tail; the ischia usually meet in a ventral ischial symphysis, from which a cartilage or bone projects backward to support the anterior lip of the eloacal orifice ; this is the *hypoischium,* a structure which is traceable throughout the Verte- brata to man (see fig. 31).

The hypoischium and epipubis are parts of a cartilaginous pelvic sternum, the former representing are xiphisternum and the latter the episternum of the shoulder girdle (see F. G. Parsons, “ Epi­physes of the Pelvis,” *J. Anal, and Phys.* vol. xxxvii. p. 315). The pubis may or may not form a symphysis ; occasionally it is double and then a pre- and post­pubis are recognized.

In birds the ilium extends for­ward and backward, and is fused with the vertebral column, as has been noticed in section *Axial* of this article. The ischia and pubes do not form a symphysis except in the struthious birds (ostrich and rhea). The acetabulum is always perforate.

In mammals the ilium projects forward toward the head, and an ischio-ρubie symphysis is common, though sometimes it is only pubic as in man. In Echidna among the monotremes the acetabulum is perforate as in birds. In the mono- tremes and marsupials part of the external oblique muscle is ossified to form the *marsupial bones* ; these are sometimes regarded as part of the epipubis, though it is more probable that they are merely adaptive strengthenings of the external oblique to support the traction of the pouch. A *cotyloid bone (os acetabuli)* is usually present, at all events in early life, and it often shuts out the pubis from taking any part in the formation of the acetabulum.

The femur is comparatively a very stable bone. Sometimes, especially in the odd-toed ungulates (Perissodaetyla), the gluteal ridge forms a large third trochanter, while in most mammals, though not in ungulates, there are two sesamoid bones, called fabellae, developed in the gastrocnemius just above the condyles.

The patella first appears in the reptiles, though it is not present in all of them. Most of the Lacertilia show it as a small sesamoid structure in the quadriceps extensor tendon. It is present in all birds and mammals, with the, exception of some bats. In most marsupials it remains cartilaginous throughout life.

The tibia and fibula fuse in the Anura and also in some mammals *(e.g.* rodents). The fibula is often nearly or quite suppressed in birds and mammals, while in birds the tibia fuses with the proximal row of tarsal bones, so that the ankle joint is obliterated and a tibio-tarsus formed. In the marsupials the upper end of the fibula is large and may articulate with the femur in certain positions of the knee, but, as a whole, it reaches its maxi­mum development in the Carnivora in the aquatic suborder of which (Pinnipedia) it is as large as the tibia. It is curious that the only epiphysis which occurs in the long bones of birds is in the head of the tibia of the Gallinaceae.

In the tarsus the bones are arranged on the same generalized plan as in the carpus; the proximal row consists of *tibiale marginale, tibiale, intermedium, fibulare* and *fibulare marginale;* the middle row as far as we know only contains one *centrale,* while the distal row has five *distalia.*

It is more difficult to trace the fate of these structures in existing vertebrates than it is with the carpal bones. In man the astragalus probably contains the tibiale, tibiale marginale and intermedium, the latter structure possibly accounting for the occasional *os tri- gonum,* already mentioned in the subsection on embryology. The fibulare and fibulare marginale probably form the calcaneum, though it is unlikely that the epiphysis at the back of that bone represents any integral part of a generalized tarsus. The centrale persists as the navicular, while the three cuneiform represent tarsalia I., II. and III. and the cuboid tarsalia IV. and V., unless V. is suppressed as some believe. Vestiges of a *prehallux* are found in the Cape jumping hare and other rodents, though they are usually more closely connected with the navicular and internal cuneiform than with the bones of the proximal row. The large size of the hallux in man is an adapta­tion to the erect position.

Most of the remarks already made about the metacarpals and phalanges of the hand apply equally to the foot, though there is a greater tendency to reduction of digits in the hind limb than in the fore.

For further details and literature see S. H. Reynolds, *The Vertebrate Skeleton* (Cambridge, 1897); W. Flower and H. Gadow, *Osteology of the Mammalia* (London, 1885); R. Wiedersheim, *Comparative Anatomy of Vertebrates,* adapted by W. N. Parker, (London 1907); C. Gegenbaur, *Vergleich Anat. der Wirbeltiere* (Bd. i.) (Leipzig, 1901).

*Visceral.*

In the lower vertebrates as well as in the embryo of man, a number of cartilaginous or bony arches encircle the mouth and pharynx (anterior part of the food tube), just as hoops encircle a barrel. There is little doubt that, when they first appeared in the history of evolution, all these bars supported gills and bounded gill slits, but in all existing types the first arch has been modified to surround the mouth and to act as both upper and lower jaws, gaining in different animals a more or less complete connexion with the cranium or brain-containing part of the skull. The first of these visceral arches, therefore, is known as the oral or jaw arch and, as has been shown, the muscles in connexion with it are supplied by the fifth nerve (see Muscular System; and Nerve: *Cranial).* The second visceral arch is the hyoid and is accompanied by the seventh or facial nerve. The third visceral or first branchial arch of most writers has the ninth or glosso-pharyngeal for its nerve supply, while the arches behind this are supplied by the vagus or tenth nerve.

It will be seen, on reading the subsections devoted to embry­ology and comparative anatomy, that in man the maxilla, palate, internal pterygoid plate, malar and tympanic bones as well as the ear ossicles, mandible, hyoid bone and thyroid cartilage are developed in connexion with this visceral skeleton. Of these the ear ossicles arc described in the article Ear, the thyroid cartilage in that on the Respiratory System, while the other bones, with the exception of the hyoid, are treated under the head of Skull. It therefore only remains to describe here the hyoid bone of man.

The *hyoid bone,* so called from its likeness to the Greek letter υ, ‘lies in the upper part of the neck in close connexion with the root of the tongue and just above the thyroid cartilage of the larynx. It con­sists of a body across the mid-ventral line and a great and small cornu on each side (see fig. 1).

The *body (basihyal)* is rectangular with its long axis placed hori­zontally; behind it is markedly concave both from above down­ward and from side to side. In front it attaches several muscles, but behind it is smooth and is separated from the thyrohyoid membrane by a bursa. From its upper border this membrane runs downward to the thyroid cartilage. The *great cornua (thyrahyals)* are attached to each side of the body by cartilage until middle life and afterwards by bony union. They curve upward and backward round the side of the pharynx and are laterally compressed. Γo their inner surfaces the thyrohyoid membrane is attached, while their knob-like ends are connected with the superior cornua of the thyroid cartilage by the lateral thyrohyoid ligaments.

The *small cornua (ceratohyals)* are conical structures about a quarter of an inch long attached to the upper part of the body at its junction with the great cornua. It is only in late life that they become united with the body by bony union, if they ever do so. At their apices they are connected with the tips of the styloid pro­cesses by the long stylohyoid ligaments (epihyals).

*Embryology.—*In the early embryo (see Mouth and Salivary Glands) the mandibular processes grow forward on each side of the slit-like stomatodaeum or primitive mouth, and at length join one another in the mid-ventral line. From the proximal part of each of these another process, the maxillary, grows forward (ventrad), only more slowly, to blend with the fronto-nasal process. In each of these processes cartilage is formed in the lower vertebrates, which in the case of the mandible (lower jaw) reaches to the mid-ventral line and