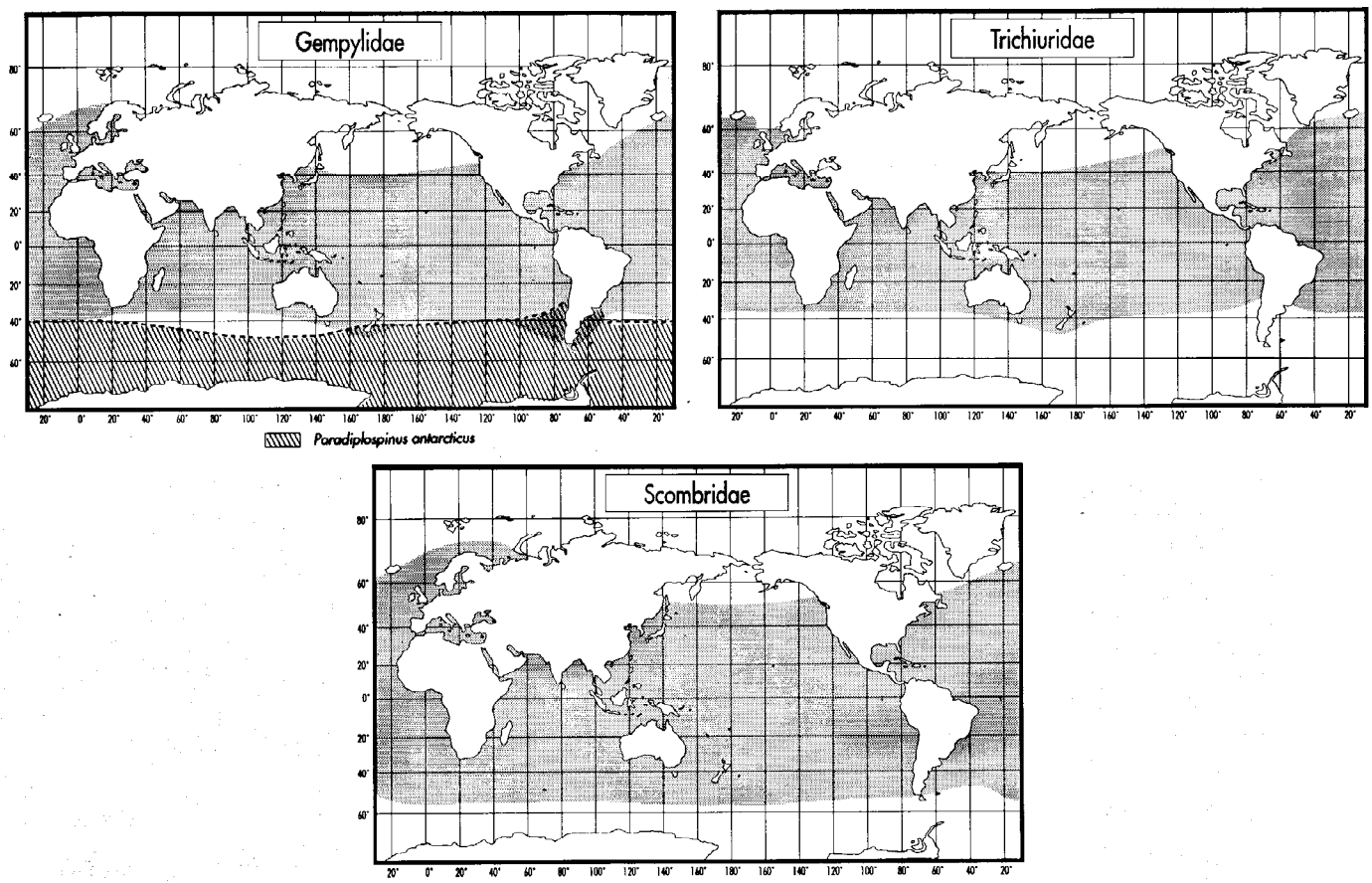

Fig. 12 Distribution limits for the Gempylidae, Trichiuridae and Scombridae

Aphanopus and *Benthodesmus* are common in midwater plankton and micronekton samples. In addition, adults of the benthopelagic gempylids *Lepidocybium flavobrunneum, Ruvettus pretiosus, Thyrsites atun,* and *Thyrsitoides marleyi* sometimes occur in epipelagic layers and are a normal bycatch of the tuna long-line fishery.

The least diverse is the third group of oceanic pelagic trichiuroids with 3 or 4 species, *Nealotus tripes* and *Gempylus serpens* are epi- to mesopelagic (both migrate to the surface at night), while *Diplospinus multistriatus* is mesopelagic (insufficiently known *Paradiplospinus antarcticus* might also be pelagic).

Trichiuroid and scombrid fishes are distributed throughout the world mainly in tropical, subtropical and warm temperate waters (Fig. 12). They tend to have different patterns of distribution in the northern and southern hemispheres. Scombrids are found further poleward in the northern hemisphere than in the southern hemisphere, especially in the eastern parts of oceans where warm currents extend further north into epipelagic layers. The significant poleward shift of the southern distributional boundary of the Gempylidae is because of the range of a single, ecologically aberrant species, *Paradiplospinus antarcticus*. Without this species, the distributional boundaries of the Gempylidae and the Trichiuridae are similar except off the southern tip of South America where the gempylid, *Thyrsites atun* occurs.

The scombrids are generally more widely distributed, especially during the warm season, than both families of the Trichiuroidea. Scombrids inhabit surface waters (Fig. 12) where they generally make long seasonal horizontal migrations. Gempylids and trichiurids are mesopelagic and benthopelagic and have much more limited horizontal migrations than scombrids. Trichiurids do however, have marked daily vertical migrations.

1.4 Problems of Identification

The tails of trichiurids are often damaged or cut off and certain standard measurements cannot be made accurately. Therefore, in this catalogue the overall length measurement for some trichiurids is taken as the preanal length, or the length from the tip of upper jaw to anus. In addition, when the tail is damaged the count of dorsal fin elements is taken from the fin's origin to above the anus.

The juvenile stages of trichiuroid fishes are largely unknown. Therefore, identification of juveniles is difficult and often not reliable.

1.5 Illustrated Glossary of Technical Terms and Measurements

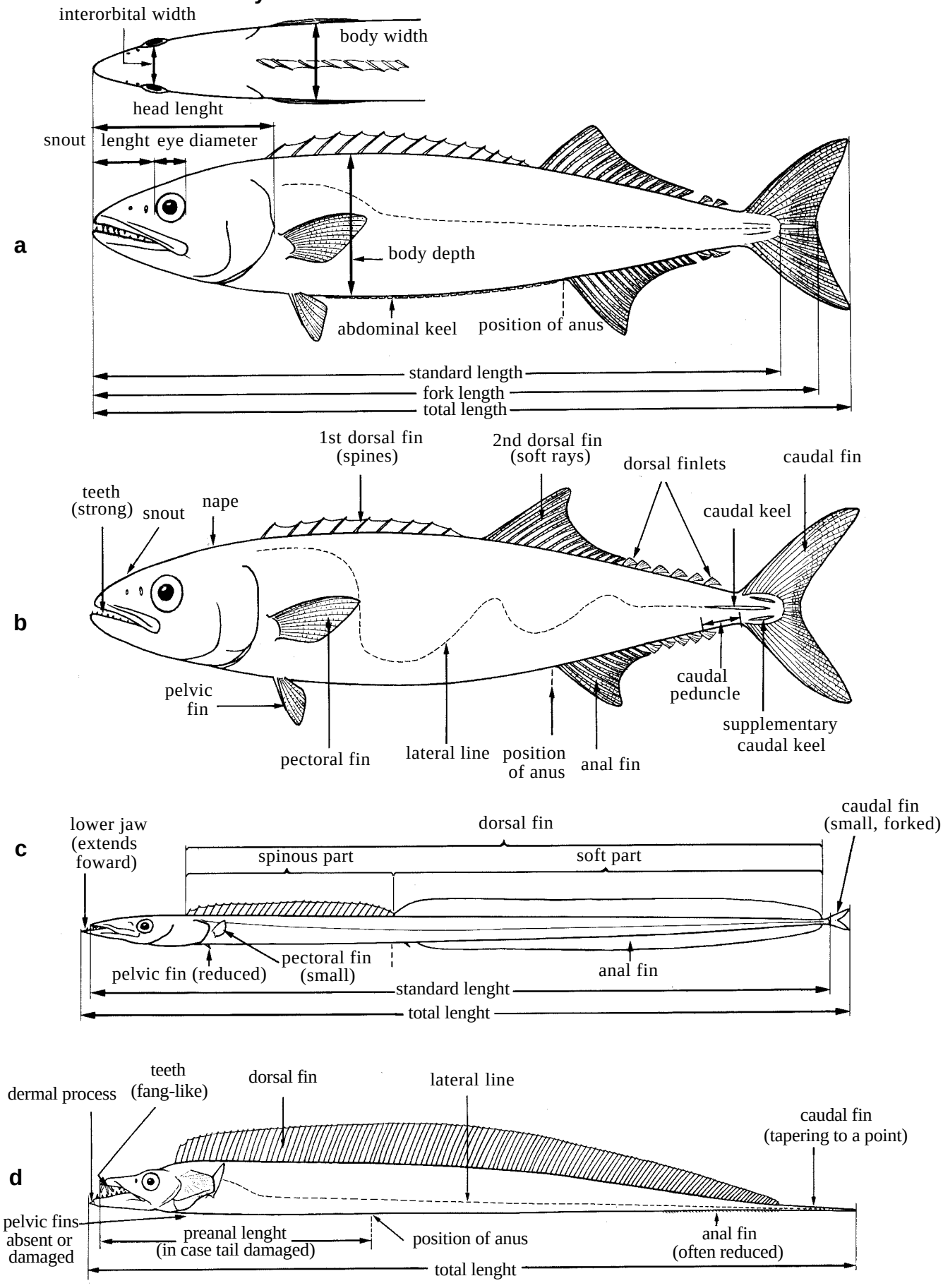

Fig. 13 External features and measurements for typical species of Gempylidae (a, b) and Trichiuridae (c, d)

Abdominal keel - Ossified dermal keel on ventral part of body between pelvic fins and anus, which is only present in *Ruvettus pretiosus* (Fig. 13a). Also called **mid-ventral keel.**

Anal fin - Unpaired fin located on the ventral median line of the body, behind the anus (Fig. 13), consisting of one to three free or comprised spines and a soft portion. Anterior soft rays underdeveloped or absent in many species of the Trichiuroidae; in this case number of anal-fin elements is counted from radio graphs interhaemal bones.

Anus - External opening of the intestine, situated on the ventral midline of the body (Fig. 13). Also known as vent. The position of the anus relative to the anal-fin and dorsal-fin origins is important in gempylid and trichiurid taxonomy.

Benthopelagic - Living near, or ecologically associated with the bottom but also often found a substantial distance above the benthos during part of the day.

Body depth - This measurement usually taken as the greatest distance from the dorsal midline to the ventral midline of the body (greatest depth of body) (Fig. 13a). However, in some works this depth is measured at the origin of pectoral fins, pelvic fins and first anal fin.

Body length - Several different measurements are used for body length. These are: the total length, standard length, fork length and preanal length (see definitions below).

Body width - **Usually measured as the greatest width** of the body (Fig. 13a). Sometimes, body width at origin of pectoral fins, pelvic fins and first anal fin is also used.

Branchial cavity - Cavity inside the mouth-enclosing the gills (Fig. 14). Also called **gill cavity.**

Branchiostegals - Ray-like bones attached to the hyoid arch, supporting the branchiostegal membrane on the underside of the head (Fig. 14).

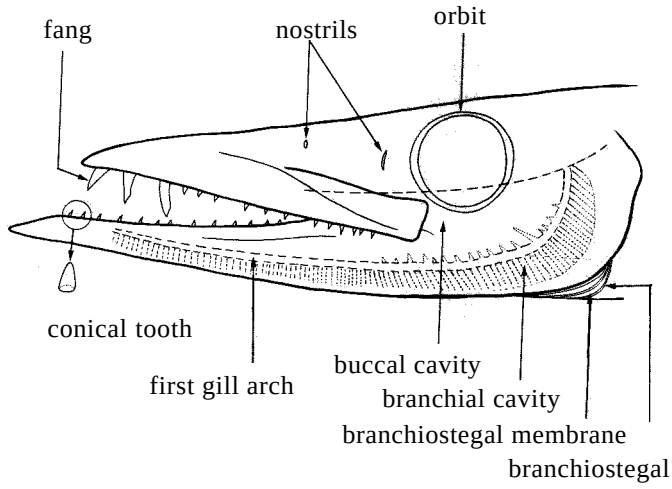

Fig. 14 Structures associated with the head

Branchiostegal membrane - The membrane connecting the branchiostegals and enclosing the gill chamber ventrally (Fig 14).

Buccal cavity - Cavity inside the mouth, above the gill arches (Fig. 14). Also called **mouth cavity.**

Conical tooth - **Cone-shaped** tooth (Fig. 14). Sharp, elongate conical teeth are sometimes called canine teeth.

Caudal fin - **Median** fin situated at the posterior end of the body, consisting of an upper and a lower lobe (Fig. 13).

Caudal keel - A lateral ridge posteriorly on the caudal peduncle or base of caudal fin. In trichiuroid fishes, only *Lepidocybium flavobrunneum* has a large median keel, and small accessory keels on the caudal fin (Fig. 13b).

Caudal peduncle -The narrow part of the body between the posterior ends of the dorsal and anal fins and the base of the caudal fin (Fig. 13b).

Caudal vertebrae - Vertebrae that bear a haemal spine ventral to the vertebral centrum (Fig. 15).

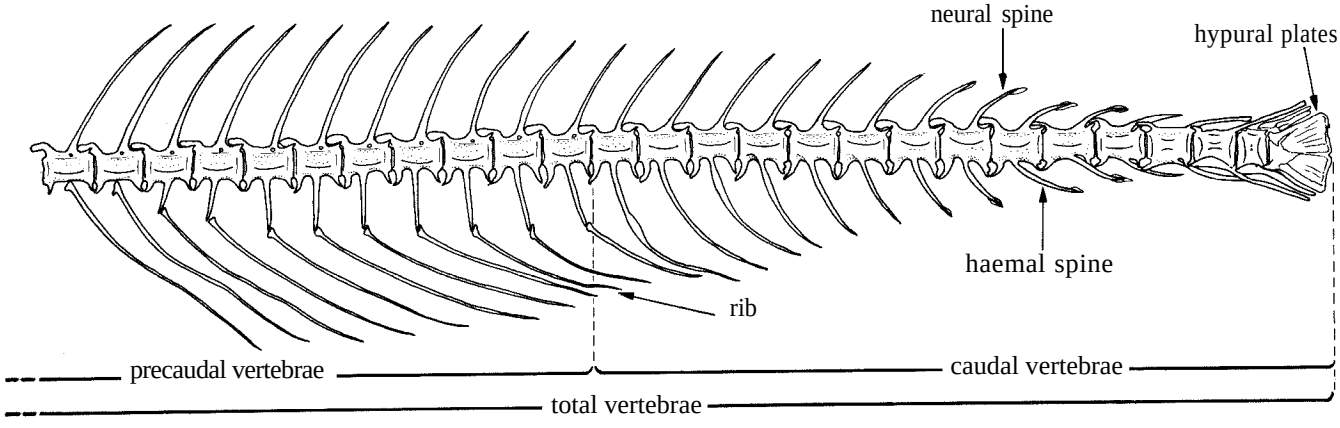

Fig. 15 Some bones associated with the axial skeleton

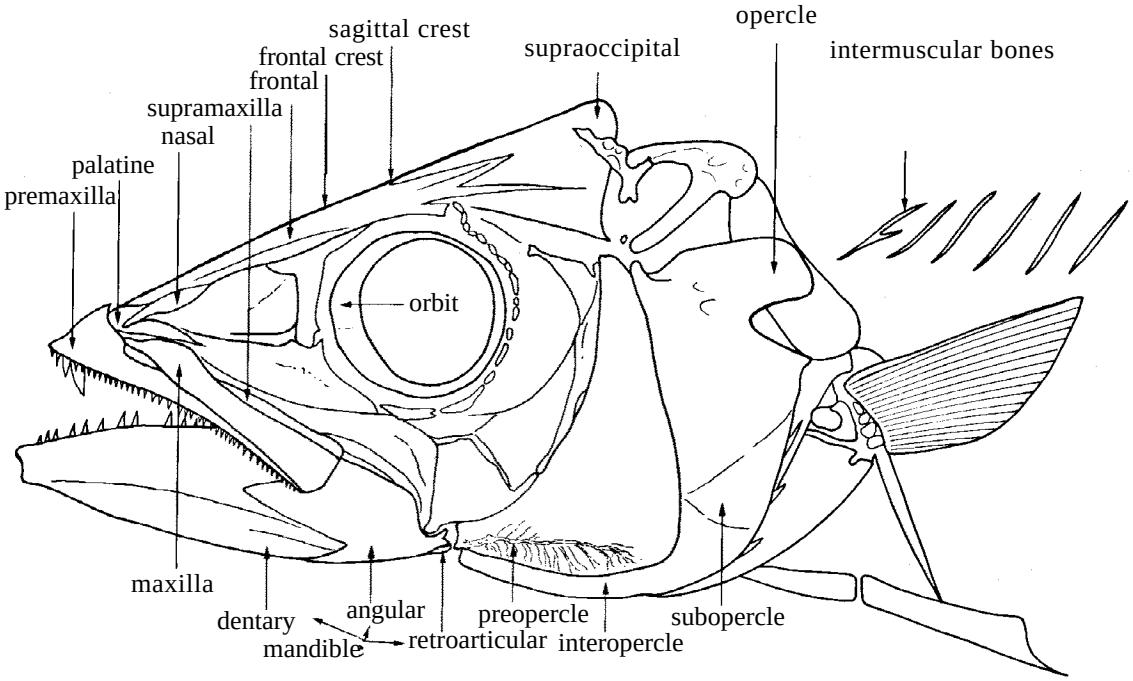

Fig. 16 Bones associated with the head

Dentary - Tooth-bearing bone of the lower jaw (Fig. 16).

Dermal processes - Conical process on tip of upper jaw or sometimes of lower jaw, found in some species of Gempylidae and Trichiuridae (Fig. 17).

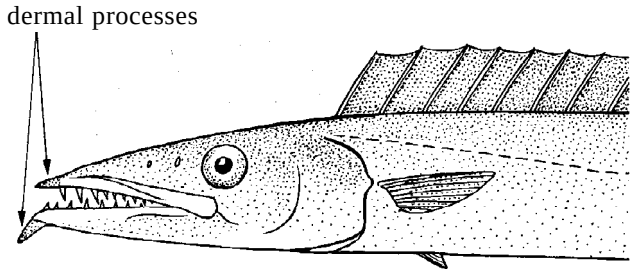

Fig. 17 Dermal processes

Dorsal fin - A median fin along the back of the fish, consisting of a spinous and a soft portion (Fig. 13).

Dorsum -The upper (dorsal) surface of the head or bqdy.

Epineurals - Bones that attach on outside of upper surface of neural spines (Fig. 18).

Epipelagic -The upper region of the open ocean extending from the surface to depths of around 200 m.

Epipleurals - Bones that attach on outside of upper surface of ribs (Fig. 18).

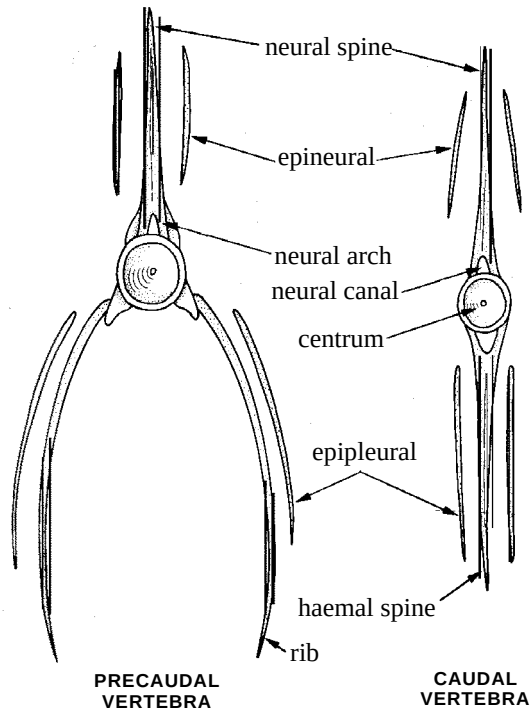

Fig.18 Bones and structures associated with vertebrae

Ethmoid - Unpaired skull bone on the anterior part of the neurocranium forming part of the nasal cavity and located above the vomer. **Lateral ethmoids** are paired bones on both sides of the nasal cavity (Fig. 19).

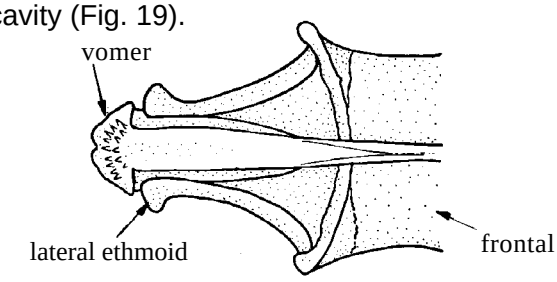

Fig. 19 Skull viewed from below

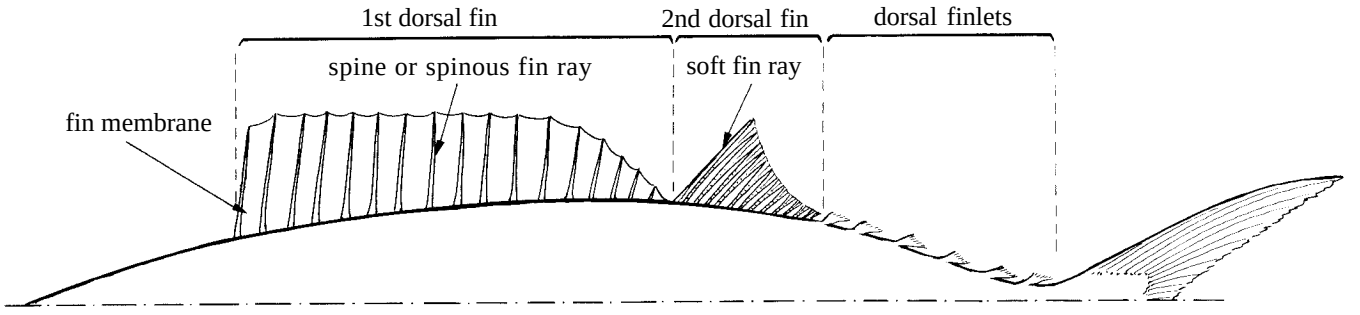

Fig. 20 Structures associated with fins

Eye **diameter -** The greatest distance between the margins of the orbit (Fig. 13a).

Fang - A long sharp tooth situated in the frontal part of the upper jaw, by which prey is seized (Fig. 14).

Finlets - Small individual fins posterior to second dorsal and anal fins (Figs 13b and 20).

Fin membranes - The thin membranes between the rays of the fins (Fig. 20).

Fin rays - General term for the soft rays and spines (spinous rays) that support the fins (Fig. 20).

Fork length -The straight line distance from the tip of upper jaw to the posterior margin of the middle caudal rays (Fig. 13a).

Frontal crest - An elevated bony ridge formed by paired frontal bones along the sagittal suture of the skull (Fig. 16).

Frontals - **Paired** skull bones in the middle dorsal part of the neurocranium (Figs 16,19).

Gill arch - The J-shaped bony or cartilaginous arches under the gill cover to which the gill filaments and gill rakers are attached (Fig. 21).

Gill filaments - The soft, red, fleshy part of the gills; organ for respiration **(Fig. 21).**

Gill rakers - Ossified stiff structures which extend from gill arches toward buccal cavity, usually from the first gill arch (the first or outermost gill arch visible when the gill cover is lifted) (Fig. 21).

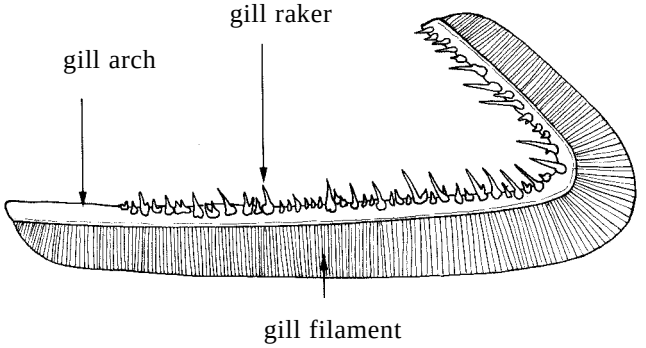

Fig. 21 The first gill arch

Haemal spines - The spines that extend ventrally from the centra of caudal vertebrae (Figs 15 and 18). The first vertebra with a haemal spine is the first caudal vertebra.

Head length - In this catalogue, the measurement is taken from the tip of the upper jaw to the most distant point on the opercular membrane (Fig. 13a). An alternative method used by fisheries biologists but not used in this catalogue, takes the anterior point of measurement from the tip of the lower jaw (mandible).

Hypurals - Terminal bones at posterior end of vertebral column (Fig. 15).

Hypural plate - The expanded ends of the hypurals that form a wide, fan-like plate onto which the caudal-fin rays are attached (Fig. 15).

Interhaemal bones - The bones situated between the haemal spines of the vertebrae and the spines or rays of the anal fin (Fig. 22).

Intermuscular bones - Long, ray-like free bone near skin, laterally in the body (Fig. 16).

Interneural bones - The bones situated between the neural spines of the vertebrae that are situated before the dorsal fin and do not support fin rays (called interneurals or pre-dorsal **bones),** or that support one or more dorsal-fin spine or ray (called **pterygiophores**) (Fig. 22).

Interorbital - The shortest distance between the fleshy margins of the orbits (Fig. 13a) is the **Interorbital width. The Interorbital space** is the area between the eyes.

Lateral line - A series of sense organs enclosed in tubular scales along the sides of the body (Fig. 13).

Mandible - Known as the lower jaw, consisting of dentary, angular and retroarticular bones (Fig. 16).

Maxilla - The bone in the upper jaw that lies behind the premaxilla (Fig. 16).

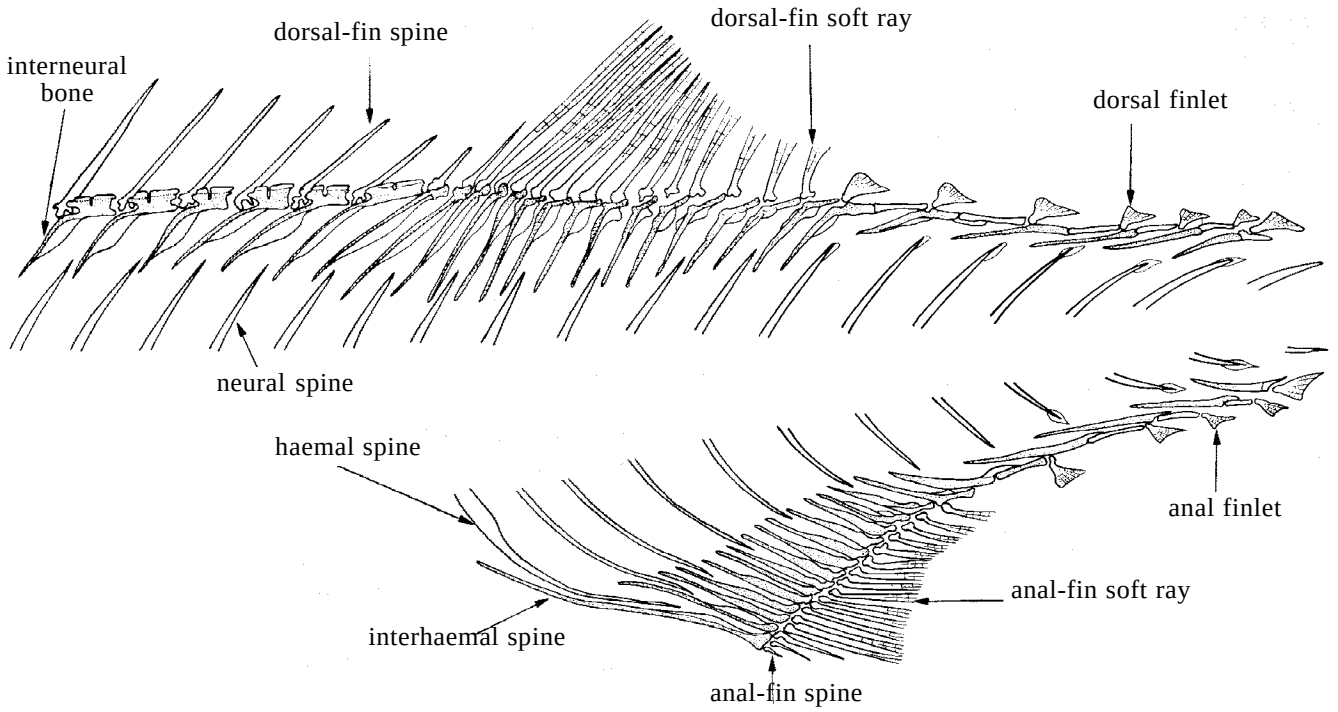

Fig. 22 Bones associated with fin structures

Mesopelagic - The region of the open ocean below the epipelagic zone, between the depths of around 200 m to 1 000 m.

Nape - The upper part of the head behind the eye (Fig. 13b).

Nasals - Paired bones in the ethmoid region of the neurocranium (Fig. 16).

Neural arch -The arch that is formed below the fused basal part of the neural spine of the vertebrae (Fig. 18).

Neural canal - The canal for the nerve cord formed by the neural arch (Fig. 18).

Neural spines - the spines that extend dorsally from the centra of vertebrae (Figs 15 and 18).

Nostrils - External openings of the nasal cavity (Fig. 14). There are a pair of nostrils (anterior and posterior) on each side of the snout in Gempylidae, and single nostril on each side in the Trichiuridae.

Operculum - Gill cover, supported by four bones: opercle, preopercle, interopercle and subopercle (Fig. 16).

Orbit - The bony border surrounding the eye (Figs 14 and 16).

Palatine - A **pair of bones on** each side of the roof of the mouth (Fig. 16).

Pectoral fins - Fin on each side of the body immediately behind the gill opening (Fig. 13).

Pelvic fins - Paired fins on the ventral edge of the anterior half of the body, usually below the pectoral fins (Fig. 13). Also known as ventral fins.

Preanal length - The straight distance from the upper jaw to the anus (Fig. 13).

Precaudal vertebrae - The anterior vertebrae without haemal spines (Fig. 15). Also known as abdominal vertebrae.

Premaxillae - Paired bones of the upper jaw, usually bearing teeth in higher teleosts and associated with the maxillae (Fig. 16).

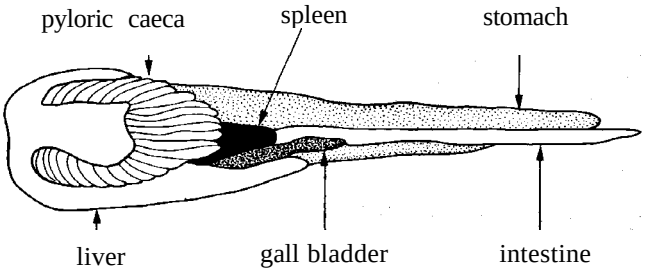

Fig. 23 Viscera of *Tongaichthys*

Pyloric caeca - Special organ of fish for secretion of digestive enzymes. It is a variously-shaped diverticulum originating at the junction of the stomach and the intestine (Fig. 23).

Rays - See definitions for soft rays and spinous rays.

Sagittal crest - An elevated bony ridge that develops along the sagittal suture of the skull (Fig. 16).

Snout - Anterior part of the head, anterior to the eyes and above the mouth (Fig. 13b).

Snout length - The distance from the tip of the upper jaw to anterior margin of the fleshy orbit (Fig. 13a).

Soft rays - A segmented fin ray that is usually flexible and branched.

Spines - Sharp, pungent and pointed structures.

Spinescent gill takers - Gill rakers formed as spines.

Spinous rays - An unsegmented fin ray that is usually rigid and sharply pointed and never branched (Fig. 20).

Standard length - The straight line distance from the tip of the upper jaw to the end of the last vertebra (easily bendable point of caudal fin) (Fig. 13).

Supraoccipital - Uppermost and posterior unpaired bone of skull (Fig. 16).

Total length - The distance from the anteriormost part of the jaw to posteriormost part of the tail (Fig. 13).

Upper jaw length - The length from the anteriormost point of the premaxilla to the posterior edge of the maxilla (Fig. 16).

Vertebrae - The bones of the axial skeleton; divided into 2 sections, precaudal and caudal vertebrae (Fig. 15).

Viscera - The internal soft organs of the body cavity (Fig. 23).

Vomer - A median bone which lies in the roof of the mouth, often bears teeth (Fig. 19).

1.6 Plan of the Systematic Catalogue

A superfamily diagnosis is given, followed by a key to the families Gempylidae and Trichiuridae. For each family, synonyms, FAO names and diagnostic features are presented as well as general information on biology, habitat and distribution, and interest to fisheries, followed by a key to genera. The generic accounts are arranged alphabetically. Genera are introduced with the type reference, synonyms, and diagnostic features (unless the genus contains only a single species and then diagnostic features are often included under the species), and a key to species is given for all non-monotypic genera.The species accounts are arranged alphabetically.The information pertaining to each species is arranged by paragraphs, in the order listed below:

(1) **Scientific Name:** The reference for the original description and the type locality is given.

(2) **Synonyms:** Only the often-used invalid names and combinations that have been applied are referenced; mis-identifications and incorrect applications of names are not referenced. A list of nominal species is given in Chapter 3 (p. 108).

(3) **FAO Names:** FAO-accepted English names and tentative French and Spanish names are given for each species. The FAO English name is considered the standard to be used for fishery purposes. This should avoid confusion which can be caused due to the existence of multiple names for the same species or because of the use of the same name for several species. The FAO name is not intended to supplant the use of local names but rather, to serve as a worldwide reference.

(4) **Field Characters:** Characters that are useful for identifying the species in the field are given.

(5) **Diagnostic Features:** Distinctive characters of the species, as an aid for identification. These diagnoses should be consulted to confirm species identified using the key.

(6) **Geographical Distribution:** The general geographic range is given in the text and illustrated on a map. The map shading includes known areas of occurrence and different types of shading are used for the known adult distribution (densely shaded) and larval distribution (lightly shaded). Limited locality records are indicated as a triangle and doubtful or probable presence indicated with a question mark.

(7) **Habitat and Biology:** Information on habitat, behaviour, food habitats and reproduction.

(8) **Size:** The approximate maximum total or standard length.

(9) **Interest to Fisheries:** General information on the extent, type of fisheries and utilization.

(10) **Local Names:** These are given where published names are available or left blank in case users wish to write in common names not listed but known from their own locality. Often, a single local name is applied to several species.

(11) **Literature:** References that are useful for identification and distributional data. It is stated if an incorrect name is given in the reference.

(12) **Remarks:** Useful information which is not appropriately covered in the previous paragraphs.

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