first are connected by the Bandaks canal, a fine engineering work giving access from the port of Skien to Dalen at the head of Bandaksvand. From Dalen, which may be reached by road from the railway at Kongsberg (38 miles) a driving road much frequented by travellers runs north-west. It traverses a pre­cipitous wooded gorge, its course in parts hewn out of the rock, and skirts the Börte and Grungedal lakes, follows the Flaathyl river, passes the Vafos and Little Rjukanfos (waterfalls), and Lake Voxli, and culminates at Haukelidsaeter, a station grandly situated among the fjelds at a height of 3085 ft. It rises to the watershed (3715 ft.) and then, leaving the district, descends abruptly with a remarkable winding course to Röldal (58 miles from Dalen), and soon divides, one branch surmounting the Horrebraekke pass and continuing to Odde, the other traversing the beautiful Bratlandsdal. On the Kongsberg-Dalen road is Hitterdal, with a good specimen of the Stavekirke or medieval timber-built church. A divergence from this route may be made by way of Tinsjö to Fosso, where the Maan river forms a fine fall (Rjukanfos) of 415 ft.

**TELEOLOGY** (Gr. τeλos, end), in philosophy and theology, strictly that branch of study which considers “ final causes ” as real principles of explanation, *i.e.* which explains things as existing solely as pre-requisites of the results wrhich they produce. More commonly the term is applied to the doctrine that the universe as a whole has been planned on a definite design, or at least that it tends towards some end. The term has been used very loosely, and its meaning has changed con­siderably. The root idea arises from the analogy of the acts of human beings which are observed to have certain purposes: hence it was natural to assume that the whole sum of existence with its amazing complexity and its orderly progress can be explained only on the assumption of a similar plan devised by a conscious agent. Such a view is essential to any theistic view of the universe which postulates God as the Creator, omniscient and all-good. The modern theory of evolution, on the other hand, has reintroduced a scientific teleology of another type. This is discussed, from the biologist’s point of view, in the article Zoology. Teleology, in this narrower sense, as the study of the adaptation of organic structures to the service of the organisms in which they occur, was completely revolutionized by Darwinism and the research founded on it.

**TELEOSTOMES,** members of the third sub-class of the class Fishes, being all the fishes in which the skull is invested with membrane bones, viz., the Crossopterygians, the Dipnoans, the Ganoids and the Teleosteans. They may be further defined as fishes with an ossified or cartilaginous skeleton, a lower jaw, gills inserted on the gill-arches, a single gill-opening on each side (exceptionally fused with its fellow on the ventral side), an opercle formed of one or several bones, the body usually covered with scales or bony plates, an air-bladder or lung, at least in the primitive forms, and without copulatory paired organs or “ claspers.”

The term which designates this sub-class has been adopted by Sir R. Owen, E. D. Cope, and A. S. Woodward in a less comprehensive sense, the Dipneusti being regarded by them as constituting a separate sub-class, and its inventor, C. L. Bona­parte (1838) had proposed it in a more restricted sense, the sturgeons, lophobranchs and plectognaths being excluded. T. Gill (1872) was the first to use it in the acceptation taken in the present article. Whether the Ostracophores should be included among the Teleostomes, as recently proposed by C. T. Regan, is still open to doubt. The sub-class is here divided into four orders, but it is difficult to decide whether, in an ascending series, the Crossopterygians or the Ganoids should be placed first. From the point of view of the evolution of the paired fins, accepting the lateral fin-fold theory as the better supported by the evidence at hand, there is much to say in favour of regarding the Chondrostean Ganoids as the more primitive type. From another point of view the con­dition of the air-bladder in the existing Crossopterygians appears to represent the earliest form assumed by this important organ, which it seems rational to conclude was originally evolved as an accessory breathing organ and later became transformed into a hydrostatic apparatus (Ganoids and Teleosteans) on the one hand, into a true lung (Dipnoans and Batrachians) on the other. Guided by the second consideration, assuming that the air-bladder of the fossil Crossopterygians conformed to the type known in their recent representatives, and also in deference to palaeontological chronology, whatever it be worth in the present state of our knowledge, we shall begin the series with the Crossopterygians, which pass into the Dipnoans, and then take up the Ganoids, which lead up very gradually to the Teleosteans, the dominant group at the present day. But we do not deny the force of the arguments adduced by Regan in attempting to show that the paired fins of the Chondrostean Ganoids are a nearer approach to the primitive condition than are those of the Crossopterygians. No doubt some day we shall become acquainted with still older Teleostomes, which we may expect to establish the connexion between the two types which in Palaeozoic times have evolved on parallel lines.

Order I.—CROSSOPTERYGII

Paired fins, at least the pectorals, lobate, having an endo-skeletal axis more or less fringed with dermal rays. Mandibular arch suspended from the upper segment of the hyoid arch (hyostylic skull). Splenial bone present. No supraoccipital bone. A pair of large jugular plates, sometimes with small lateral plates and an anterior azygous element, developed in the branchiostegal mem­brane between the mandibular rami. Heart with a contractile, multivalvular conus arteriosus; intestine with a spiral valve; air- bladder with pneumatic duct communicating with the ventral side of the oesophagus.

Maxillary bone large, toothed, bordering the mouth. Bones of the upper surface of the skull mostly paired. Pectoral arch with both clavicle (so-called infra-clavicle) and cleithrum. Ventral fins inserted far back. With few exceptions (tail of Coelacanthidae, dorsal and caudal fins of Polypteridae) the dermal rays of the unpaired fins more numerous than their endo-skeletal supports, a primitive character also found in the lower Ganoids, but disappearing in the higher.

Sub-order **I.—**OSTEOLEPIDA

(Including the Haplistia, Rhipidistia and Actinistia.) Pectoral fins obtusely or acutely lobate, articulating with the pectoral girdle by a single basal endo-skeletal element. Nostrils on the lower side of the snout. Two dorsal fins.

Families: Osteolepidae, Rhizodontidae, Holoptychidae, Coel­acanthidae.

The scales may be rhombic and thickly coated with ganoine (Osteolepidae) or cycloid. The vertebral axis is strongly hetero­cercal in the Osteolepidae and Holoptychidae, and diphycercal or intermediate between the heterocercal and the diphycercal types in the other families; usually acentrous, sometimes with ring-like calcifications (some of the Rhizodontidae). In the Holoptychidae the pectoral fin is extremely similar to that of the Dipneusti of the family Dipteridae, which they resemble closely in form and scaling. Their teeth are remarkable for their complicated structure, resem­bling that of the Labyrinthodont Batrachians. A pineal foramen is present between the frontal bones in most of the Rhizodontidae.

The Osteolepidae were mostly moderate-sized fishes, the largest *(Megalichthys)* measuring about 4 ft. in length.

These Crossopterygians first appear in the Lower Devonian, are abundant in the Upper Devonian, Carboniferous and Permian; in later periods they are represented only by the more specialized Coelacanthidae, which appear in the Lower Carboniferous, and persist as late as the Upper Chalk.

Sub-order II.—CLADISTIA

Pectoral fin obtusely lobate, with three basal endo-skeletal ele­ments. Nostrils on the upper side of the snout. A single dorsal fin, formed of a series of detached rays.

A single family : Polypteridae.

The existing Crossopterygians which form this sub-order differ very considerably from the extinct Osteolepida, perhaps quite as much as these differ from the Dipneusti. The ventral fins are not lobate, the vertebral column is well ossified and its termination is of the diphycercal type. Spiracles, covered by bony valves, are present on the upper surface of the head. The dorsal fin is unique among fishes, being formed of detached rays consisting of a spine­like fulcral scale supporting the fringes of the ray; these rays have been regarded, erroneously, as representing so many distinct fins, or “ finlets.” The scales are bony, rhombic and thickly coated with ganoine.

The Polypteridae are confined to tropical Africa and the Nile, and represented by two genera: *Polypterus* and *Calamichthys,* the former moderately elongate and provided with ventral fins, the