS

OF THE

SKELETON

AND OF THE

TEETH.

BY

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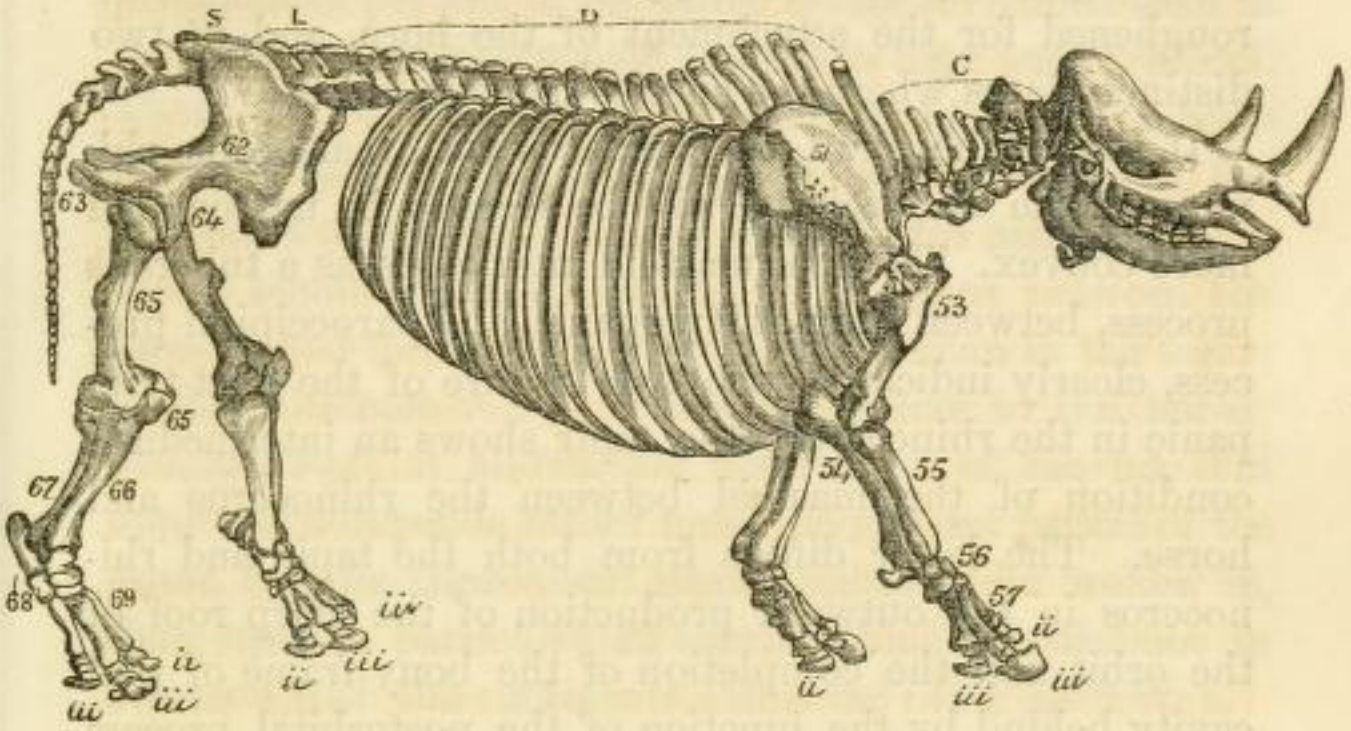
which they are therein inserted becomes more favorable for their force; the longer, therefore, and the more horizontal the pelvis, the better the hind-quarter of the horse, and its qualities for swiftness and maintenance of speed depend much on the "good point" due to the development of this part of the skeleton. The femur, 65, is characterized by a third trochanter springing from the outer part of the shaft before the great trochanter. There is a splint-shaped rudiment of the proximal end of the fibula, 67, but not any rudiment of the distal end. The tibia, 66, is the chief bone of the leg. The heel-bone, "calcaneum," is much produced, and forms what is called the "hock." The astragalus is characterized by the depth and obliquity of the superior trochlea, and by the extensive and undivided anterior surface, which is almost entirely appropriated by the naviculare. The external cuneiforme is the largest of the second series of tarsals, being in proportion to the metatarsal of the large middle digit, *iii*, which it mainly supports. The diminished cuboides articulates partly with this, partly with the rudiment of the metatarsal corresponding with that of the fourth toe, *iv*. A similar rudiment of the metatarsal of the toe, corresponding with that of the second, *ii*, articulates with a cuneiforme medium—here, however, the innermost of the second series of tarsal bones.

Of all the other known existing hoofed quadrupeds, it would hardly be anticipated that the rhinoceros presented the nearest affinity to the horse; one might rather look to the light camel or dromedary; but a different modification of the entire skeleton may be traced in the animals with toes in even number, as compared with the horse and other odd-toed hoofed quadrupeds. In an extinct kind of horse (*Hippopotherium*), the two splint-bones are more developed,

and each supports three phalanges, the last being provided with a diminutive hoof. In the extinct *Palæotheria*, the outer and inner digits acquired stronger proportions, and

Fig. 29.



SKELETON OF THE RHINOCEROS (*Rh. bicornis*).

the entire foot was shortened. The transition from the *Palæotheria*, by the extinct hornless rhinoceros (*Acerotherium*), to the existing forms of rhinoceros, is completed. In the skeleton of the rhinoceros, we find resemblances to the horse in the number of the dorsal vertebræ, in the third trochanter of the femur, and in the number of digits on each foot, albeit the two that are hidden and rudimental in the swifter quadruped are here made manifest in their full development: the concomitant shortening of the whole foot, and strengthening of the entire limbs, accord with the greater weight of the body to be supported, clad as it is with a coat-armor of thickened tuberculated hide: the broader feet, terminated each by three hoofs, afford a better basis of support in the swampy localities affected

by the rhinoceros. Both scapulæ and iliac bones are of greater breadth, and less length. The ulna is fully developed in the fore-limb, and the fibula in the hind-leg; but there is no power of rotation of the fore-limb in any hoofed quadruped. The upper surface of the skull is roughened for the attachment of the horn, and in two distinct places where the species has two horns.

If the equine skull be compared with that of the rhinoceros, the basioccipital will be seen to be narrow and more convex. The true mastoid intervenes, as a tuberous process, between the post-tympanic and paroccipital process, clearly indicating the true nature of the post-tympanic in the rhinoceros; the tapir shows an intermediate condition of the mastoid between the rhinoceros and horse. The latter differs from both the tapir and rhinoceros in the outward production of the sharp roof of the orbit and the completion of the bony frame of that cavity behind by the junction of the postorbital process with the zygoma. The temporal fossa, so defined, is small in proportion to the length of the skull: the base of the postorbital process is perforated by a superorbital foramen. The lachrymal canal begins by a single foramen. The premaxillaries extend to the nasals, and shut out the maxillaries from the anterior aperture of the nostrils. The chief marks of affinity to other odd-toed hoofed beasts (*Perissodactyles*) are seen in the shape, size, and formation of the posterior aperture of the nostrils, the major part of which is bounded by the palatine bones, of which only a small portion enters into the formation of the bony palace, which terminates behind opposite the interspace between the penultimate and last molars. A narrow groove divides the palato-pterygoid process from the socket of the last molar, as in the tapir and rhinoceros. The pterygoid process has but little antero-posterior ex-

tent: its base is perforated by the ectocarotid canal. The entopterygoids are thin plates, applied like splints over the inner side of the squamous suture between the pterygoid processes of the palatines and alisphenoids. The postglenoid process in the horse is less developed than in the tapir. The Eustachian process is long and styliform. There is an anterior condyloid foramen, and a wide "fissura lacera." The broad and convex bases of the nasals articulate with the frontals a little behind the anterior boundary of the orbits. The space between the incisors and molars is of greater extent than in the tapir; a long diastema is not, however, peculiar to the horse; and, although it allows the application of the bit, that application depends rather upon the general nature of the horse, and its consequent susceptibility to be broken in, than upon a particular structure which it possesses in common with the ruminants and some other herbivora.

The tapir and the rock cony have four digits on each fore-foot, and three digits on each hind-foot; but they resemble more the horse and rhinoceros than any other *Ungulata*. If the osteological characters of the hoofed animals with the hind digits in uneven number be compared together, they will be found to present, notwithstanding the differences of form, proportion, and size presented by the rhinoceros, hyrax, tapir, and horse, the following points of agreement, which are the more significative of natural affinity when contrasted with the skeletons of the hoofed animals with digits in even number. Thus, in the odd-toed or "perissodactyle" ungulates, the dorso-lumbar vertebræ differ in different species, but are never fewer than twenty-two; the femur has a third trochanter, and the medullary artery does not penetrate the fore part of its shaft. The fore part of the astragalus