summits into wide plates which articulate by suture with each other and with similarly expanded ribs, to form the carapace.

In Serpents and Iguanas we have a special mode of vertebral interarticulation, over and above that formed by the zygapophyses. The neural arch develops a median anterior prominence with two articular surfaces called the zygosphene, and this fits into a corre­sponding median posterior recess called the zygantrum.

The maximum of complication as regards the interarticulation of dorsal vertebræ is found in the last dorsal of the Great Anteater. There each posterior zygapophysis develops two additional articular surfaces, one on each side of a notch which receives a process from the anterior side of the neural arch of the succeeding vertebra, which process is furnished with two corresponding surfaces. More or less distinct traces of certain additional processes, called met- apophyses and anapophyses, are sometimes present, but these it will be better to notice when describing the lumbar vertebræ, wherein they are more developed.

We find in some Serpents peculiar processes which project down­wards and forwards from the base of the inner side of the transverse processes. We may also find present a long median inferior pro­cess extending vertically from the ventral surface of the centrum and as long as, or longer than, the neural spine of the same vertebra. Such processes are present in many Serpents—especially the poisonous ones—and in such Birds as the Penguin and Cormorant.

*Lumbar Vertebræ.—*These are vertebræ interposed between the dorsal vertebræ and the sacrum; they are generally the largest vertebræ of each vertebral column, but sometimes (as in Bats and Pterodactyles) the cervical vertebræ are yet larger. Lumbar vertebræ are generally to be distinguished in Mammals, in Croco­diles, and in certain Lizards, but not in any Ichthyopsidan.

In Birds lumbar vertebræ are present, but are disguised and hidden by the extent to which the sacral ossification extends for­wards.

There are five lumbar vertebræ in Man, but the number in him is below the average of his class, though some Apes have but four. The Slow Lemur may have nine, the Two-toed Sloth has but three, and the Monotremes but two. These vertebræ are very numerous in the *Cetacea,* but the hinder limit of the lumbar region is more or less difficult to determine in these animals. The transverse processes are generally much longer than those of the dorsal vertebræ, and do not bear either capitular or tubercular arti­cular surfaces.

The processes already spoken of as metapophyses and anapophyses are generally much more developed in the lumbar than in the dorsal vertebræ. The former project forwards from the vicinity of the anterior zygapophyses, and the latter project backwards at a lower level. Both processes are to be detected in the last dorsal and first lumbar vertebræ of Man, but are at their maximum in the Armadillos. In addition, also, to the complexity of articula­tion before described as existing on the last dorsal vertebra of the Great Anteater, we find in that animal’s lumbar region an addi­tional articular surface on each side of each transverse process.

The lumbar vertebræ may be anchylosed together and to other parts of the skeleton, as is the case in Birds.

*Sacral Vertebræ.—*These are distinguished from others, not only by their connexion with the skeleton of the pelvic limbs, but also by their coalescence and a certain degradation in their structure as compared with the trunk and cervical vertebræ. In Man five vertebræ thus coalesce to form the more or less triangular single bone known as the sacrum, but which always shows plain traces of its composite nature. Such coalescence and degradation generally exist in Vertebrates above the *Ichthyopsida,* which possess fully developed limbs. The coalescence of vertebræ is generally less extensive than in Man, though sometimes—as in Birds, some Edentates, and some Reptiles—it is much greater. The sacrum may be composed of as many as ten vertebræ (as in some Arma­dillos) or of twenty (as in the Ostrich), and the lumbar or caudal vertebræ or both contribute to its formation.

In most if not all Mammals the sacral vertebræ—or the more anterior of them—have what are at first distinctly ossified elements in their transverse processes, which elements (like parts before noticed in the cervical vertebræ) are costal in their nature, *i.e*., represent rudimentary ribs, and in Crocodiles and Tailed Amphibians the sacral vertebræ have a distinct rudimentary rib attached to each transverse process. In Birds, however, the vertebræ of the sacrum, which have expanded transverse processes, do not develop these from distinct ossifications.

As regards the extent of connexion between the sacrum and the hip bones, union is more extensive in Man than in most Beasts, or in animals below Birds. Often in Mammals and almost always in Tailed Batrachians it may be confined to a single vertebra ; but ten vertebræ may be involved in this union in Mammals and twenty in Birds.

That the development of the sacrum is not always in proportion to that of the pelvic limbs is proved by the little Lizard *Seps,* in which, in spite of the rudimentary condition of the limbs, there are true sacral vertebræ.

No Fishes have a true sacrum, though, very rarely, as in the Tur­bot, we meet with a kind of false sacrum, formed by the anchylosis of the bodies and ventral spines of the first two caudal vertebræ.

*Caudal Vertebræ.—*The vertebræ of the tail may be as many as 270, as in some Sharks. Amongst Mammals 48 *(Microgale longi∙ caudata}* is the highest number. Man has usually rudimentary caudal vertebræ, completely or partially united so as to form a small conical bone called the coccyx. Its proximal end articulates with the sacrum by its centrum and two small zygapophyses. It has besides two rudimentary transverse processes and two processes representing piers of the absent neural arch. The other vertebræ are destitute of processes and consist but of smaller and smaller vertebral centra. Thus the last vertebra is the very opposite of the first (or atlas), being all centrum, while the atlas has no centrum at all. The coccyx usually becomes anchylosed to the sacrum about or after the middle of life. The caudal region is still more reduced in some Bats, where there may be but two such vertebræ.

In animals provided with numerous coccygeal vertebræ, such vertebræ may be provided with processes and articulations as complex as those of other spinal regions. Transverse processes may be largely developed at the tail root, but almost always thence backwards diminish in extent ; sometimes, however, as in the Armadillo *(Chlamydophorus},* they may increase in size backwards from the tail root. Rarely (as, *c.g.,* in *Menobranchus}* caudal vertebræ may be furnished with two ribs supported by both tubercular and capitular processes. Inferior arches may exist in the form of detached “ chevron bows ” placed beneath the intervals of successive caudal vertebræ, especially towards the tail root. They may be represented by processes or by continuously ossified inferior arches, which may, as in the Flat Fishes, be very prolonged, extend­ing downwards from each centrum as much as the neural arch and spine extend upwards from it.

Birds have generally six or eight, but may have ten, caudal vertebræ, at the end of which is a so-called "ploughshare-bone,” consisting of two or more vertebræ anchylosed together.

The caudal region of the Frog is formed in a very peculiar way. It never consists of distinct vertebræ at any time of life, but is formed by the ossification of the membrane which surrounds the notochord, to which two small neural arches become attached. This structure is called the urostyle.

In Fishes (as in the Perch and Stickleback) there may be a urostyle continuous with the centrum of the last vertebra. Such a urostyle, unlike that of the Frog, is very sharply bent upwards. It is very small and inconspicuous. In other Fishes the hinder part of the notochord may (as in the Salmon) remain unossified and only pro­tected by lateral bony plates, but it is still sharply bent upwards. In a few Fishes (as, *e.g., Polypterus*) the hinder end of the spinal column is not bent upwards. In other Fishes again (as in the Sturgeon and many Sharks) the hinder end of the vertebral column gradually tapers and gradually (not suddenly as in the Perch and Salmon) inclines upwards. In the forms in which the hinder end of the vertebral column bends upwards—whether gradually or suddenly—the arches and processes beneath its hinder end exceed in size those on the dorsal side of it, as also do the fin-rays attached to them. Thus it happens that the part of the caudal fin which is on the ventral side of the gradually or suddenly bent-up part of the spinal column more or less greatly exceeds in size the part on the dorsal side. In those Sea Fishes *(e.g.,* the Sturgeon and many Sharks) in which the upward flexion is gradual and manifest, the ventral part of the caudal fin is evidently the larger, and such a tail is called *heterocercal.* In Fishes in which the hinder end of the spinal column is suddenly bent up and of minute size, so that its real condition is disguised, the caudal fin appears symmetrical and as if the parts dorsal and ventral to the end of the spinal column were equal. Such a condition has been named *homocercal.* Those Fishes in which the spinal column ends without turning upwards, and in which the parts of the caudal fin dorsal and ventral to it are really and not only apparently symmetrical, are said to be *diphycercal.*

*Sternum.—*The breastbone or sternum extends more or less along the middle line of the ventral region of the anterior part of the trunk in all Vertebrates above Fishes, except Serpents and a few other Reptiles.

Almost always it is connected with the more anterior ribs. Its anterior end is distinguished as the manubrium or presternum, and its hinder is called the xiphoid process or xiphisternum—the middle part being the “ body ” or mesosternum. A sternum may exist without ribs, or without forming any cartilaginous or osseous connexion with ribs, as in the *Amphibia.* The plastron of Chelonians might well be supposed to be a great sternum, more especially as the plate-like ribs are connected with it. It appears, however, that this great complex plate does not really include a sternum.