branchiostegal rays were present; scales were absent, except on the caudal lobe.

In the modern Polyodontidae and Acipenseridae, whose first representatives appear in the Eocene, praemaxillaries are absent and the mouth is edentulous (Acipenseridae) or beset with minute teeth (Polyodontidae), the membrane bones of the skull are more irregular and comprise azygous elements, branchiostegal rays are absent, and the body is naked or covered with small ossifications and longitudinal series of bony scutes, whilst the caudal fin is scaled exactly as in the Palaeoniscidae. Barbels are absent in the Polyodontidae.

in the Polyodontidae, represented by one species, the paddle­fish or spoon-bill (*Polyodon folium),* in the Mississippi, Ohio and Missouri rivers of North America, and by another *(Psephurus gladius')* in the Yang-tse-kiang and Hoang Ho rivers of China, the snout is produced into a very long, spatulate *(Polydon)* or sub-conical (*Psephurus)* appendage, apparently useful in stirring up the mud of the thick waters in which these fishes live, and perhaps a tactile organ compensating the very reduced size of the eyes. *Psephurus gladius* is said to grow to a length of 20 ft. The sturgeons (Acipen­seridae) are divided into two genera: *Acipenser,* distributed over the coasts and fresh waters of the temperate parts of the northern hemisphere, and *Scaphirhynchus,* inhabiting North America and Central Asia. About twenty species of *Acipenser* and five of *Scaphirhynchus* are known. The sturgeons are of great value for their flesh, their eggs (caviare) and the isinglass from the air-bladder; several species are migratory, ascending rivers to spawn. The largest species attain a length of 10 to 18 ft.

Sub-order II.—HOLOSTEI

Clavicle proper absent. Ventral fins inserted more or less far back, without or with mere rudiments of endo-skeletal rays; dermal rays of the dorsal and anal fins corresponding to their endo- skeletal supports. Caudal fin of an abbreviate-heterocercal or homocercal type.

Families: Semionotidae, Macrosemiidae, Pycnodontidae, Eugna- thidae, Pachycormidae, Lcpidosteidae, Aspidorhynchidae, Amiidae.

First appear in the Permian with the Semionotidae, become abundant in the Trias, dominant in the Jurassic, begin to decline in the Cretaceous, and from the Eocene to the present day are reduced to the two families Lcpidosteidae and Amiidae, the modern representatives of which inhabit the fresh waters of North America.

In most of the Holostei the scales are bony, rhombic and covered with an enamel-like (ganoine) coating, but there is every gradation between this so-called ganoid type of scaling and the cycloid type exemplified by the Amiidae. Fulcra also disappear in some of the more specialized types. The mouth is always large and toothed, and branchiostegal rays are invariably present; a single gular plate is often present. In the earlier groups the notochord was persistent, with or without annular centra, or with each centrum composed of two elements—pleurocentrum and hypocent rum ; these elements remain distinct and alternate in the caudal region of the Amiidae, whilst in the Lepidosteidae the centra are as fully developed as in most Teleosteans, and opisthocœlous or convexo-concave.

The pike-like genus *Lepidosteus* was abundant in Europe in Eocene and Miocene times, and is now represented by three species in eastern North America, Mexico and Cuba. The largest species reaches a length of 10 ft. *Amia,* the bowfin, of similar geological age, is a much smaller fish, not exceeding 2 ft., from the eastern parts of North America. Its air-bladder is cellular and acts as an accessory breathing organ. It deposits its eggs in a sort of nest, which is protected by the male, who for some time accompanies the swarm of young fry and defends them with great courage.

*Leedsia prablematica,* one of the Pachycormidae from the Oxford day, probably reached a length of 30 ft., and is the largest known Teleostome.

Order IV.—TELEOSTEI

Paired fins non-lobate, the ventrals without baseosts. Mandible suspended from the upper segment of the hyoid arch. Splenial bone absent. Supraoccipital bone present. Heart without muscular conus arteriosus, or with much reduced conus, with one, excep­tionally two, rows of valves. Air-bladder, if present, communi­cating with the dorsal side of the oesophagus or digestive tract, or completely closed.

Sub-order I.—MALACOPTERYGII

Air bladder, if present, with a duct. Opercle well developed. Pectoral arch suspended from the skull; mesocoracoid bone present. Fine without spines, the ventrals abdominal (rarely absent). An­terior vertebrae distinct, without Weberian ossicles.

Families: Pholidophoridae, Archaeomenidae, Oligopleuridae, Leptolepidae, Elopidae, Albulidae, Mormyridae, Hyodontidae, Notopteridae, Osteoglossidae, Pantodontidae, Ctenothrissidae, Phractolaemidae, Saurodontidae, Chirocentridae, Clupeidae, Chani- dae, Salmohidae, Alepocephalidae, Stomiatidae, Gonorhynchidae, Cromeriidae.

Unquestionably the most generalized sub-order, having most in common with the Holostean ganoids. The first four families, of Triassic to Cretaceous age, are so closely connected with these Ganoids that their allocation to the Teleosteans must be regarded as provisional. Some of the Pholidophoridae were flying fishes. The Elopidae and Albulidae are also low forms, traced back to the Cretaceous seas, having points in common with the Ganoids (gular plate in the former, conus arteriosus with two rows of valves in the latter). The Mormyridae are among the most extraordinary fishes, and, like the four families which follow in the above list, confined to fresh waters. Other families, like the Chirocentridae, Clupeidae and Salmonidae, are entirely or partly marine, the two last being of great economic importance. The Alepocephalidae and Stomiatidae arc restricted to the deep sea.

See Anchovy, Herring, Menhaden, Mormyr, Pilchard, Salmonidae, Shad and Sprat.

Sub-order II.—OSTARIOPHYSI

Air-bladder, if well developed, with a duct. Pectoral arch sus­pended from the skull; mesocoracoid bone present. Fins without spines, or dorsal and pectoral with a single spine formed by the co-ossification of the segments of an articulated ray. The anterior four vertebrae strongly' modified, often co-ossified, and bearing a chain of small bones (so-called Weberian ossicles) connecting the air-bladder with the ear.

Families: Characinidae, Gymnotidae, Cyprinidae, Siluridae, Loricariidae, Aspredinidae.

One of the most natural groups of the class Pisces, as demon­strated by Μ. Sagemehl in 1885. The Characinidae are the most generalized, although perhaps not directly derived from the Amiid Ganoids, as believed by Sagemehl; they show great variety of form and dentition, and are confined to Central and South America and Africa. The Gymnotidae, which include the so-called electric eel, are closely related to the Characinidae, and occur only in South America. The largest families are the Cyprinidae and Siluridae. With the exception of a few Siluridae, the Ostariophysi are all fresh-water fishes.

Sub-order III.—SYMBRANCHII

Eel-shaped fishes without paired fins, with the pectoral arch free or suspended from the skull, without mesocoracoid bone, and with the anterior vertebrae distinct, without Weberian ossicles. Gill-openings confluent into a single, ventral slit. Air-bladder absent.

Families: Symbranchidae and Amphipnoidae.

Like the Apodes, which they' resemble in general appearance, these fishes are no doubt derived from some low type with abdominal ventral fins, but whether from the Malacopterygii or the Haplomi we have as yet no data from which to conclude. Inhabitants of the fresh or brackish waters of south-eastern Asia, tropical America, Australia and Tasmania.

In the cuchia, *Amphipnous cuchia,* the gills are much reduced, and a respiratory air-sac extends on each side of the body behind the head, communicating with the gill-cavity.

Sub-order IV.—APODES

Air-bladder, if present, with a duct. Praemaxillary bones absent; the maxillaries, if present, separated on the median line in front by the coalescent ethmoid and vomer. Pectoral arch, if present, not connected with and remote from the skull ; mesocora­coid bone absent. Fins without spines, the ventrals absent. Anterior vertebrae distinct, without Weberian ossicles.

Elongate, serpentiform fishes with naked skin, or with minute scales imbedded in the skin.

Families: Anguillidae, Nemichthyidae, Synaphobranchidae, Sac- copharyngidae, Muraenidae.

A large group of aberrant, degraded fishes, heralded by the Cretaceous genus *Urenchelys,* the most generalized of eels. Mostly' marine, many bathybial; some living principally in fresh water, but breeding in the sea, like the common eel (see articles Eel and MurAENa).

Sub-order V.—HAPLOMI

Air-bladder, if present, with a duct. Opercle well developed. Pectoral arch suspended from the skull; no mesocoracoid bone. Fins usually without, rarely with a few spines; ventrals abdominal, if present. Anterior vertebrae distinct, without Weberian ossicles.

Families: Galaxiidae, Haplochitonidae, Enchodontidae, Esocidae, Dalliidae, Scopelidae, Atepidosauridae, Cetomimidae, Chirothricidae, Kneriidae, Cyprinodontidae, Amblyopsidae, Stephanoberycidae, Percopsidae.

The absence of the mesocoracoid bone distinguishes these fishes from the Malacopterygii, and the presence of a duct to the air- bladder separates them from the Percesoces, to some of which, the Scombresocidae and the Atherinidae, they are linked by the Cypri- nodontidae; whilst the Scopelidae are connected with the Berycidae by the Stephanoberycidae.

The type family of this sub-order is that of the Esocidae or pike, inhabitants of the fresh waters of Europe, northern Asia, and North