

ORIGINAL RESEARCH

## Otolith atlas for marine fishes of the southwestern Atlantic occurring along southern Brazil (28° S-34° S)

MANUEL HAIMOVICI<sup>1, \*</sup>, LUCAS DOS S. RODRIGUES<sup>1</sup>, SILVIA H. B. LUCATO<sup>1</sup>, MARCIO DE A. FREIRE<sup>1</sup>,  
LUCIANO G. FISCHER<sup>2</sup> and LUIS G. CARDOSO<sup>1</sup>

<sup>1</sup>Laboratório de Recursos Pesqueiros Demersais e Cefalópodes, Instituto de Oceanografia (IO), Universidade Federal do Rio Grande (FURG), Avenida Itália, km 8, 96203-900 - Rio Grande, Brazil. <sup>2</sup>Núcleo em Ecologia e Desenvolvimento Socioambiental de Macaé (NUPEM), Instituto de Biodiversidade e Sustentabilidade, Universidade Federal do Rio de Janeiro (UFRJ), Avenida Sao José Barreto, 764, 27910-970 - Macaé, Brazil. ORCID Manuel Haimovici  <https://orcid.org/0000-0003-1741-8182>, Lucas dos S. Rodrigues  <https://orcid.org/0000-0003-2310-2619>, Luciano G. Fischer  <https://orcid.org/0000-0002-7219-4364>, Luis G. Cardoso  <https://orcid.org/0000-0003-1026-0853>



\*Correspondence:  
manuelhaimovici@gmail.com

†Additional authorships option: MH  
and LdSR should be considered joint  
first authors

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**ABSTRACT.** Otoliths are acellular apposition structures composed of approximately 90% of calcium carbonate and other inorganic salts, which develop over a protein matrix located in the inner ear of bony fishes playing an essential role in the senses of balance and hearing. These structures grow throughout a fish's lifetime. Owing to their species-specific shape, otoliths are an important tool for the identification of fish species in the diet of predators when collected from stomachs and, due to their low water content, are helpful for archaeological, paleontological and anthropological studies for its presence in fossilized remains. This atlas is aimed at the identification of abundant or frequent bony fishes otoliths in the diet of predators and in fossilized remains from the continental shelf and upper continental slope of southern Brazil between Santa Marta Grande cape (28° S) and Chuí (34° S) on the border with Uruguay. It includes the otolith description of 136 bony fishes species, including most of the abundant and frequent species in the region. Easy to use graphics are provided to infer fish size based on otolith measurements. Vouchers of different sizes of otolith of all species included in this atlas are deposited and available for consultation at the Demersal Fisheries Resources and Cephalopods Laboratory (IO-FURG).

**Key words:** Shape, morphology, length-weight relation, stomach content, feeding ecology.

**Atlas de otolitos de peces marinos presentes en el Atlántico Sudoccidental a lo largo del sur de Brasil (28° S-34° S)**

**RESUMEN.** Los otolitos son estructuras de aposición acelular compuestas por alrededor de un 90% de carbonato de calcio y otras sales inorgánicas, que se desarrollan sobre una matriz proteica ubicada en el oído interno de los peces óseos y que desempeña un papel fundamental en los sentidos del equilibrio y la audición. Estas estructuras crecen a lo largo de la vida de un pez. Debido a su forma especie-específica, los otolitos son una herramienta importante para la identificación de las especies de peces en la dieta de los depredadores cuando se recolectan de estómagos y, debido a su bajo contenido de agua, son útiles para estudios arqueológicos, paleontológicos y antropológicos debido a su presencia en los restos fosilizados. Este atlas tiene como objetivo la identificación de otolitos de peces óseos abundantes o frecuentes en la dieta de los depredadores y restos fosilizados de la plataforma continental y talud continental superior del sur de Brasil entre el Cabo Santa Marta Grande (28° S) y Chuí (34° S) en la frontera con Uruguay. Incluye la descripción de otolitos de 136 especies de peces óseos, incluyendo la mayoría de las especies abundantes y frecuentes en la región. Se proporcionan gráficos fáciles de usar para inferir el tamaño del pez en función a las medidas de

los otolitos. Los otolitos se encuentran depositados y disponibles para consulta en el Laboratorio de Recursos Pesqueros Demersales y Cefalópodos (IO-FURG) comprobantes de diferentes tamaños de otolitos de todas las especies incluidas en este atlas.

**Palabras clave:** Forma, morfología, relación talla-peso, contenido estomacal, ecología alimenticia.

## INTRODUCTION

Otoliths are acellular apposition structures that grow throughout a fish lifetime and are located in the inner ear of bony fishes, playing an essential role in the senses of balance and hearing (Popper and Lu, 2000; Schulz-Mirbach et al. 2019). Their structure is composed of approximately 90% of calcium carbonate and other inorganic salts, which develop over a protein matrix (Blacker 1969; Degens et al. 1969).

The inner ear or ‘labyrinth’ of most bony fishes, including all teleosts, consists of three semi-circular canals, each with an ampulla and end organs in which otoliths (*sagittae*, *lapilli*, and *asterisci*) are located (Figure 1). In adult fishes, the three pairs of otoliths differ markedly in shape and size, with the *sagittae* usually being the largest pair and the *lapilli* the smallest (Smale et al. 1995). However, in some orders as Cypriniformes and Siluriformes, *lapillus* is the largest otolith (Assis 2005; Volpedo and Fuchs 2010).

Otoliths recall the attention since antiquity (Duffin 2007; Tuset et al. 2008) given an extensive account of its popular use from classical times to the present. These uses comprised the divining of weather conditions and protection trustening of sailors against sea storms, aphrodisiac properties, relief of several types of pain, colic and swelling, elimination of calculi from several organs and, healing of diseases such as malaria, jaundice, recurrent fevers and nosebleeds.

Otolith shapes are highly species-specific and vary widely among species (Popper et al. 2005). For this reason, they are used for the identification of bony fishes, an important tool in feeding- and trophic-related studies in which predator

stomach contents are analyzed to reconstruct the community composition and prey size in the diet. Identification of fish through their otoliths is aided by their degradation resistance better than most other tissues, and often are the only identifiable animal remains recovered from stomachs and droppings (Härkönen 1986).

Otoliths are mainly formed by aragonite crystals (Degens et al. 1969). The *sagitta* is usually the largest otolith and has the greatest morphological variability, making it the most frequently used for fish identifications (Campana 2004). Typically, *sagitta* otoliths have a rostrum and an antirostrum in their anterior margin while their proximal surface presents a sulcus acusticus –a scar related to the point of attachment of the sen-

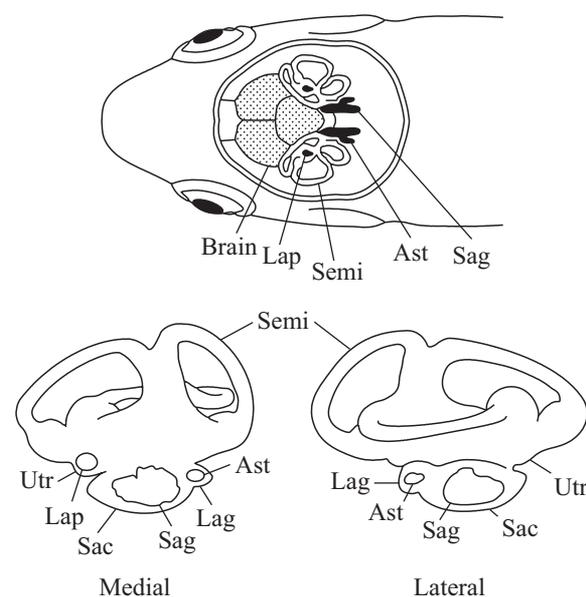


Figure 1. The inner ear of fish with the three semicircular canals, their end organs, and otolith organs. Utr: utricle, lap: *lapillus*, sac: *sacculus*, sag: *sagitta*, lag: *lagena*, ast: *asteriscus*, semi: *semicircular channel*. Modified from Campana (2004).

sory macula. The extension of the sulcus varies substantially among species and may have an ostium in the anterior end and a cauda in the posterior end (Figure 2).

The analysis of the shape and microstructure of otolith enables a large variety of studies (Begg et al. 2005; Campana 2005). They are metabolically almost inert structures that grow by mineral and protein deposition. For these reasons, they allow records of the entire lifetime of fish, including growth, date of hatching, migration pathways, water temperature, population identity and climatological parameters (Franco et al. 2018), ecomorphology and functional ecology (Tuset et al. 2016; Assis et al. 2020). For example, given a measurement of otolith size it is possible to estimate the length of the fish from which the otolith was obtained. Although there is variability in the size of otoliths among fish of the same length, these estimates provide useful approximations of fish length. Some ingestion metrics, such as Prey-

Specific Index of Relative Importance (PSIRI), are based on these estimations to be calculated (Brown et al. 2012).

In addition to their broad applicability in fisheries sciences due to their high fossilization potential, otoliths play an important role in identifying fossil fish remains in palaeo-ichthyological studies, for example, to identify fossil fish assemblages for phylogenetics (Nolf 1985; Lin et al. 2019; Aguilera et al. 2020) and reconstruct reef fish communities (Lin et al. 2019). Archeologists and anthropologists may also use otoliths to reconstruct fishing and food habits of ancient populations and palaeoclimatologists to reconstruct climatological events (Reitz and Wing 2008; Bertucci et al. 2018; Agiadi et al. 2022; Milheira et al. 2023).

Otoliths have been used for prey identifications since older times (Tuset et al. 2008). The systematic collection of otolith for trophic relations studies began in the 1960s (Fitch and

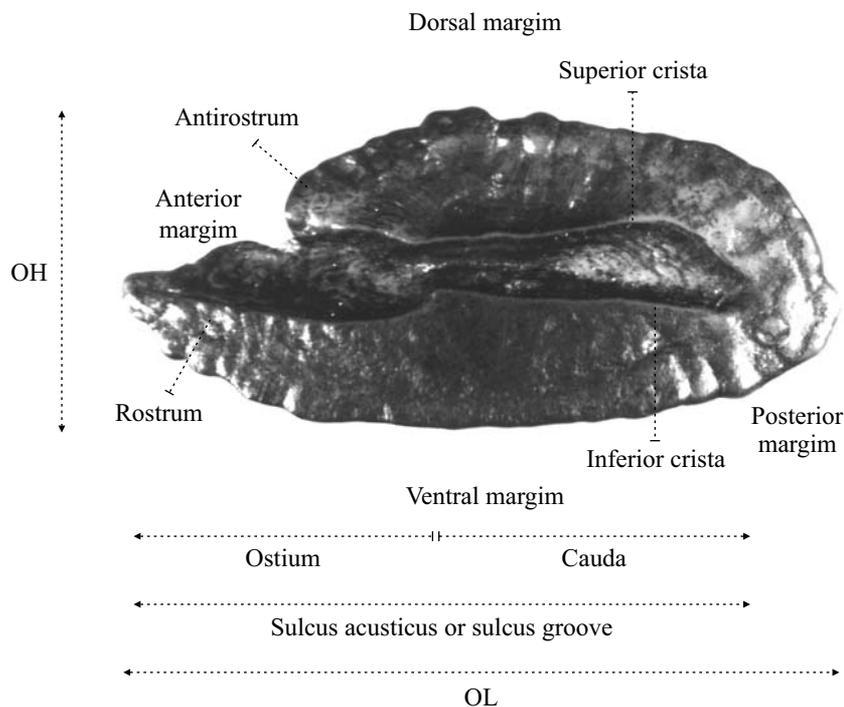


Figure 2. Terms used to describe the proximal face of the *sagitta* otoliths. OL: otolith length, OH: otolith height.

Brownell 1968; Pinkas et al. 1971) and was soon followed by the publications of comprehensive atlases of fish otoliths from different marine regions. Examples are for Bering Sea fishes (Morrow 1977), northeast Atlantic (Härkönen 1986), Antarctica (Hecht et al. 1987; Williams and McEldowney 1990), southern Africa (Smale et al. 1995), northeastern Pacific (Harvey et al. 2000), northwestern Atlantic (Campana 2004) northeastern Atlantic and Mediterranean Sea (Tuset et al. 2008) and Argentina (Volpedo and Echeverria 2000; Volpedo et al. 2017). In Brazil, diverse published papers included the description of a large number of otoliths from southern and southeastern Brazil including Bastos (1990), Abilhôa and Corrêa (1992), Corrêa and Vianna (1993) and Lemos et al. (1992, 1995). More recently, Rossi-Wongtschowski et al. (2014), Brenha-Nunes et al. (2016), Siliprandi et al. (2016), Giaretta et al. (2017), Conversani et al. (2017) and Santificetur et al. (2017a, 2017b), described otoliths of different orders of teleosts that, together, constitutes an atlas.

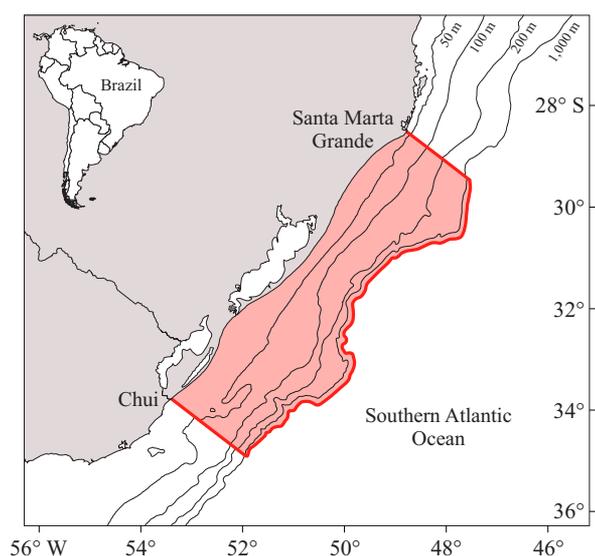


Figure 3. Map of the southwestern Atlantic Ocean showing the region (red polygon) in which the species include in this otolith atlas were collected between 28° S and 34° S.

In 1976, the otolith collection in the Instituto de Oceanografia of the Universidade Federal do Rio Grande-FURG (IO-FURG) started to be formed. Initially, from fishes landed commercially in the port of Rio Grande, sampling onboard commercial fishing boats and from bottom trawl and longline surveys by the RV ‘Atlântico Sul’ (Haimovici et al. 1994, 1996, 2004, 2008). In fact, these different sampling/catch methodologies allowed to improve the representativeness of fish species from several habitats along southern Brazil. Furthermore, since the 1980s, many researchers and graduate students have consulted this collection in order to identify the fish species from otoliths.

In this manner, this atlas is aimed at the identification of otoliths in the diet and in fossilized remains of abundant or frequent bony fishes from the continental shelf and upper continental slope of southern Brazil between Santa Marta Grande Cape (28° S) and Chui (34° S) on the border with Uruguay (Figure 3). It describes the otoliths of 136 species classified among 66 families and 25 orders of fishes, including most of the commercially important teleosts fished along southern Brazil. The nomenclature of the species follows mostly Fricke et al. (2018). Vouchers of different sizes of otolith of all species included in this atlas are deposited and available for consultation at the Demersal and Cephalopods Laboratory (IO-FURG).

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## MATERIALS AND METHODS

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### Preparation of the images

Typically, otoliths of small-, medium-, and large-sized specimens in the size range of each species from the collection were selected to produce digital images. Otoliths were sprinkled with finely powdered graphite to enhance their surface details. Very smooth otoliths were etched with 0.1

to 0.2 hydrochloric acid solutions for 1 to 10 min, washed, and dried before covering them with graphite.

Images were taken using a high definition digital camera attached to a binocular microscope (Moticam 2300-Live Resolution, 3.0 MP) for small size otoliths, and a high-definition digital camera (Sony DSC-H100, 16.1MP) for large size otoliths. Otoliths were placed over an opaque black surface and illuminated with a high-intensity dual fiber optic illuminator (Nikon NI-150).

### Measurements

All specimens had their total (TL), fork (FL), or pre-anal (PAL) length measured from the tip of the snout to the most distal point of the caudal fin, bifurcation on the caudal fin or immediately anterior to the cloaca, respectively, recorded in the mm and total weight (TW) recorded in grams.

On the otoliths, the maximum length (otolith length: OL) and the maximum height between the dorsal and ventral margins (otolith height: OH) were measured with a 0.1 mm precision under a binocular microscope.

### Organization of the plates

Each species is presented on one page. Besides the name of the species, family, and order, the information included was:

- 1) A paragraph indicating: the worldwide and southwestern Atlantic Ocean distribution, the larger typical size in southern Brazil, the environment in which the species was found (marine, estuarine, anadromous or catadromous), and its habitat (neritic, demersal, benthodemersal, epipelagic, mesopelagic, benthopelagic). These last were based on the gears with which the collected specimens were fished (either in research surveys or commercial fishing) complemented with information from Nelson (1994), and Fishbase (Froese and Pauly 2023).
- 2) A paragraph with the exploitation status of the species (target, incidentally landed catch, discarded on board or occasionally fished) and the gear and depth range in which it was fished.
- 3) Two or three references were included. The first was related to the distribution range in the southwestern Atlantic Ocean, most frequently Menezes et al. (2003), Bernardes et al. (2005), Cousseau and Perrota (2013) and Fishbase. Second references were publications in which information on size ranges or reporting depth at which the species was fished in bottom trawl and bottom longline surveys (Haimovici et al. 1994, 1996, 2004, 2008). For commercially crucial species or those poorly represented in surveys (e.g. mullets, anchovies, and bluefish that form pelagic schools), references on the species' life history, biology, or fishery were available.
- 4) One to four images of the proximal face of (preferentially) right-side otolith look cover a wide spectrum of species' length. Each image is from a different individual and has approximately the same size (favoring visualization of details in shape and sulcus acusticus). The total, fork or preanal length (TL; FL; PAL) of fish and OL are next to each otolith image.
- 5) A short description of main figures of the *sagitta* otoliths: shape, thickness, distal face, proximal face, anterior, posterior, dorsal and ventral margins, rostrum and antirostrum, sulcus acusticus (also known as sulcus groove), ostium, cauda and crista. In the case of catfishes of the Family Ariidae, *lapilli* otoliths are the largest. Their description was based on the shape, thickness, anterior and posterior regions, lateral and medial edges, profile and the sulculus *lapilli* (as defined by Santificetur et al. (2017b) modified from Assis (2005).
- 6) The number of specimens with examined otoliths, the range of length and weight of the fish and lengths and heights of otoliths.
- 7) A box with (a) the best-fit regressions coefficients (linear or potential) between the total,

fork or preanal length and the OL and the OH, (b) the best fit regressions coefficients (potential) between the TW and the OL and the otolith height, (c) the range of the quotient between height and length of otoliths (d) weight-length relationships reproduced from Haimovici and Velasco (2000).

8) A graph in which the fish length (total, fork or pre-anal) was plotted against otolith lengths. For those species for which more than five fish were available, a regression line and 95% confidence limits were included. In this way, the most likely length range of the fish can be inferred visually and directly from the otolith length.

In general, the same text structure is followed throughout the atlas, however we highlight some exceptions: (1) for Order Pleuronectiformes, we fit regressions for otolith of both sides due to asymmetry in the fish body. There is a potential influence of eye migration during early life phases on internal head structures, including the associated otolith; (2) for *Sardinella aurita* we preferred otolith height instead of otolith length in relationship plot due to fragility of otolith rostrum, which increases the risk of breakage; (3) we fit sex-specific regressions for *Astroscopus scipinosus* that have notorious differences in the size of their otoliths.

### Anatomical terminology

Terms used to describe otoliths in this guide mostly followed the nomenclature of former works, mainly Härkönen (1986), Smale et al. (1995), Campana (2004), and Tuset et al. (2008). The otolith description took into account the shape, convexity, margins, rostrum, antirostrum, ostium, cauda and crista of the sulcus acusticus. Shapes of the outline or lateral view of otoliths were grouped into sixteen basic categories: discoidal, oval, trapezoidal, pentagonal, rhomboidal, oblong, fusiform, semicircular, lanceo-

late, arrow-shaped, spindle-shaped, kidney-shaped, cuneiform, elliptic, hour-glass, and irregular (Figure 4). Outlines of the anterior and posterior margins of otoliths were described according to their shape in five categories: flattened, double-peaked, round, oblique, and angled (Figure 5). Outlines of dorsal and ventral margins of otoliths were described according to their shape in three categories: flattened, convex, and angled (Figure 6). The texture of dorsal and ventral margins of the *sagitta* otolith was classified into five categories: sinuate, serrate, dentate, lobate, and smooth (Figure 7). The type of opening displayed by the sulcus acusticus was classified as opened or closed at anterior and posterior margins (Figure 8). The shape of the ostium was described in six categories: funnel-like, tubular, round-oval, pear-like, lateral, and rectangular (Figure 9). The shape and curvature of cauda was described in five categories: elliptic, tubular-straight, tubular slightly curved ventrally, tubular strongly curved ventrally, and tubular curled ventrally (Figure 10).

This atlas is aimed to facilitate the comparisons of otoliths collected from stomach contents of predators found in middens or, once otoliths are measured, to easily infer the fish size (available through easy-to-use relationships and graphics). Although the vast volume and the quality of data available in this atlas, we would like to clarify that images and descriptions of otoliths were based on individuals we had access. Therefore, the morphological description does not pretend to be exhaustive and error-free. Over time, otoliths change shape throughout lifetime and tend to show individual changes in overall otolith morphology in older individuals (e.g. the emergence of spicules, teeth), which do not configure a taxonomic criterion. Despite this drawback we hope that the material and findings available in this atlas become useful for studies related to trophic ecology (e.g. stomach contents), ecomorphology and ichthy-archeology, formalizing contributions of the otolith collection from IO-FURG.

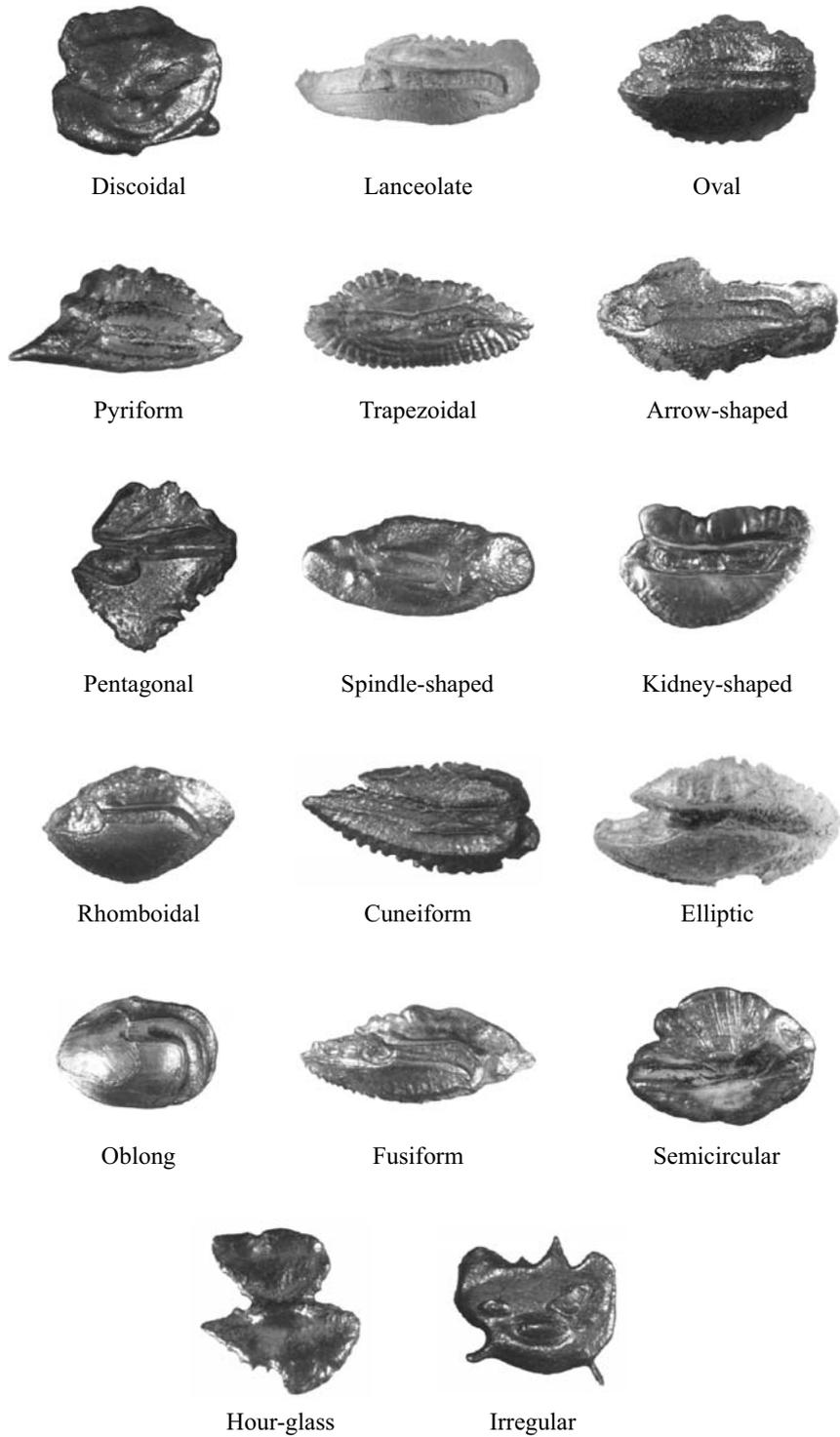


Figure 4. Terms used to describe the general shapes of the lateral view of *sagitta* otoliths.

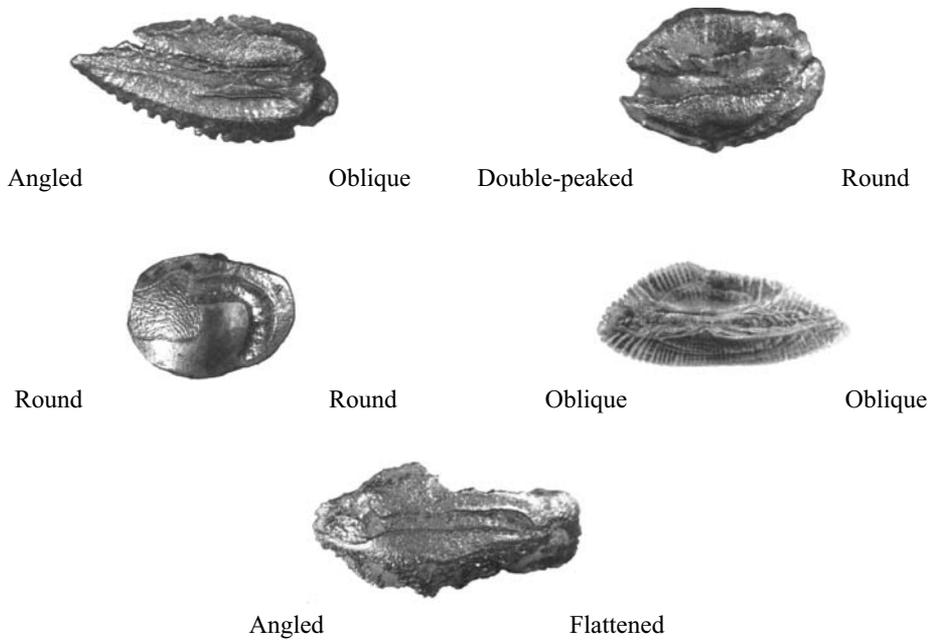


Figure 5. Terms used to describe the anterior and posterior margins of *sagitta* otoliths.

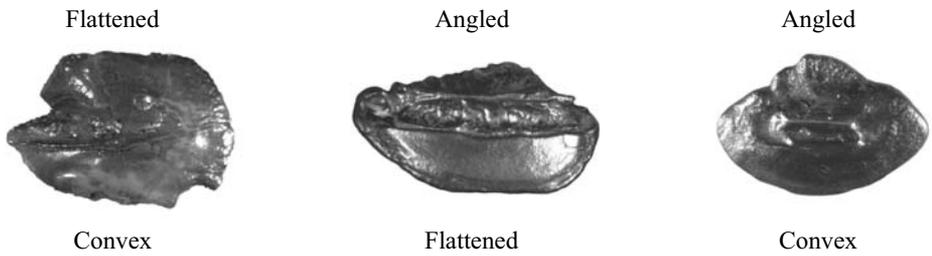


Figure 6. Terms used to describe the dorsal and ventral margins of *sagitta* otolith.

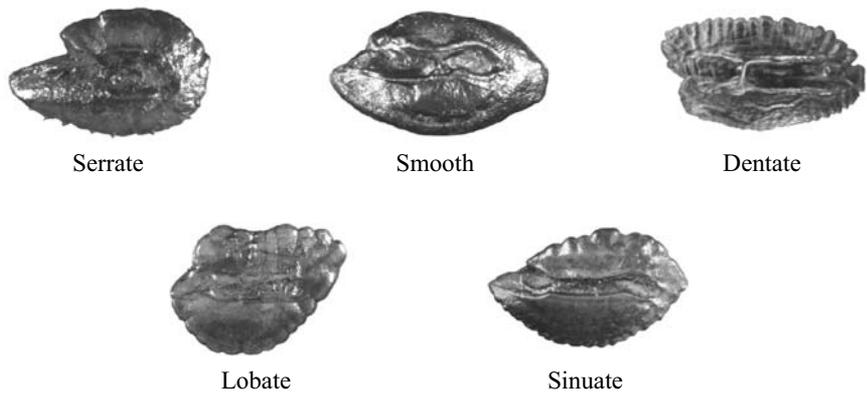


Figure 7. Terms used to describe the texture of margins of *sagitta* otoliths.

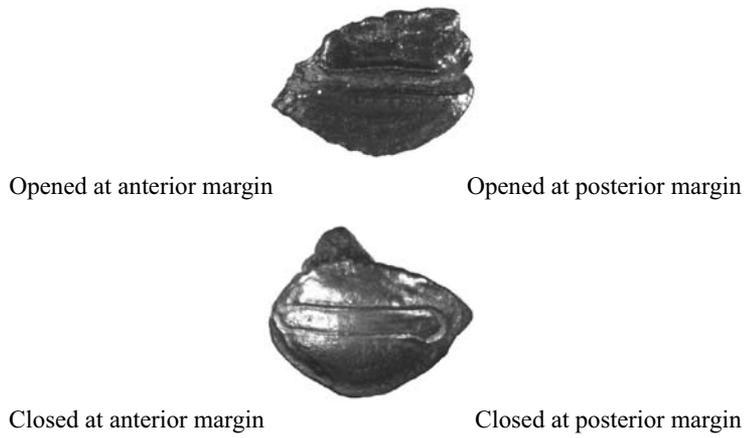


Figure 8. Terms used to describe the type of opening displayed by the sulcus acusticus of *sagitta* otoliths.

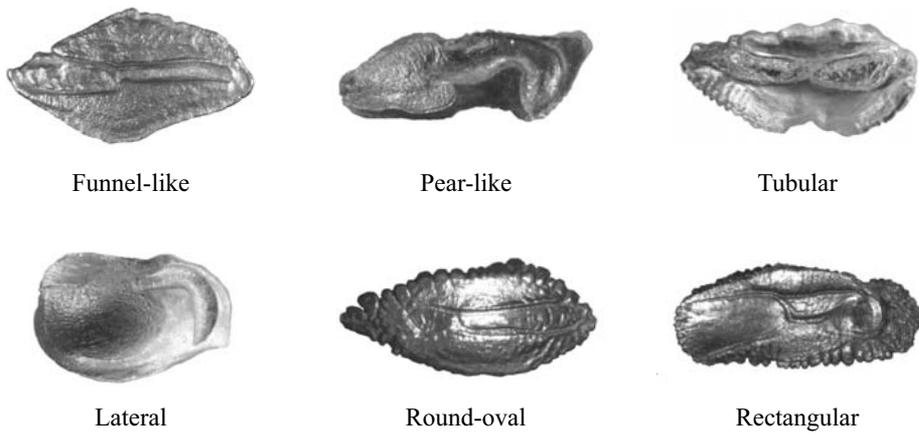


Figure 9. Terms used to describe the shape of ostium of *sagitta* otoliths.

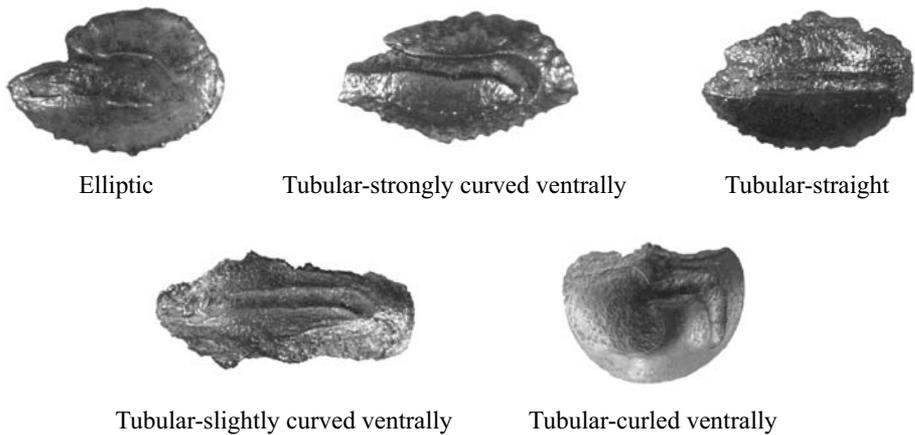


Figure 10. Terms used to describe the shape and curvature of cauda of *sagitta* otoliths.

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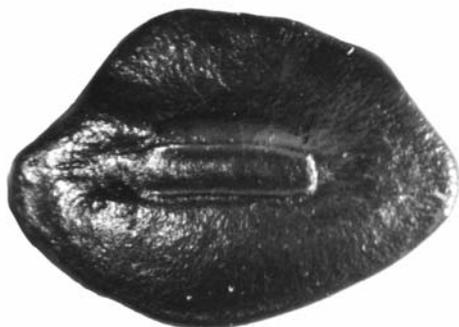
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**Order Anguilliformes****Family Congridae*****Ariosoma opisththalmum* (Ranzani 1839)**

**Distribution and habitat.** Western Atlantic Ocean from Rio de Janeiro to Uruguay (22° S-36° S). Small-sized (TL < 250 mm) benthic marine species. It is rarely fished by bottom trawlers in the outer shelf and upper continental slope (300-600 m) along southern Brazil.

**Exploitation.** Not targeted by any fishery.

**References.** Menezes et al. (2003); Haimovici et al. (2008).



(a) 5 mm OL, 321 mm TL

**Description.** *Shape* pentagonal. *Distal face* convex. *Proximal face* slightly convex. *Anterior margin* angled. *Posterior margin* angled. *Dorsal margin* convex, smooth. *Ventral margin* convex, smooth. *Rostrum* present, short. *Antirostrum* absent. *Sulcus acusticus* opened at the anterior region, closed at central-posterior region. *Ostium* same width and length of cauda, shallow, round-oval. *Cauda* deep, tubular-straight. *Crista* present.

**Material.** Otoliths from 2 specimens, 286 and 321 mm TL, 25.6 and 31.2 g TW, 4.31 and 5 mm OL, and 3.37 and 3.49 mm OH.

**Relationships.** Insufficient data.

*Bassanago albescens* (Barnard 1923)

**Distribution and habitat.** Western Atlantic Ocean, Florida, USA to Uruguay 31° N-36° S). Large-sized (TL > 1,000 m) demersal marine species. It occurs on the upper continental slope, rarely fished by bottom trawlers and discarded on board along southern Brazil.

**Exploitation.** Not targeted by any fishery.

**References.** Menezes et al. (2003); Bernardes et al. (2005); Haimovici et al. (2008) as *Rechias dubius*.

**Description.** Shape elliptic to pentagonal. Distal face convex. Proximal face slightly convex. Anterior margin angled. Posterior margin angled. Dorsal margin angled, smooth. Ventral margin convex to angled, smooth. Rostrum present, prominent. Antirostrum absent. Sulcus acusticus opened at the anterior region, closed at central-posterior region. Ostium same width and shorter than cauda, shallow, round-oval to tubular. Cauda deep, tubular-straight. Crista present.

**Material.** Otoliths from 115 specimens ranging between 370 to 730 mm TL, 53 to 740 g TW, 5.2 to 10 mm OL and 3.5 to 6.49 mm OH.

**Relationships.**

$$TL = 70.872 OL^{0.994} \quad R^2 = 0.87$$

$$TL = 93.973 OH^{1.123} \quad R^2 = 0.83$$

$$TW = 0.0421 OL^{4.23} \quad R^2 = 0.87$$

$$TW = 0.1431 OH^{4.759} \quad R^2 = 0.83$$

$$TW = 1E-09 TL^{4.129} \quad R^2 = 0.95$$

$$OH/OL = \text{min. } 0.51\text{-max. } 0.70$$



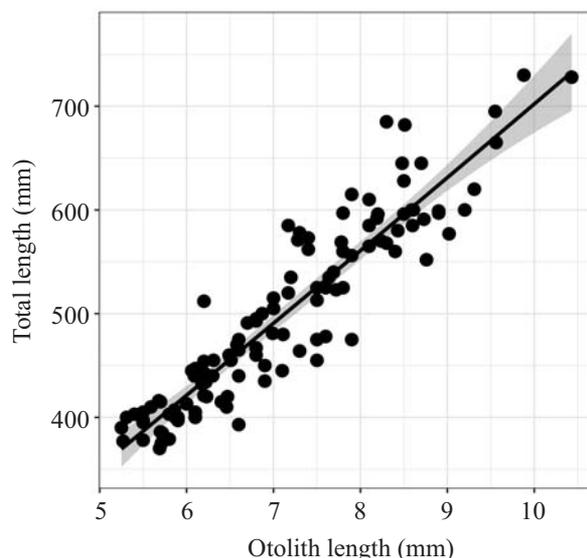
(a) 5.3 mm OL, 370 mm TL



(b) 7.4 mm OL, 520 mm TL



(c) 10.4 OL, 730 mm TL



*Conger orbignianus* Valenciennes 1837

**Distribution and habitat.** Southwestern Atlantic Ocean from southeastern Brazil to northern Argentina (22° S-42° S). Large-sized (TL < 1,500 mm) demersal (benthic) marine species. It occurs in the shelf to the upper continental slope along southern Brazil.

**Exploitation.** Frequently fished in small quantities by bottom trawlers and occasionally landed for bait.

**References.** Menezes et al. (2003); Haimovici et al. (1996).



(a) 6.3 mm OL, 425 mm TL



(b) 10.8 mm OL, 1,058 mm TL

**Description.** *Shape* kidney-shaped to spindle-shaped. *Distal face* straight. *Proximal face* slightly convex. *Anterior margin* round. *Posterior margin* round. *Dorsal margin* angled to convex, smooth. *Ventral margin* convex, smooth. *Rostrum* absent. *Antirostrum* absent. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* same width and shorter than cauda, shallow, undefined. *Cauda* shallow, tubular-straight. *Crista* present.

**Material.** Otoliths from 40 specimens ranging between 425 to 1,155 mm TL, 80 to 2,340 g TW, 6.45 to 10.9 mm OL, and 2.8 to 4.65 mm OH.

**Relationships.**

$$TL = 17.901 OL^{1.716} \quad R^2 = 0.88$$

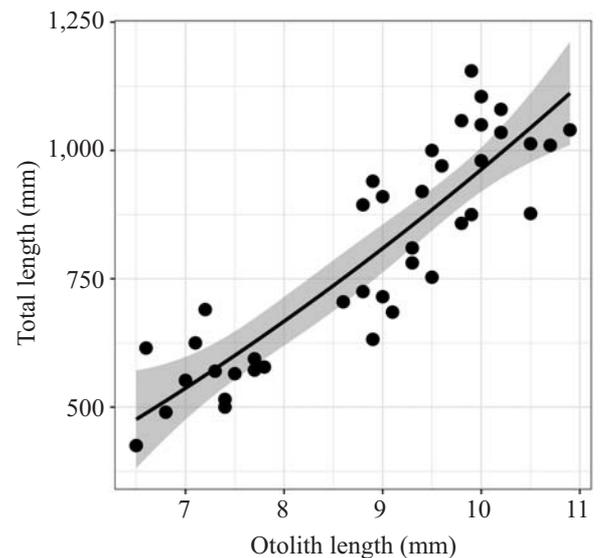
$$TL = 75.977 OH^{1.788} \quad R^2 = 0.81$$

$$TW = 0.0016 OL^{5.850} \quad R^2 = 0.89$$

$$TW = 0.218 OH^{6.098} \quad R^2 = 0.82$$

$$TW = 7E-08 TL^{3.441} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.37\text{-max. } 0.45$$



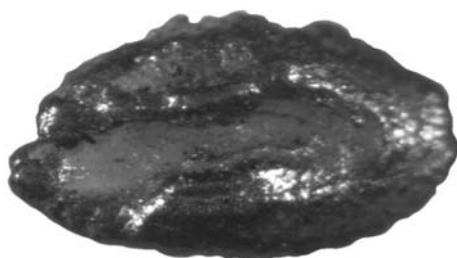
### Family Ophichthidae

#### *Ophichthus gomesii* (Castelnaud 1855)

**Distribution and habitat.** Southwestern Atlantic Ocean from southeastern Brazil to northern Argentina (22° S-42° S). Large-sized (TL < 1,500 mm) demersal (benthic) marine species. It occurs in the shelf to the upper continental slope along southern Brazil. Occasionally caught in small numbers by bottom trawlers and discarded on board.

**Exploitation.** Not targeted by any fishery.

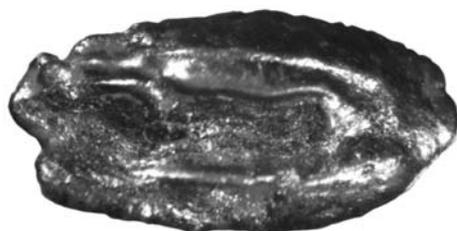
**References.** Haimovici et al. (1996); Menezes et al. (2003).



(a) 1.8 mm OL, 392 mm TL



(b) 2.8 mm OL, 585 mm TL



(c) 3.8 mm OL, 750 mm TL

**Description.** *Shape* elliptic to spindle-shaped. *Distal face* straight. *Proximal face* slightly convex. *Anterior margin* double-peaked. *Posterior margin* round. *Dorsal margin* convex, smooth to sinuate. *Ventral margin* convex, smooth to sinuate. *Rostrum* present, short. *Antirostrum* present. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* same width and shorter than cauda, deep, undefined. *Cauda* shallow, elliptic to tubular-straight. *Crista* present.

**Material.** Otoliths from 40 specimens ranging between 425 to 1,155 mm TL, 80 to 2,340 g TW, 2 to 3.7 mm OL, and 1 to 1.91 mm OH.

#### Relationships.

$$TL = 245.08 OL^{0.831} \quad R^2 = 0.97$$

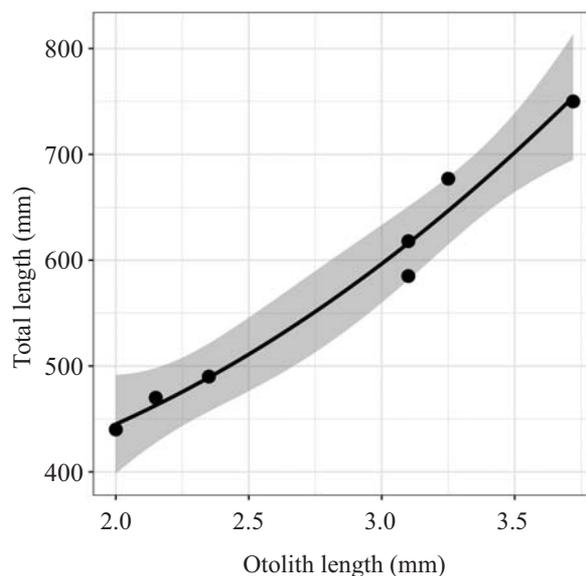
$$TL = 442.29 OH^{0.86} \quad R^2 = 0.87$$

$$TW = 19.236 OL^{2.049} \quad R^2 = 0.94$$

$$TW = 83.544 OH^{2.078} \quad R^2 = 0.82$$

$$TW = 2E-05 TL^{2.484} \quad R^2 = 0.94$$

$$OH/OL = \text{min. } 0.42\text{-max. } 0.52$$



**Order Argentiniformes**  
**Family Argentinidae**  
*Argentina striata* Goode and Bean 1896

**Distribution and habitat.** Western Atlantic: Nova Scotia to Uruguay (46° N-36° S). Small-sized (TL < 250 mm) bathypelagic marine species. It is present in the outer shelf and upper continental slope (50-600 m) along southeastern Brazil. Occasionally fished in small numbers by bottom trawlers and discarded on board.

**Exploitation.** Not targeted by any fishery.

**References.** Menezes et al. (2003); Haimovici et al. (2008).



(a) 2.6 mm OL, 86 mm TL



(b) 7.9 mm OL, 221 mm TL

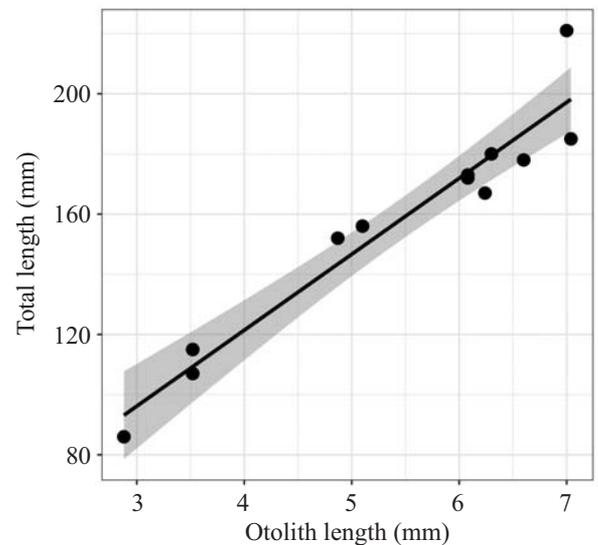
**Description.** Shape pentagonal to oval. Distal face straight. Proximal face slightly convex. Anterior margin angled. Posterior margin flattened. Dorsal margin oblique, smooth to lobate.

*Ventral margin* convex, smooth. *Rostrum* present, short. *Antirostrum* absent. *Sulcus acusticus* opened at the anterior region, closed or opened at posterior region. *Ostium* broader and shorter than cauda, deep, funnel-like. *Cauda* deep, tubular-straight. *Crista* present.

**Material.** Otoliths from 12 specimens ranging between 86 to 221 mm total length (TL), 3.9 to 64.6 g TW, 2.88 to 7.04 mm OL, and 2.08 to 4.8 mm OH.

**Relationships.**

$$\begin{aligned} TL &= 20.436 + 25.546 OL & R^2 &= 0.92 \\ TL &= 46.520 OH^{0.958} & R^2 &= 0.91 \\ TW &= 0.203 OL^{2.819} & R^2 &= 0.93 \\ TW &= 0.537 OH^{3.020} & R^2 &= 0.89 \\ TW &= 3E-06 TL^{3.163} & R^2 &= 0.99 \\ OH/OL &= \text{min. } 0.60\text{-max. } 0.72 \end{aligned}$$



**Order Atheriniformes**  
**Family Atherinopsidae**  
*Atherinella brasiliensis*  
 (Quoy and Gaimard 1825)

**Distribution and habitat.** Southwestern Atlantic Ocean: Venezuela to Rio Grande do Sul (11° N-35° S). Small-sized (TL < 200 mm) brackish water and marine benthopelagic species. It is fished in small numbers in the estuaries and coastal water along southeastern Brazil.

**Exploitation.** Occasionally by small scale fishers with cast nets.

**References.** Menezes et al. (2003); Fischer et al. (2011).



(a) 4 mm OL, 148 mm TL

**Description.** *Shape* elliptic to oval. *Distal face* straight to concave. *Proximal face* convex. *Anterior margin* double-peaked. *Posterior margin* round. *Dorsal margin* convex, sinuate to dentate. *Ventral margin* convex, sinuate. *Rostrum* present, short. *Antirostrum* present. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* broader and shorter than cauda, shallow, rectangular. *Cauda* shallow, tubular-straight. *Crista* absent.

**Material.** Otoliths from 39 specimens ranging between 27 to 155 mm TL, 0.1 to 29.1 g TW, 0.7 to 4.1 mm OL, and 0.5 to 2.5 mm OH.

**Relationships.**

$$TL = 34.173 OL^{1.056} \quad R^2 = 0.98$$

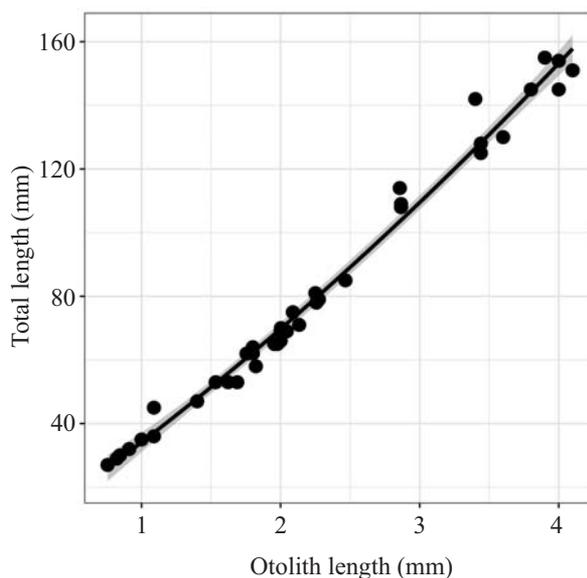
$$TL = 55.037 OH^{1.179} \quad R^2 = 0.97$$

$$TW = 0.234 OL^{3.325} \quad R^2 = 0.98$$

$$TW = 1.041 OH^{3.725} \quad R^2 = 0.98$$

$$TW = 4E-06 TL^{3.129} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.51\text{-max. } 0.82$$



***Odontesthes argentinensis*** (Valenciennes 1835)

**Distribution and habitat.** South America: southern Brazil, Argentina and Uruguay. Mid-sized (TL > 400 mm) freshwater, estuarine and marine species.

**Exploitation.** Fished with gillnets by small scale fishers in estuaries and coastal waters.

**References.** Menezes et al. (2003); Fischer et al. (2011).

**Material.** Otoliths from 67 specimens ranging between 23 to 421 mm TL, 0.05 to 449 g TW, 0.4 to 6.95 mm OL, and 0.31 to 3.5 mm OH.

**Relationships.**

$$TL = 52.432 OL^{0.987} \quad R^2 = 0.97$$

$$TL = 77.629 OH^{1.117} \quad R^2 = 0.96$$

$$TW = 0.753 OL^{3.048} \quad R^2 = 0.97$$

$$TW = 2.599 OH^{3.447} \quad R^2 = 0.96$$

$$TW = 3E-06 TL^{3.124} \quad R^2 = 0.99$$

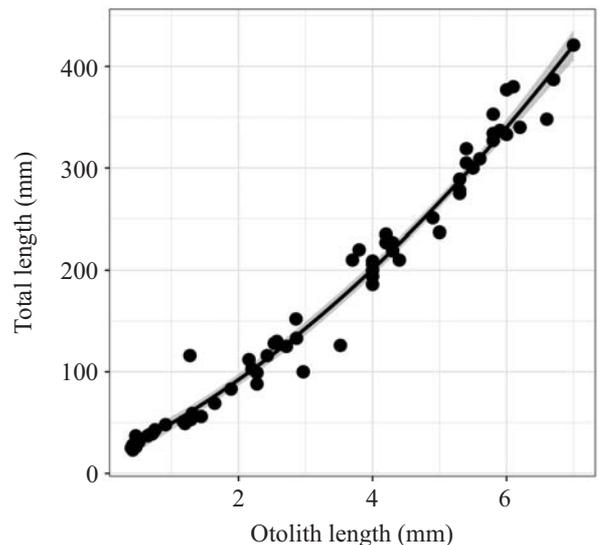
$$OH/OL = \text{min. } 0.46\text{-max. } 0.93$$



(a) 3.8 mm OL, 194 mm TL



(b) 8.3 mm OL, 421 mm TL



**Description.** *Shape* semicircular to spindle-shaped. *Distal face* concave. *Proximal face* convex. *Anterior margin* angled. *Posterior margin* round to oblique. *Dorsal margin* angled, smooth to sinuate. *Ventral margin* convex to flattened, sinuate. *Rostrum* present, short. *Antirostrum* present. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* broader and shorter than cauda, deep, rectangular. *Cauda* deep, tubular-straight. *Crista* present.

*Odontesthes bonariensis* (Valenciennes 1835)

**Distribution and habitat.** Southwestern Atlantic Ocean from southern Brazil to Argentina. Mid-sized (TL > 400 mm) freshwater, estuarine and marine species. Common in southern Brazil.

**Exploitation.** Fished with gillnets by small scale fishers in estuaries and coastal waters.

**References.** Menezes et al. (2003).



(a) 7 mm OL, 355 mm TL

**Description.** *Shape* cuneiform. *Distal face* slightly concave. *Proximal face* convex. *Anterior margin* angled. *Posterior margin* oblique. *Dorsal margin* convex to angled, sinuate. *Ventral margin* convex, sinuate. *Rostrum* present, prominent. *Antirostrum* present. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* broader and shorter than cauda, deep, rectangular. *Cauda* deep, tubular-straight. *Crista* absent.

**Material.** Otoliths from 7 specimens ranging between 264 to 390 mm TL, 206 to 439 g TW, 5.8 to 7.64 mm OL, and 3.1 to 4.23 mm OH.

**Relationships.**

$$TL = 3.7743 + 50.341 OL \quad R^2 = 0.94$$

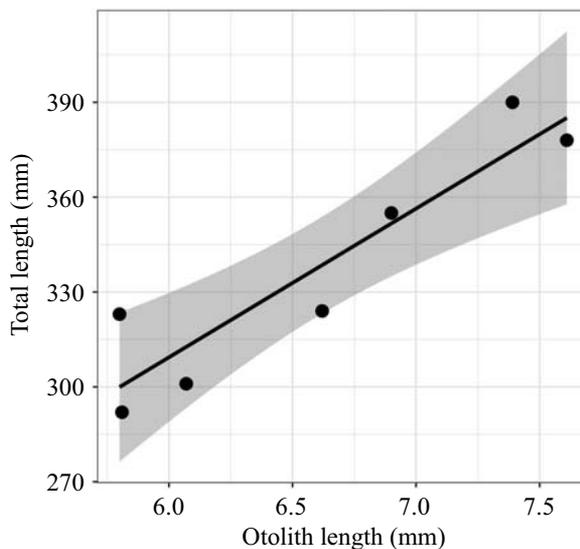
$$TL = 134.02 OH^{0.735} \quad R^2 = 0.85$$

$$TW = 17.91 OL^{1.570} \quad R^2 = 0.71$$

$$TW = 68.81 OH^{1.286} \quad R^2 = 0.67$$

$$TW = 3E-03 TL^{2.001} \quad R^2 = 0.94$$

$$OH/OL = \text{min. } 0.47\text{-max. } 0.57$$



**Order Aulopiformes**  
**Family Chlorophthalmidae**  
*Chlorophthalmus agassizi* Bonaparte 1840

**Distribution and habitat.** Atlantic Ocean and Mediterranean Sea, western Atlantic from New England, USA to Uruguay. Small-sized (TL < 250 mm) demersal marine species. It is present in the outer shelf and upper continental slope (100-600 m) along southern Brazil. Occasionally fished in small numbers by bottom trawlers and discarded on board.

**Exploitation.** Not targeted by any fishery.

**References.** Menezes et al. (2003); Haimovici et al. (2008).



(a) 2.4 mm OL, 79 mm TL



(b) 4.2 mm OL, 164 mm TL

**Description.** *Shape* spindle-shaped. *Distal face* straight. *Proximal face* slightly convex. *Anterior margin* round to flattened. *Posterior margin* round to angled. *Dorsal margin* oblique, sinuate. *Ventral margin* oblique to convex, smooth. *Rostrum* absent. *Antirostrum* absent. *Sulcus acusticus* opened at the anterior region, opened at posterior region. *Ostium* same width and shorter than

*cauda*, deep, undefined. *Cauda* deep, tubular-straight. *Crista* present.

**Material.** Otoliths from 32 specimens ranging between 79 to 164 mm TL, 3.2 to 30.2 g TW, 2.79 to 4.4 mm OL, and 1.22 to 1.8 mm OH.

**Relationships.**

$$TL = -29.28 + 45.673 OL \quad R^2 = 0.73$$

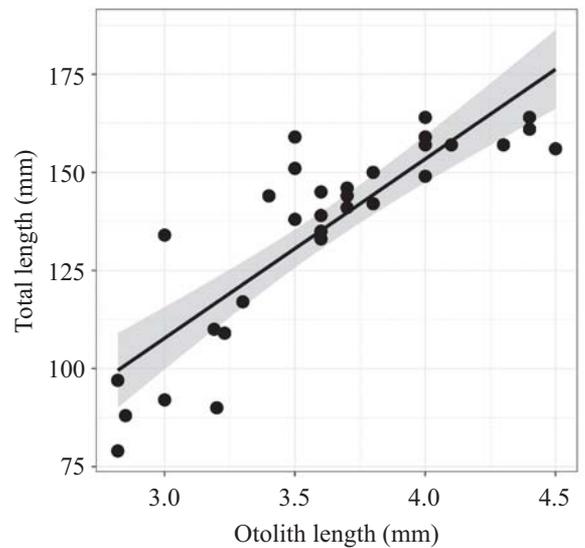
$$TL = 60.11 OH^{1.711} \quad R^2 = 0.79$$

$$TW = 0.026 OL^{4.907} \quad R^2 = 0.86$$

$$TW = 1.107 OH^{5.498} \quad R^2 = 0.79$$

$$TL = 3E-06 TL^{3.161} \quad R^2 = 0.96$$

$$OH/OL = \text{min. } 0.39\text{-max. } 0.49$$

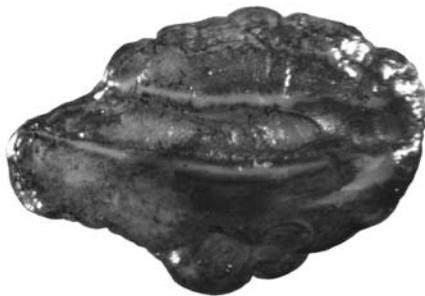


*Parasudis truculenta* (Goode and Bean 1896)

**Distribution and habitat.** Western Atlantic: New England, USA to southern Brazil. Small-sized (TL < 300 mm) demersal marine species. It is present in the outer shelf and upper continental slope (200-600 m) in southern Brazil. Occasionally fished in small numbers by bottom trawlers and discarded on board.

**Exploitation.** Not targeted by any fishery.

**References.** Menezes et al. (2003); Bernardes et al. (2005); Haimovici et al. (2008).



(a) 2 mm OL, 100 mm TL



(b) 4 mm OL, 252 mm TL

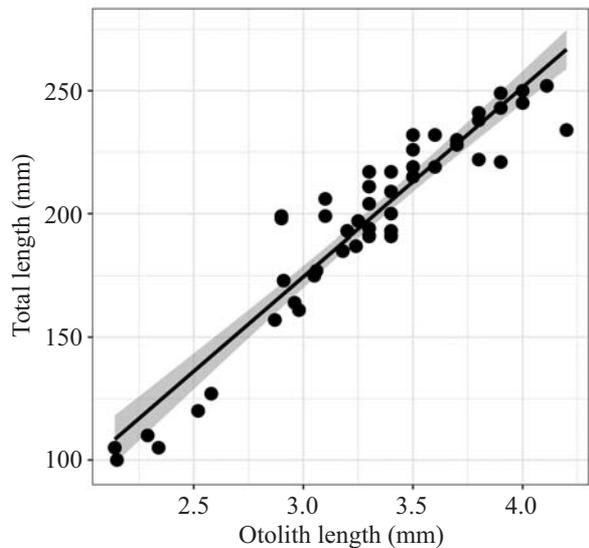
**Description.** Shape elliptic to oval. Distal face straight. Proximal face straight. Anterior margin angled. Posterior margin round to flattened. Dorsal margin convex, smooth to lobate. Ventral margin convex, lobate to dentate. Rostrum present, prominent. Antirostrum present. Sulcus acus-

ticus opened at the anterior region, closed or opened at posterior region. Ostium broader or same width and shorter than cauda, deep, tubular. Cauda deep, tubular-straight. Crista present.

**Material.** Otoliths from 32 specimens ranging between 79 to 164 mm TL, 3.2 to 30.2 g TW, 2.79 to 4.4 mm OL, and 1.22 to 1.8 mm OH.

**Relationships.**

$$\begin{aligned} TL &= -57.97 + 77.446 OL & R^2 &= 0.91 \\ TL &= 74.514 OH^{1.096} & R^2 &= 0.79 \\ TW &= 0.156 OL^{4.761} & R^2 &= 0.86 \\ TW &= 1.907 OH^{3.613} & R^2 &= 0.79 \\ TW &= 5E-07 TL^{3.486} & R^2 &= 0.96 \\ OH/OL &= \text{min. } 0.61\text{-max. } 0.89 \end{aligned}$$



**Family Synodontidae**  
***Saurida caribbaea* Breder 1927**

**Distribution and habitat.** Western Atlantic: northeastern Florida to Uruguay. Small-sized (TL < 200 mm) demersal marine species. It is present in the outer shelf and upper continental slope (200-600 m) along southern Brazil. Occasionally fished in small numbers by bottom trawlers and discarded on board.

**Exploitation.** Not targeted by any fishery.

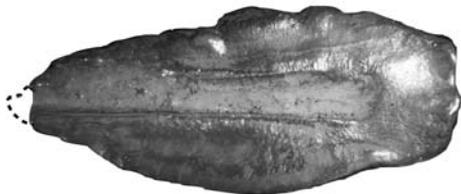
**References.** Menezes et al. (2003); Bernardes et al. (2005); Haimovici et al. (2008).



(a) 1.7 mm OL, 69 mm TL



(b) 2.8 mm OL, 90 mm TL



(c) 5.1 mm OL, 134 mm TL

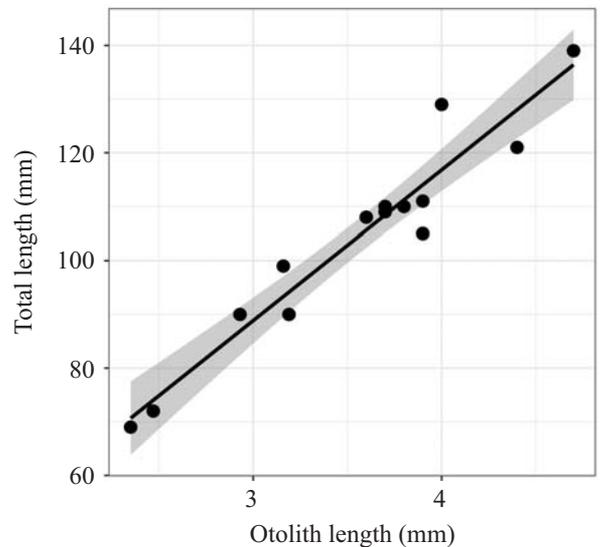
**Description.** *Shape* cuneiform. *Distal face* slightly convex. *Proximal face* straight. *Anterior margin* angled. *Posterior margin* flattened to oblique.

*Dorsal margin* convex, lobed to smooth. *Ventral margin* convex, sinuate to smooth. *Rostrum* present, prominent. *Antirostrum* absent. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* broader and shorter than cauda, shallow, funnel-like. *Cauda* shallow, tubular-straight. *Crista* present.

**Material.** Otoliths from 14 specimens ranging between 69 to 139 mm TL, 1.4 to 17.6 g TW, 1.24 to 4.8 mm OL, and 0.63 to 1.85 mm OH.

**Relationships.**

$$\begin{aligned} \text{TL} &= 36.061 + 19.38 \text{ OL} & R^2 &= 0.92 \\ \text{TL} &= 82.366 \text{ OH}^{0.602} & R^2 &= 0.71 \\ \text{TW} &= 0.611 \text{ OL}^{1.817} & R^2 &= 0.75 \\ \text{TW} &= 2.505 \text{ OH}^{2.159} & R^2 &= 0.71 \\ \text{TW} &= 4\text{E-}07 \text{ TL}^{3.569} & R^2 &= 0.93 \\ \text{OH/OL} &= \text{min. } 0.38\text{-max. } 0.51 \end{aligned}$$

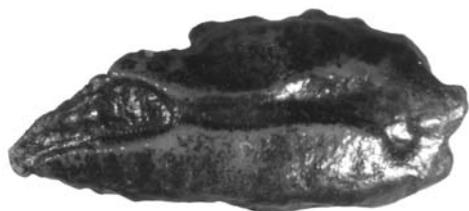


*Synodus foetens* (Linnaeus 1766)

**Distribution and habitat.** Western Atlantic: Massachusetts, USA and northern Gulf of Mexico to southern Brazil. Mid-sized (TL < 500 mm) brackish and marine coastal waters species.

**Exploitation.** It is incidentally caught by bottom trawlers in the continental shelf north of Santa Catarina along southern Brazil. Probably landed in small numbers.

**References.** Robins and Ray (1986); Menezes et al. (2003).



(a) 3.7 mm OL, 221 mm TL



(b) 9 mm OL, 470 mm TL

**Description.** *Shape* cuneiform. *Distal face* slightly concave to straight. *Proximal face* slightly convex. *Anterior margin* angled. *Posterior margin* round. *Dorsal margin* convex, smooth. *Ventral margin* flattened to convex, smooth. *Rostrum* present, prominent. *Antirostrum* absent. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* broader and shorter than cauda, deep, funnel-like. *Cauda* deep, tubular-strongly curved ventrally. *Crista* absent.

**Material.** Otoliths from 20 specimens ranging between 275 to 470 mm TL, 140 to 640 g TW, 4.8 to 7.87 mm OL, and 2.34 to 3.47 mm OH.

**Relationships.**

$$TL = 48.585 + 46.978 OL \quad R^2 = 0.74$$

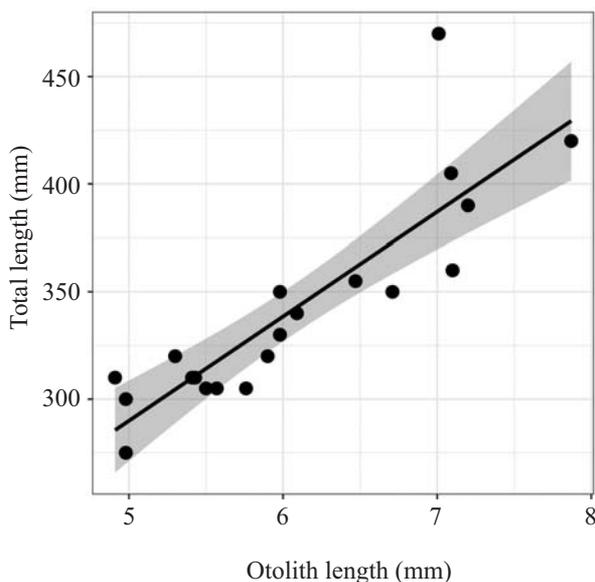
$$TL = 136.74 OH^{0.911} \quad R^2 = 0.56$$

$$TW = 10.227 OL^{1.760} \quad R^2 = 0.65$$

$$TW = 19.230 OH^{2.569} \quad R^2 = 0.54$$

$$TW = 2E-05 TL^{2.767} \quad R^2 = 0.94$$

$$OH/OL = \text{min. } 0.38\text{-max. } 0.62$$



*Trachinocephalus myops* (Forster 1801)

**Distribution and habitat.** Worldwide in tropical and warm temperate waters. Mid-sized (TL < 500 mm) demersal, brackish water and coastal marine species.

**Exploitation.** It is incidentally caught by bottom trawlers in the continental shelf north of Santa Catarina along southern Brazil.

**References.** Sulak (1990); Menezes et al. (2003).

**Material.** Otoliths from 3 specimens ranging between 171 to 275 mm TL, 39.4 to 73.2 g TW, 6.79 to 11.2 mm OL, and 3.58 to 6.61 mm OH.

**Relationships.** Insufficient data.



(a) 6.8 mm OL, 171 mm TL



(b) 11.2 mm OL, 275 mm TL

**Description.** *Shape* oval. *Distal face* concave. *Proximal face* convex. *Anterior margin* angled. *Posterior margin* round. *Dorsal margin* convex, smooth to sinuate. *Ventral margin* convex, smooth. *Rostrum* present, prominent. *Antirostrum* absent. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* same width and shorter than cauda, deep, funnel-like. *Cauda* deep, tubular-straight. *Crista* present.

### Order Batrachoidiformes

#### Family Batrachoididae

#### *Porichthys porosissimus* (Cuvier 1829)

**Distribution and habitat.** Southwest Atlantic: Espírito Santo, Brazil to Argentina. Small-sized (TL < 350 mm) demersal marine species. It is present in the continental shelf along southern Brazil.

**Exploitation.** Frequent in catches of bottom trawlers, larger specimens landed in small quantities.

**References.** Haimovici et al. (1996); Menezes et al. (2003).



(a) 1.4 mm OL, 35 mm TL



(b) 5.5 mm OL, 138 mm TL



(c) 11.5 mm OL, 294 mm TL

**Description.** Shape discoidal to irregular. Distal face straight. Proximal face straight. Anterior margin flattened. Posterior margin round to angled. Dorsal margin angled, smooth to dentate. Ventral margin straight, smooth. Rostrum absent. Antirostrum absent. Sulcus acusticus opened at the anterior region, closed at posterior margin. Ostium same width and length of cauda, shallow, round-oval. Cauda shallow, elliptic to tubular-straight. Crista absent.

**Material.** Otoliths from 54 specimens ranging between 25 to 334 mm TL, 0.12 to 429 g TW, 1.0 to 11.6 mm OL, and 1.0 to 9.25 mm OH.

#### Relationships.

$$TL = 24.395 OL^{1.019} \quad R^2 = 0.99$$

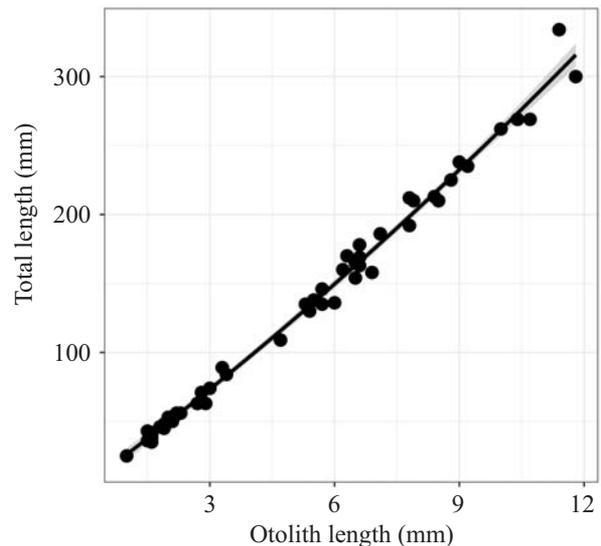
$$TL = 20.374 OH^{1.209} \quad R^2 = 0.99$$

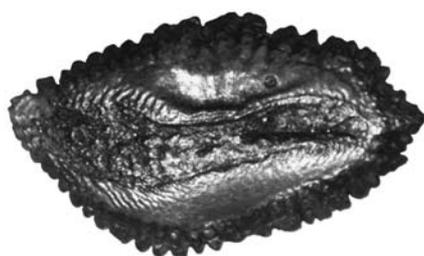
$$TW = 0.082 OL^{3.301} \quad R^2 = 0.99$$

$$TW = 0.046 OH^{3.914} \quad R^2 = 0.99$$

$$TW = 3E-06 TL^{3.236} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.76\text{-max. } 1.17$$



**Order Beloniformes****Family Exocoetidae***Exocoetus volitans* Linnaeus 1758**Distribution and habitat.** Circumtropical.**Exploitation.** Not targeted by any fishery.**References.** Menezes et al. (2003).

(a) 6.1 mm OL, 152 mm TL

**Description.** *Shape* rhomboidal. *Distal face* slightly concave. *Proximal face* slightly convex. *Anterior margin* angled. *Posterior margin* angled. *Dorsal margin* convex, sinuate to dentate. *Ventral margin* angled, sinuate to dentate. *Rostrum* present, prominent. *Antirostrum* absent. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* broader and shorter than cauda, shallow, round-oval. *Cauda* shallow, tubular-slightly curved ventrally. *Crista* present.

**Material.** Otoliths from 1 specimen of 152 mm TL, 24 g TW, 6.07 mm OL and 3.47 mm OH.

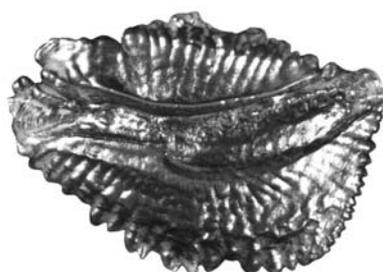
**Relationships.** Insufficient data.

**Order Beryciformes**  
**Family Berycidae**  
*Beryx splendens* Lowe 1834

**Distribution and habitat.** Circumglobal, excluding the northeast Pacific and Mediterranean Sea. Mid-sized (TL < 500 mm) demersal marine species. It is present in the outer shelf and upper continental slope (300-600 m) along southern Brazil. Occasionally fished and landed in small numbers by bottom trawlers.

**Exploitation.** Not targeted by any fishery.

**References.** Menezes et al. (2003); Haimovici et al. (1994, 2008).



(a) 7.9 mm OL, 165 mm TL



(b) 14.5 mm OL, 367 mm TL

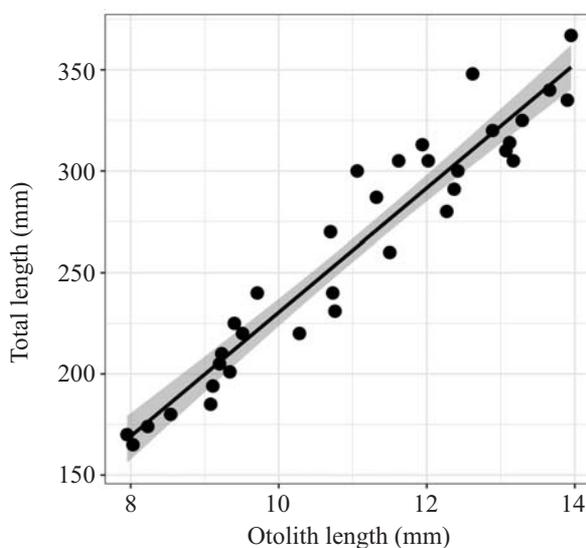
**Description.** *Shape* rhomboidal to oval. *Distal face* slightly concave. *Proximal face* slightly convex. *Anterior margin* round. *Posterior margin* angled. *Dorsal margin* convex, sinuate. *Ventral margin* convex, sinuate to dentate. *Rostrum* absent. *Antirostrum* absent. *Sulcus acusticus*

opened at the anterior region, opened at posterior region. *Ostium* broader and same length of cauda, deep, tubular. *Cauda* deep, tubular-straight. *Crista* present.

**Material.** Otoliths from 34 specimens ranging between 165 to 367 mm TL, 58 to 638 g TW, 7.13 to 13.95 mm OL, and 5.19 to 10.5 mm OH.

**Relationships.**

$$\begin{aligned} TL &= -75.63 + 30.60 OL & R^2 &= 0.92 \\ TL &= 23.020 OH^{1.172} & R^2 &= 0.95 \\ TW &= 0.024 OL^{3.806} & R^2 &= 0.91 \\ TW &= 0.135 OH^{3.576} & R^2 &= 0.95 \\ TW &= 6E-06 TL^{3.133} & R^2 &= 0.97 \\ OH/OL &= \text{min. } 0.64\text{-max. } 0.77 \end{aligned}$$



**Order Clupeiformes****Family Clupeidae*****Brevoortia pectinata*** (Jenyns 1842)

**Distribution and habitat.** Southwestern Atlantic Ocean: São Paulo to northern Argentina (23° S-41° S). Small-sized (TL < 350 mm) estuarine and demersal marine species. It is caught by gillnets and purse seines in estuaries and coastal waters (< 50 m) along southern Brazil. Fished with gillnets and occasionally by bottom trawlers or purse seiners. Usually discarded on board or used as bait.

**Exploitation.** Not targeted by any fishery.

**References.** Haimovici et al. (1996); Menezes et al. (2003).



(a) 3.2 mm OL, 260 mm TL

**Description.** *Shape* rectangular. *Distal face* straight. *Proximal face* slightly convex. *Anterior margin* double-peaked. *Posterior margin* round. *Dorsal margin* flattened, sinuate. *Ventral margin* convex, sinuate. *Rostrum* present, prominent. *Antirostrum* present. *Sulcus acusticus* opened at the anterior region, closed at posterior margin. *Ostium* same width and length of cauda, shallow, undefined. *Cauda* shallow, elliptic to tubular-straight. *Crista* present.

**Material.** Otoliths from 42 specimens ranging between 31 to 330 mm TL, 0.28 to 440 g TW, 0.44 to 4.16 mm OL, and 0.59 to 2.1 mm OH.

**Relationships.**

$$TL = -3.265 + 82.017 OL \quad R^2 = 0.96$$

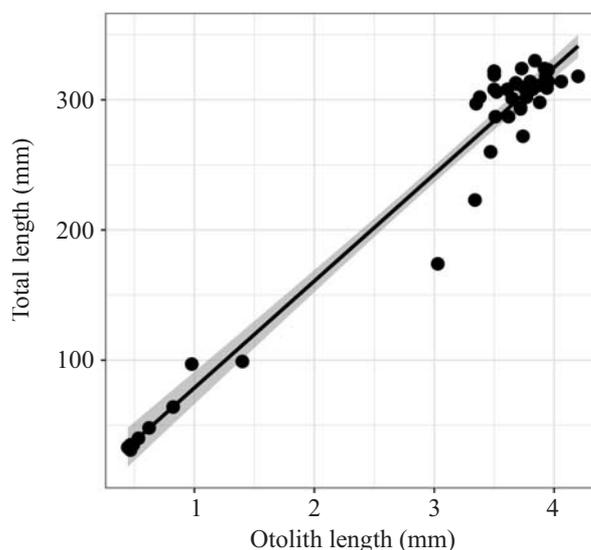
$$TL = 83.482 OH^{1.973} \quad R^2 = 0.87$$

$$TW = 4.498 OL^{3.313} \quad R^2 = 0.99$$

$$TW = 6.064 OH^{6.170} \quad R^2 = 0.86$$

$$TW = 1E-06 TL^{3.153} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.45\text{-max. } 0.81$$



### *Harengula clupeiola* (Cuvier 1829)

**Distribution and habitat.** Western Atlantic: Gulf of Mexico and southeastern Florida to southern Brazil. Small-sized (TL < 200 mm) brackish and pelagic-neritic marine species. It was recorded in the Patos Lagoon Estuary and shallow coastal waters along southern Brazil.

**Exploitation.** Not targeted by any fishery.

**References.** Figueiredo and Menezes (1978); Fischer et al. (2011).



(a) 3.1 mm OL, 160 mm TL

**Description.** *Shape* rectangular. *Distal face* slightly concave. *Proximal face* slightly convex. *Anterior margin* double-peaked. *Posterior margin* round. *Dorsal margin* flattened, smooth to sinuate. *Ventral margin* convex, sinuate. *Rostrum* present, prominent. *Antirostrum* present. *Sulcus acusticus* opened at the anterior region, closed at posterior margin. *Ostium* same width and length of cauda, shallow, undefined. *Cauda* shallow, elliptic. *Crista* present.

**Material.** Otoliths from 5 specimens ranging between 72 to 160 mm TL, 4.5 to 49 g TW, 1.26 to 3.19 mm OL, and 0.68 to 1.8 mm OH.

### Relationships.

$$TL = 8.1519 + 49.357 OL \quad R^2 = 0.99$$

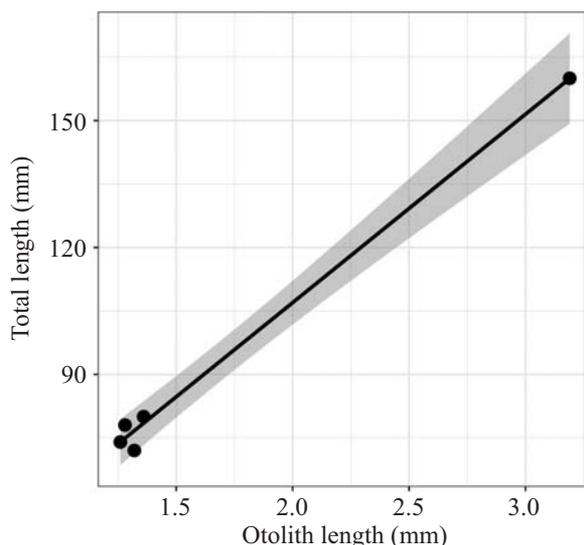
$$TL = 83.482 OH^{1.973} \quad R^2 = 0.87$$

$$TW = 4.498 OL^{3.313} \quad R^2 = 0.99$$

$$TW = 6.064 OH^{6.170} \quad R^2 = 0.86$$

$$TL = 1E-06 TW^{3.153} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.52\text{-max. } 0.61$$



**Family Dromosomatidae**  
*Sardinella aurita* Valenciennes 1847

**Distribution and habitat.** Gulf of Mexico to Argentina. Small-sized (TL < 300 mm) pelagic marine species.

**Exploitation.** An important purse seine fishery mostly north of Santa Catarina along southern Brazil, incidentally caught in small quantities in Rio Grande do Sul.

**References.** Lima and Castello (1995); Menezes et al. (2003).



(a) 0.9 mm OL, 108 mm TL



(b) 1.8 mm OL, 253 mm TL

**Description.** *Shape* rectangular. *Distal face* straight. *Proximal face* straight. *Anterior margin* double-peaked. *Posterior margin* round. *Dorsal margin* flattened, sinuate. *Ventral margin* convex, sinuate. *Rostrum* present, prominent. *Antirostrum* present. *Sulcus acusticus* opened at the anterior region, closed at posterior margin. *Ostium* same width and length of cauda, shallow, undefined. *Cauda* shallow, elliptic. *Crista* present.

**Material.** Otoliths from 25 specimens ranging between 102 to 278 mm TL, 6.7 to 242 g TW, 1.18 to 4.35 mm OL, and 0.08 to 1.83 mm OH.

**Relationships.**

$$TL = 32.733 + 48.573 OL \quad R^2 = 0.79$$

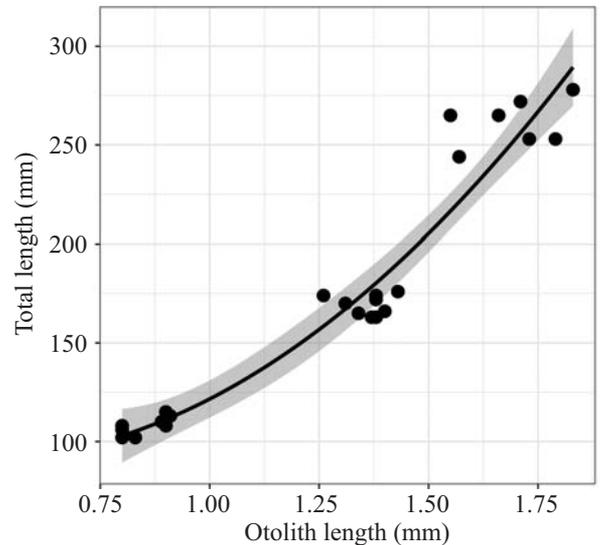
$$TL = 127.38 OH^{1.209} \quad R^2 = 0.94$$

$$TW = 5.324 OL^{2.314} \quad R^2 = 0.81$$

$$TW = 19.384 OH^{4.100} \quad R^2 = 0.97$$

$$TW = 3E-06 TL^{3.217} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.07\text{-max. } 0.46$$



**Note.** We preferred OH instead of OL in the plot relationship due to the fragility of otolith ostium, which increases the risk of breakage.

**Family Engraulidae**  
*Anchoa marinii* Hildebrand 1943

**Distribution and habitat.** Southwest Atlantic from southeastern Brazil to Argentina (22° S-40° S). Small-sized (TL < 140 mm) benthopelagic estuaries and coastal species. It occurs in estuarine and coastal waters along southern Brazil.

**Exploitation.** Not targeted by any fishery.

**References.** Chao et al. (1982); Menezes et al. (2005); Fischer et al. (2011).



(a) 2.4 mm OL, 67 mm TL



(b) 2.9 mm OL, 80 mm TL

**Description.** Shape oval. Distal face straight to slightly concave. Proximal face slightly convex. Anterior margin double-peaked. Posterior margin round. Dorsal margin convex, sinuate. Ventral margin convex, serrate. Rostrum present, prominent. Antirostrum present. Sulcus acusticus opened at the anterior region, closed at central region. Ostium same width and length of cauda, shallow, funnel-like to undefined. Cauda shallow, elliptic. Crista present.

**Material.** Otoliths from 43 specimens ranging between 34 to 115 mm TL, 0.23 to 8 g TW, 1.44 to 4.08 mm OL, and 1.12 to 2.4 mm OH.

**Relationships.**

$$TL = -1.385 + 28.126 OL \quad R^2 = 0.95$$

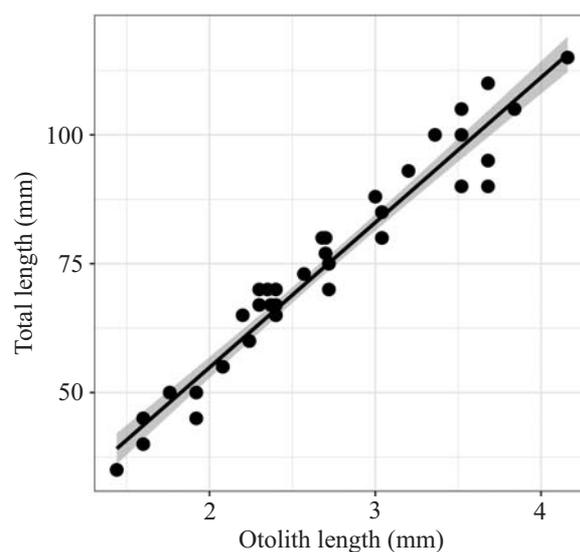
$$TL = 34.719 OH^{1.362} \quad R^2 = 0.92$$

$$TW = 0.089 OL^{3.177} \quad R^2 = 0.89$$

$$TW = 0.215 OH^{4.063} \quad R^2 = 0.86$$

$$TW = 7E-06 TL^{2.939} \quad R^2 = 0.97$$

$$OH/OL = \text{min. } 0.57\text{-max. } 0.78$$

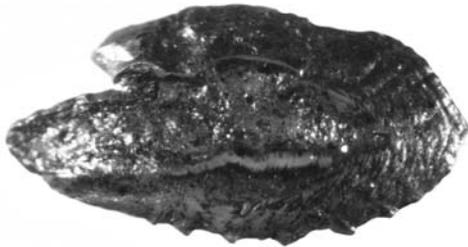


*Engraulis anchoita* Hubbs and Marini 1935

**Distribution and habitat.** Southwest Atlantic: north of Rio de Janeiro, Brazil to San Jorge Gulf, Argentina (22° S-47° S). Small-sized (TL < 200 mm) benthopelagic marine species.

**Exploitation.** It is fished by purse seiners mainly for live bait along southern Brazil.

**References.** Lima and Castello (1995); Menezes et al. (2003); Cousseau and Perrota (2013).



(a) 5.3 mm OL, 175 mm TL

**Description.** Shape elliptic. Distal face straight. Proximal face slightly convex. Anterior margin double-peaked. Posterior margin angled. Dorsal margin convex, sinuate. Ventral margin convex, serrate. Rostrum present, prominent. Antirostrum present. Sulcus acusticus opened at the anterior region, closed at posterior region. Ostium same width and length of cauda, shallow, undefined. Cauda shallow, elliptic. Crista present.

**Material.** Otoliths from 32 specimens ranging between 62 to 180 mm TL, 1.3 to 33.4 g TW, 1.85 to 4.34 mm OL, and 1.05 to 2.33 mm OH.

**Relationships.**

$$TL = 27.364 OL^{1.285} \quad R^2 = 0.97$$

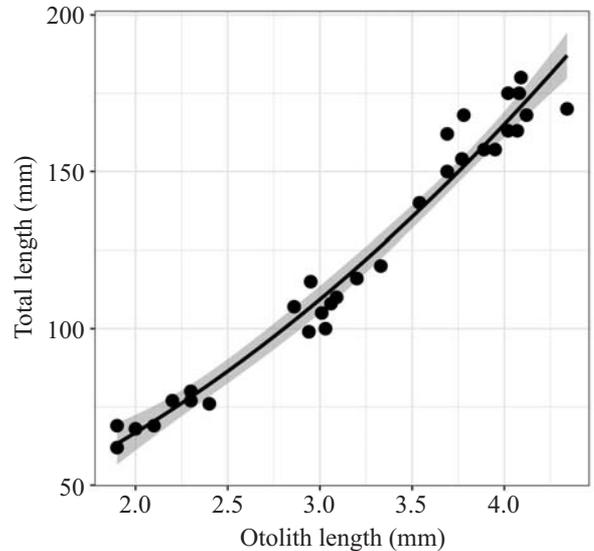
$$TL = 58.547 OH^{1.361} \quad R^2 = 0.96$$

$$TW = 0.097 OL^{4.043} \quad R^2 = 0.98$$

$$TW = 1.067 OH^{4.286} \quad R^2 = 0.97$$

$$TW = 3E-06 TL^{3.116} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.47\text{-max. } 0.58$$



***Lycengraulis grossidens***  
(Spix and Agassiz 1829)

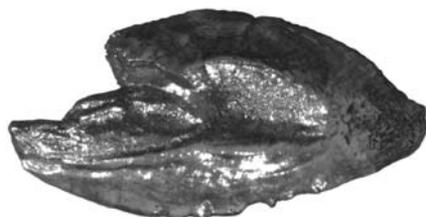
**Distribution and habitat.** Western Atlantic from Venezuela to northern Patagonia in Argentina (19° N-41° S). Small-sized (TL < 300 mm) fresh-water, brackish, marine, pelagic-neritic, anadromous species. It is fished in small quantities in estuaries and shallow coastal waters with gillnets and beach seines along southern Brazil.

**Exploitation.** Not targeted by any fishery.

**References.** Menezes et al. (2003); Fischer et al. (2011); Mai et al. (2014).



(a) 2.8 mm OL, 115 mm TL



(b) 4.8 mm OL, 197 mm TL

**Description.** Shape elliptic to fusiform. Distal face straight. Proximal face slightly convex. Anterior margin double-peaked. Posterior margin angled. Dorsal margin convex, smooth. Ventral margin convex, serrate. Rostrum present, prominent. Antirostrum present. Sulcus acusticus opened at the anterior region, closed at posterior region. Ostium same width and length of cauda, deep, funnel-like. Cauda shallow, elliptic. Crista present.

**Material.** Otoliths from 47 specimens ranging between 37 to 245 mm TL, 0.2 to 125.3 g TW, 0.72 to 5.12 mm OL, and 0.54 to 2.4 mm OH.

**Relationships.**

$$TL = 42.557 OL^{0.980} \quad R^2 = 0.97$$

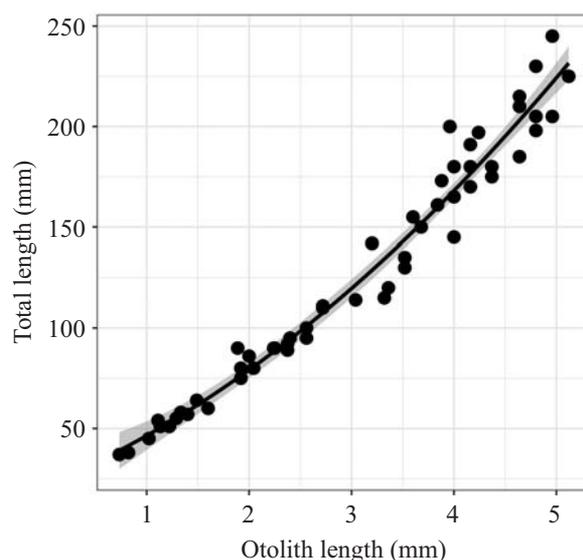
$$TL = 64.150 OH^{1.297} \quad R^2 = 0.96$$

$$TW = 0.351 OL^{3.215} \quad R^2 = 0.96$$

$$TW = 1.357 OH^{4.239} \quad R^2 = 0.94$$

$$TW = 1E-06 TL^{3.314} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.47\text{-max. } 0.75$$

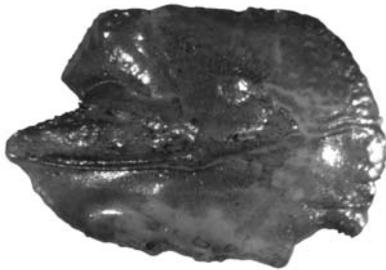


**Family Pristigasteridae**  
***Pellona harroweri*** (Fowler 1917)

**Distribution and habitat.** Western Atlantic from Panama to southern Brazil. Small-sized (TL < 200 mm) brackish, marine coastal, pelagic-neritic species. It is recorded in the Patos Lagoon Estuary and shallow coastal waters along southern Brazil.

**Exploitation.** Not targeted by any fishery.

**References.** Menezes et al. (2003); Fischer et al. (2011).



(a) 3.2 mm OL, 105 mm TL



(b) 5 mm OL, 175 mm TL

**Description.** *Shape* rectangular. *Distal face* slightly concave. *Proximal face* slightly convex. *Anterior margin* double-peaked. *Posterior margin* round. *Dorsal margin* flattened, smooth. *Ventral margin* convex, serrate. *Rostrum* present, prominent. *Antirostrum* present. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* broader and larger than cauda, deep, funnel-like to undefined. *Cauda* shallow, elliptic to tubular-straight. *Crista* present.

**Material.** Otoliths from 10 specimens ranging between 105 to 175 mm TL, 11 to 51 g TW, 3.21 to 4.82 mm OL, and 2.32 to 3.11 mm OH.

**Relationships.**

$$TL = -25.44 + 40.480 OL \quad R^2 = 0.73$$

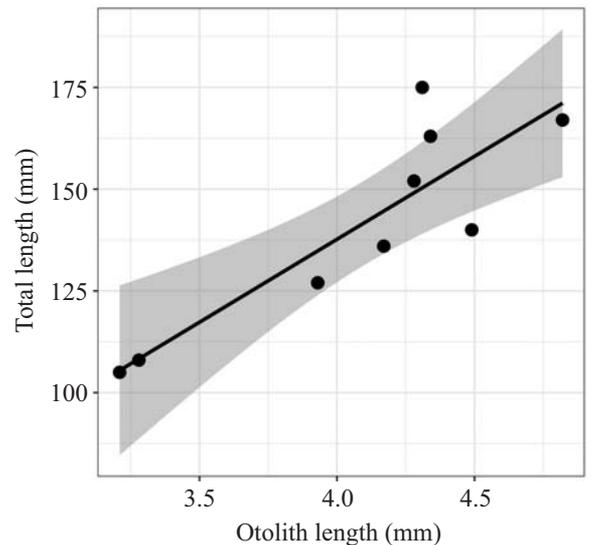
$$TL = 31.637 OH^{1.434} \quad R^2 = 0.78$$

$$TW = 0.126 OL^{3.829} \quad R^2 = 0.86$$

$$TW = 0.236 OH^{4.601} \quad R^2 = 0.82$$

$$TW = 7E-06 TL^{3.091} \quad R^2 = 0.98$$

$$OH/OL = \text{min. } 0.65\text{-max. } 0.74$$



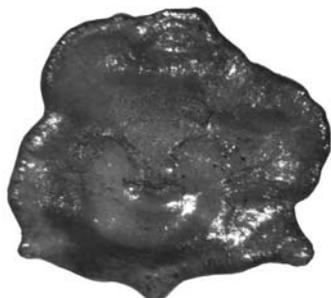
**Order Gadiformes**  
**Family Bregmacerotidae**

*Bregmaceros atlanticus* Goode and Bean 1886

**Distribution and habitat.** Atlantic and Indian oceans and Mediterranean Sea. Southwards to Uruguay and South Africa. Small-sized (TL < 100 mm) demersal marine species. It is present in the outer shelf and upper continental slope (< 100 m) along southern Brazil.

**Exploitation.** Not targeted by any fishery.

**References.** Menezes et al. (2003); Haimovici et al. (2008).



(a) 1.5 mm OL, 47 mm TL



(b) 2.2 mm OL, 73 mm TL

**Description.** *Shape* discoidal. *Distal face* straight. *Proximal face* straight to slightly convex. *Anterior margin* round. *Posterior margin* round. *Dorsal margin* convex, sinuate. *Ventral margin* convex, smooth to dentate. *Rostrum* absent. *Antirostrum* absent. *Sulcus acusticus* opening mode not appli-

cable. *Ostium* same width and length of cauda, shallow, tubular. *Cauda* shallow, elliptic to tubular. *Crista* absent.

**Material.** Otoliths from 20 specimens ranging between 50 to 73 mm TL, 0.5 to 1.8 g TW, 1.57 to 2.18 mm OL, and 1.43 to 1.99 mm OH.

**Relationships.**

$$TL = 30.997 OL^{1.083} \quad R^2 = 0.61$$

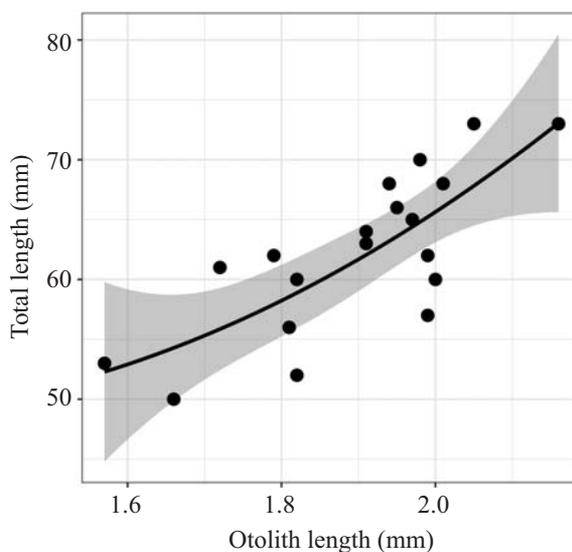
$$TL = 34.355 OH^{1.074} \quad R^2 = 0.59$$

$$TW = 0.098 OL^{3.731} \quad R^2 = 0.67$$

$$TW = 0.142 OH^{3.666} \quad R^2 = 0.64$$

$$TW = 2E-06 TL^{3.227} \quad R^2 = 0.97$$

$$OH/OL = \text{min. } 0.89\text{-max. } 0.94$$



**Family Macrouridae**  
***Coelorinchus marinii* Hubbs 1934**

**Distribution and habitat.** Southwest Atlantic: from southern Brazil to South Georgia. Small-sized (TL < 400 mm) bentopelagic marine species. It is present in the upper continental slope (< 300 m) along southern Brazil. Occasionally fished in small numbers by bottom trawlers and discarded on board.

**Exploitation.** Not targeted by any fishery.

**References.** Cohen (1990); Menezes et al. (2003); Haimovici et al. (2008).



(a) 4.4 mm OL, 103 mm TL



(b) 9.4 mm OL, 298 mm TL

**Description.** *Shape* rhomboidal. *Distal face* straight. *Proximal face* convex. *Anterior margin* angled. *Posterior margin* angled. *Dorsal margin* convex, sinuate. *Ventral margin* convex to straight, smooth. *Rostrum* present, prominent. *Antirostrum* absent. *Sulcus acusticus* opened at the anterior region, opened at posterior region. *Ostium* same width and length of cauda, deep,

tubular. *Cauda* deep, tubular-straight. *Crista* absent.

**Material.** Otoliths from 53 specimens ranging between 94 to 390 mm TL, 2 to 148 g TW, 3.71 to 12.15 mm OL, and 2.75 to 6.1 mm OH.

**Relationships.**

$$TL = -65.28 + 38.450 OL \quad R^2 = 0.94$$

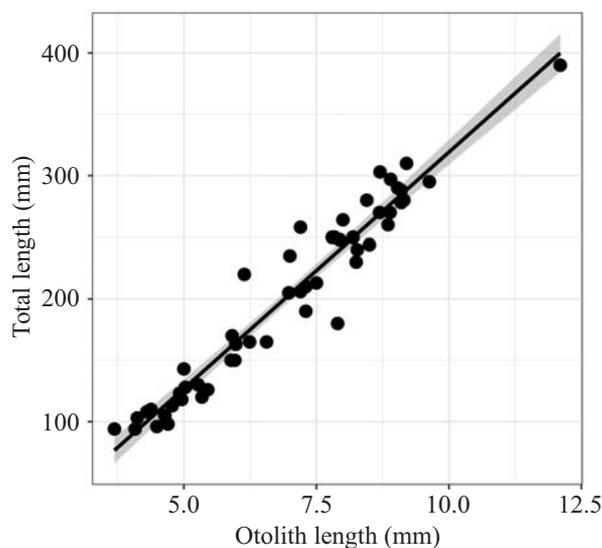
$$TL = 11.089 OH^{1.932} \quad R^2 = 0.93$$

$$TW = 0.023 OL^{3.766} \quad R^2 = 0.77$$

$$TW = 0.012 OH^{5.353} \quad R^2 = 0.78$$

$$TW = 1E-04 TL^{2.043} \quad R^2 = 0.79$$

$$OH/OL = \text{min. } 0.50\text{-max. } 0.80$$



### *Lucigadus ori* (Smith 1968)

**Distribution and habitat.** Southeast Atlantic and southwest Indian Ocean. In the western Atlantic from Costa Rica to Uruguay. Small-sized (TL > 300 mm) bathydemersal marine species. It is present in the upper continental slope (< 300 m) along southern Brazil. Occasionally fished in small numbers by bottom trawlers and discarded on board.

**Exploitation.** Not targeted by any fishery.

**References.** Menezes et al. (2003); Bernardes et al. (2005).



(a) 3 mm OL, 104 mm TL



(b) 6.5 mm OL, 237 mm TL

**Description.** *Shape* semicircular to pentagonal. *Distal face* slightly convex. *Proximal face* slightly convex. *Anterior margin* oblique. *Posterior margin* angled. *Dorsal margin* flattened, smooth. *Ventral margin* convex, smooth. *Rostrum* present or absent. *Antirostrum* absent. *Sulcus acusticus* closed at the anterior region, closed at posterior

region. *Ostium* same width and length of cauda, shallow, round-oval. *Cauda* shallow, elliptic. *Crista* absent.

**Material.** Otoliths from 52 specimens ranging between 104 to 237 mm TL, 2 to 28 g TW, 3.64 to 6.65 mm OL, and 2.57 to 4.33 mm OH.

#### Relationships.

$$TL = -8.084 + 37.597 OL \quad R^2 = 0.94$$

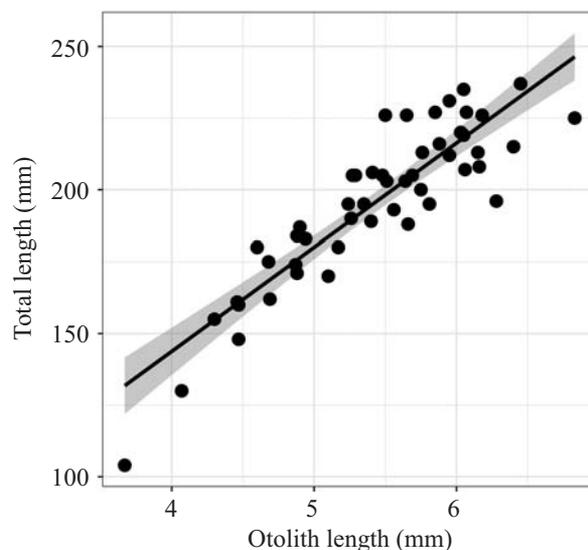
$$TL = 36.842 OH^{1.297} \quad R^2 = 0.93$$

$$TW = 0.012 OL^{4.207} \quad R^2 = 0.77$$

$$TW = 0.026 OH^{4.908} \quad R^2 = 0.78$$

$$TW = 3E-07 TL^{3.389} \quad R^2 = 0.79$$

$$OH/OL = \text{min. } 0.50\text{-max. } 0.80$$



*Malacocephalus laevis* (Lowe 1843)

**Distribution and habitat.** Atlantic, Pacific and Indian oceans. In the western Atlantic from Florida State to southern Brazil. Mid-sized (TL < 600 mm) bathydemersal marine species. It is present in the upper continental slope (< 300 m) along southern Brazil. Occasionally fished in small numbers by bottom trawlers and discarded on board.

**Exploitation.** Not targeted by any fishery.

**References.** Menezes et al. (2003); Bernardes et al. (2006); Haimovici et al. (2008).

**Description.** Shape oblong to kidney-shape. Distal face slightly convex. Proximal face slightly convex. Anterior margin angled. Posterior margin round. Dorsal margin convex, sinuate to lobate. Ventral margin convex, sinuate to dentate. Rostrum present, prominent. Antirostrum absent. Sulcus acusticus opened at the anterior region, opened at posterior region. Ostium same width and length of cauda, shallow, tubular. Cauda shallow, tubular-straight. Crista present.

**Material.** Otoliths from 57 specimens ranging between 276 to 575 mm TL, 29.8 to 490 g TW, 7.9 to 15 mm OL, and 4.57 to 7.85 mm OH.

**Relationships.**

$$TL = 31.180 OL^{1.042} \quad R^2 = 0.91$$

$$TL = 40.666 OH^{1.255} \quad R^2 = 0.88$$

$$TW = 0.004 OL^{4.282} \quad R^2 = 0.95$$

$$TW = 0.012 OH^{5.126} \quad R^2 = 0.91$$

$$TW = 1E-08 TL^{3.380} \quad R^2 = 0.93$$

$$OH/OL = \text{min. } 0.49\text{-max. } 0.60$$



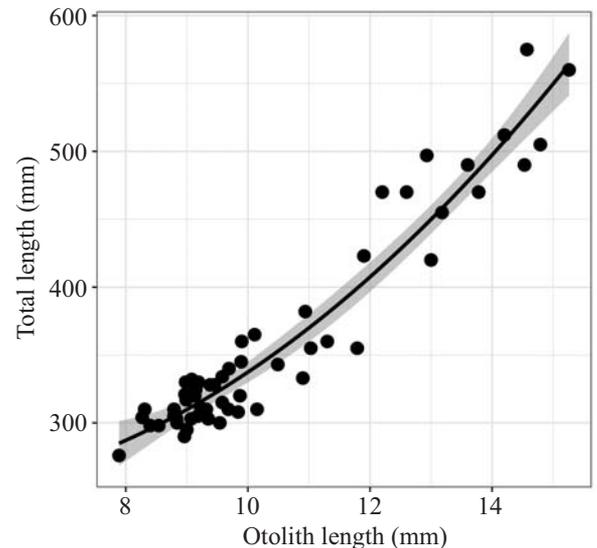
(a) 4.9 mm OL, 165 mm TL



(b) 10.7 mm OL, 367 mm TL



(c) 14.4 mm OL, 520 mm TL



*Malacocephalus occidentalis*

Goode and Bean 1885

**Distribution and habitat.** Western Atlantic from Cape Cod USA to Uruguay. Mid-sized (TL < 500 mm) bathydemersal marine species. It is present in the upper continental slope (< 300 m) along southern Brazil. Occasionally fished in small numbers by bottom trawlers and discarded on board.

**Exploitation.** Not targeted by any fishery.

**References.** Menezes et al. (2003); Bernardes et al. (2006); Haimovici et al. (2008).



(a) 3.7 mm OL, 105 mm TL



(b) 7.4 mm OL, 249 mm TL

**Description.** Shape oval to kidney-shape. Distal face slightly convex. Proximal face slightly convex. Anterior margin angled. Posterior margin angled. Dorsal margin flattened to convex, lobate to dentate. Ventral margin convex, lobate to smooth. Rostrum present, short. Antirostrum present. Sulcus acusticus opened at the anterior region, opened at posterior region. Ostium same width

and length of cauda, shallow, tubular. Cauda deep, tubular-straight. Crista present.

**Material.** Otoliths from 41 specimens ranging between 105 to 520 mm TL, 2 to 454 g TW, 3.85 to 14.2 mm OL, and 2.78 to 7.0 mm OH.

**Relationships.**

$$TL = -36.55 + 38.723 OL \quad R^2 = 0.93$$

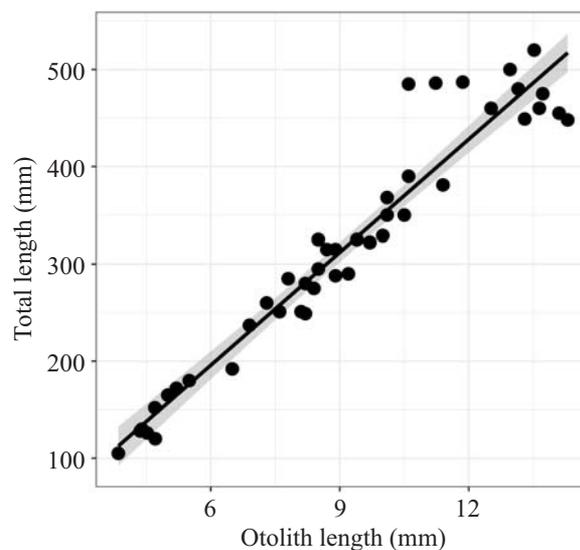
$$TL = 17.900 OH^{1.771} \quad R^2 = 0.93$$

$$TW = 0.006 OL^{4.204} \quad R^2 = 0.98$$

$$TW = 0.003 OH^{6.235} \quad R^2 = 0.96$$

$$TW = 1E-04 TL^{2.043} \quad R^2 = 0.79$$

$$OH/OL = \text{min. } 0.46\text{-max. } 0.73$$



*Ventrifossa macropogon* Marshall 1973

**Distribution and habitat.** Western central and southern Atlantic: from western Caribbean to southern Brazil. Small bathydemersal marine species. It is present in the upper continental slope (< 400 m) along southern Brazil. Occasionally fished in small numbers by bottom trawlers and discarded on board.

**Exploitation.** Not targeted by any fishery.

**References.** Menezes et al. (2003); Haimovici et al. (2008).



(a) 6.5 mm OL, 183 mm TL



(b) 8 mm OL, 244 mm TL

**Description.** *Shape* discoidal to kidney-shaped. *Distal face* slightly convex. *Proximal face* slightly convex. *Anterior margin* double-peaked. *Posterior margin* round. *Dorsal margin* angled, lobate. *Ventral margin* convex, smooth to dentate.

*Rostrum* present, short. *Antirostrum* present. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* same width and length of cauda, deep, tubular. *Cauda* deep, tubular-straight. *Crista* present.

**Material.** Otoliths from 52 specimens ranging between 94 to 390 mm TL, 2 to 148 g TW, 3.71 to 12.15 mm OL, and 2.75 to 6.1 mm OH.

**Relationships.**

$$TL = -65.28 + 38.450 OL \quad R^2 = 0.94$$

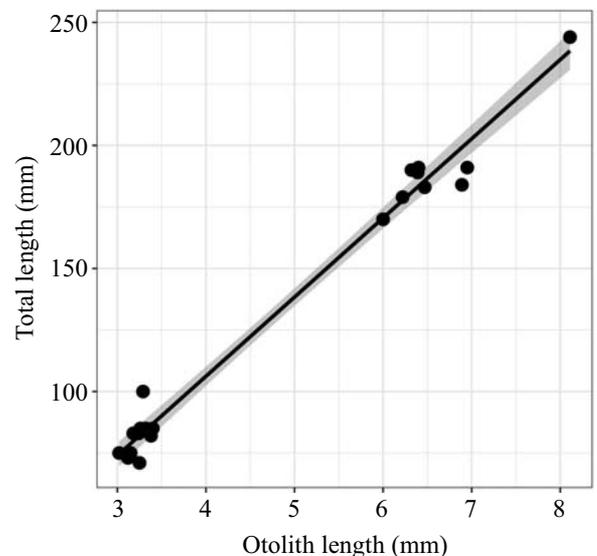
$$TL = 11.089 OH^{1.932} \quad R^2 = 0.93$$

$$TW = 0.023 OL^{3.766} \quad R^2 = 0.77$$

$$TW = 0.012 OH^{5.353} \quad R^2 = 0.78$$

$$TW = 1E-04 TL^{2.043} \quad R^2 = 0.79$$

$$OH/OL = \text{min. } 0.50\text{-max. } 0.80$$



*Ventrifossa mucocephalus* Marshall 1973

**Distribution and habitat.** Western central and southern Atlantic from western Caribbean to southern Brazil. Small (TL < 400 mm) bathydemersal marine species. It is present in the upper continental slope (< 400 m) along southern Brazil. Occasionally fished in small numbers by bottom trawlers and discarded on board.

**Exploitation.** Not targeted by any fishery.

**References.** Cohen et al. (1990); Haimovici et al. (2008).



(a) 7.3 mm OL, 166 mm TL



(b) 9.4 mm OL, 215 mm TL

**Description.** *Shape* elliptic to kidney-shape. *Distal face* slightly convex. *Proximal face* slightly convex. *Anterior margin* angled. *Posterior margin* round. *Dorsal margin* angled, dentate. *Ventral margin* convex, lobate to smooth. *Rostrum* present, short. *Antirostrum* present. *Sulcus acusticus* opened at the anterior region, opened at posterior region. *Ostium* same width and length of cauda, deep, tubular. *Cauda* deep, tubular-straight. *Crista* present.

**Material.** Otoliths from 5 specimens ranging between 166 to 215 mm TL, 12 to 26 g TW, 7.29 to 9.2 mm OL, and 4.86 to 5.51 mm OH.

**Relationships.**

$$TL = -3.898 + 23.40 OL \quad R^2 = 0.91$$

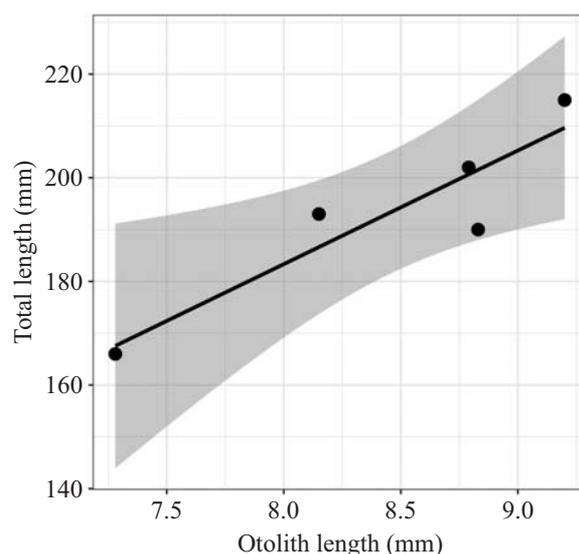
$$TL = 24.487 OH^{1.246} \quad R^2 = 0.58$$

$$TW = 0.032 OL^{3.005} \quad R^2 = 0.90$$

$$TW = 0.031 OH^{3.893} \quad R^2 = 0.64$$

$$TW = 6E-06 TL^{2.838} \quad R^2 = 0.91$$

$$OH/OL = \text{min. } 0.60\text{-max. } 0.67$$



### Family Merlucciidae

#### *Macruronus novaezelandiae* (Hector 1871)

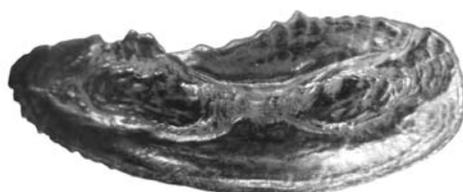
**Distribution and habitat.** Southeast Pacific and southwest Atlantic: off southern Chile and southern Brazil. Large-sized (< 1,150 mm TL) benthopelagic marine species. It is present in the upper continental slope (< 400 m) along southern Brazil. Occasionally fished in small numbers by bottom trawlers and discarded on board.

**Exploitation.** Not targeted by any fishery.

**References.** Menezes et al. (2003); Bernardes et al. (2006); Haimovici et al. (2008).



(a) 14.8 mm OL, 530 mm TL



(b) 24.5 mm OL, 876 mm TL

**Description.** *Shape* kidney-shaped. *Distal face* concave. *Proximal face* convex. *Anterior margin* round. *Posterior margin* round. *Dorsal margin* flattened, sinuate. *Ventral margin* convex, smooth. *Rostrum* present, prominent. *Antirostrum* absent. *Sulcus acusticus* opened at the anterior region, opened at posterior region. *Ostium* same width and length of cauda, shallow, tubular. *Cauda* shallow, elliptic. *Crista* present.

**Material.** Otoliths from 70 specimens ranging between 78 to 770 mm TL, 3 to 3,500 g TW, 3.77 to 30.4 mm OL, and 1.67 to 9.93 mm OH.

#### Relationships.

$$TL = 36.878 OL^{0.990} \quad R^2 = 0.99$$

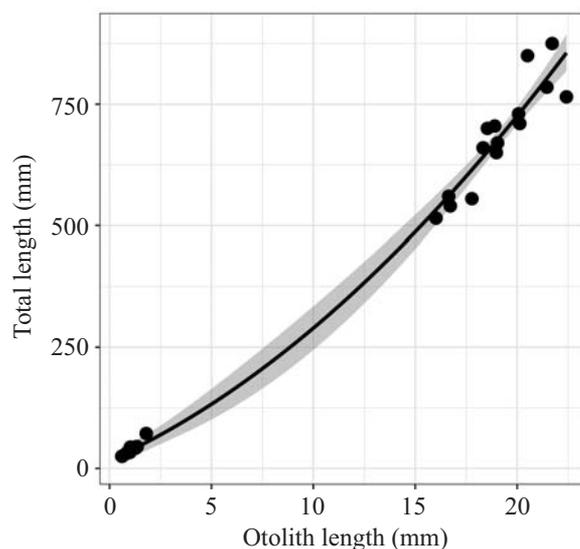
$$TL = 15.945 OH^{1.813} \quad R^2 = 0.96$$

$$TW = 0.577 OL^{2.520} \quad R^2 = 0.99$$

$$TW = 0.099 OH^{4.489} \quad R^2 = 0.98$$

$$TW = 5E-05 TL^{2.574} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.30\text{-max. } 2.00$$



*Merluccius hubbsi* Marini 1933

**Distribution and habitat.** Southwest Atlantic from off southern Brazil to southern Argentina (54° S). Large-sized (TL > 800 mm) benthopelagic marine species present in the outer shelf and upper continental slope of southern Brazil (50 to 500 m).

**Exploitation.** Commercially valuable species, mostly landed as incidental catch of bottom trawlers.

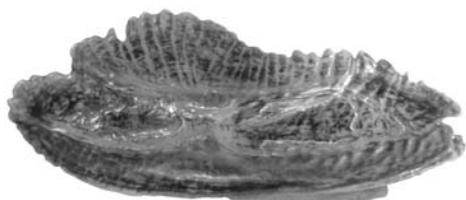
**References.** Menezes et al. (2003); Bernardes et al. (2005); Haimovici et al. (2008).



(a) 6.3 mm OL, 128 mm TL



(b) 15.4 mm OL, 351 mm TL



(c) 30.7 mm OL, 770 mm TL

**Description.** *Shape* trapezoidal to kidney-shaped. *Distal face* straight. *Proximal face* slightly convex. *Anterior margin* oblique. *Posterior margin* oblique. *Dorsal margin* flattened, sinuate to den-

tate. *Ventral margin* convex, dentate to smooth. *Rostrum* present, short. *Antirostrum* absent. *Sulcus acusticus* opened at the anterior region, opened at posterior margin. *Ostium* same width and length of cauda, shallow, tubular. *Cauda* deep, elliptic to tubular straight. *Crista* present.

**Material.** Otoliths from 70 specimens ranging between 78 to 770 mm TL, 3 to 3,500 g TW, 3.77 to 30.4 mm OL and, 1.67 to 9.93 mm OH.

**Relationships.**

$$TL = 15.703 OL^{1.137} \quad R^2 = 0.99$$

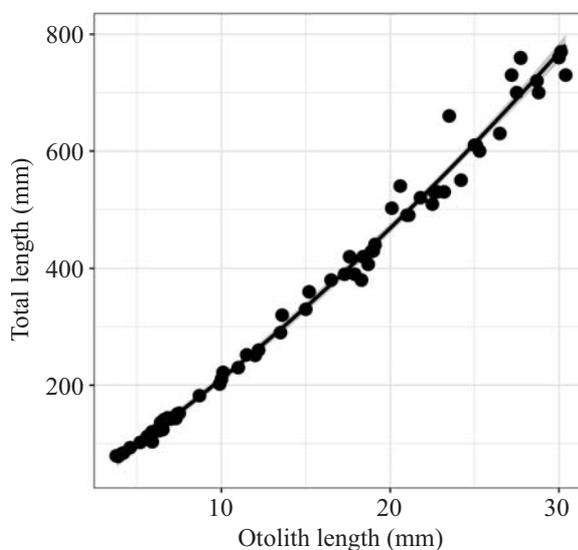
$$TL = 32.017 OH^{1.338} \quad R^2 = 0.98$$

$$TW = 0.023 OL^{3.453} \quad R^2 = 0.99$$

$$TW = 0.197 OH^{4.065} \quad R^2 = 0.98$$

$$TW = 5E-06 TL^{3.032} \quad R^2 = 0.97$$

$$OH/OL = \text{min. } 0.31\text{-max. } 0.51$$



### Family Moridae

#### *Antimora rostrata* (Günther 1878)

**Distribution and habitat.** Circumtropical. Large-sized (TL > 700 mm) benthopelagic marine species. It occurs in the lower slope 1,000-2,000 m deep along southeastern Brazil.

**Exploitation.** Not targeted by any fishery.

**References.** Menezes et al. (2005); Haimovici et al. (2017)



(a) 12.6 mm OL, 373 mm TL



(b) 17.5 mm OL, 516 mm TL

**Description.** *Shape* cuneiform. *Distal face* slightly convex. *Proximal face* slightly convex. *Anterior margin* double-peaked. *Posterior margin* angled to flattened. *Dorsal margin* angled, smooth, with protuberance. *Ventral margin* flattened, smooth. *Rostrum* present, short. *Antirostrum* present. *Sulcus acusticus* opened at the anterior region, opened at ventro-posterior region. *Ostium* broader and shorter than cauda, deep, funnel-like. *Cauda* deep, tubular-straight. *Crista* absent.

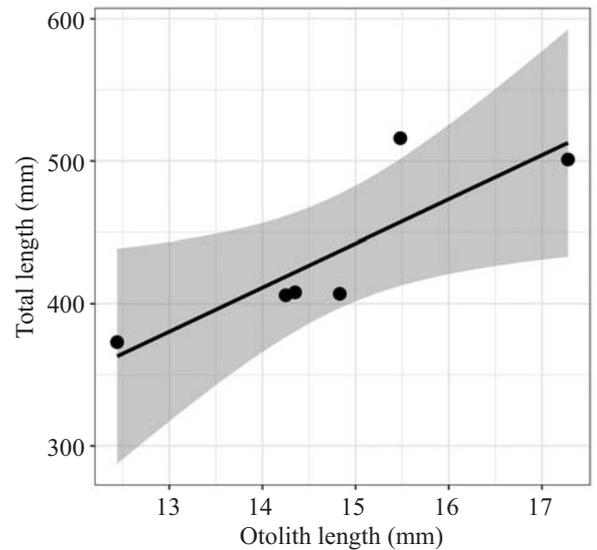
**Material.** Otoliths from 5 specimens ranging between 166 to 215 mm TL, 12 to 26 g TW, 12.33 to 17.31 mm OL, and 5.19 to 6.51 mm OH.

### Relationships.

$$TL = -0.028 + 29.525 OL \quad R^2 = 0.97$$

$$TL = 50.486 OH^{1.212} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.35\text{-max. } 0.48$$

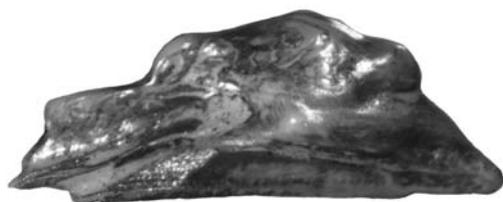


*Gadella imberbis* (Vaillant 1888)

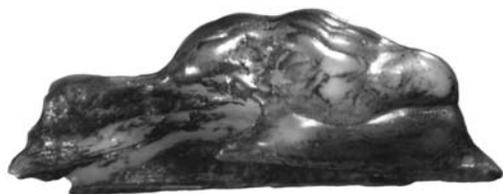
**Distribution and habitat.** Atlantic Ocean. Small-sized (TL < 350) demersal, benthopelagic marine species. It is occasionally caught by bottom trawlers in the upper continental slope along southern Brazil, and discarded on board by bottom trawlers.

**Exploitation.** Not targeted by any fishery.

**References.** Menezes et al. (2003); Haimovici et al. (2008).



(a) 5 mm OL, 222 mm TL



(b) 6.8 mm OL, 285 mm TL

**Description.** *Shape* trapezoidal. *Distal face* slightly convex. *Proximal face* slightly convex. *Anterior margin* angled. *Posterior margin* angled. *Dorsal margin* convex, smooth. *Ventral margin* flattened, smooth. *Rostrum* present, short. *Antirostrum* present. *Sulcus acusticus* opening mode not applicable. *Ostium* irregular. *Cauda* irregular. *Crista* absent.

**Material.** Otoliths from 14 specimens ranging between 217 to 285 mm TL, 51.6 to 169 g TW, 5.5 to 6.7 mm OL, and 2.01 to 2.39 mm OH.

**Relationships.**

$$TL = 44.720 + 32.520 OL \quad R^2 = 0.37$$

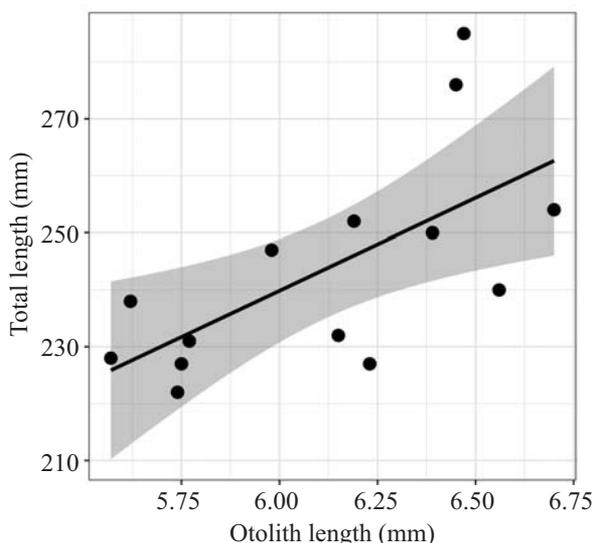
$$TL = 89.126 OH^{1.248} \quad R^2 = 0.56$$

$$TW = 0.006 OL^{5.369} \quad R^2 = 0.58$$

$$TW = 0.647 OH^{6.201} \quad R^2 = 0.53$$

$$TW = 1E-08 TL^{4.142} \quad R^2 = 0.80$$

$$OH/OL = \text{min. } 0.32\text{-max. } 0.40$$



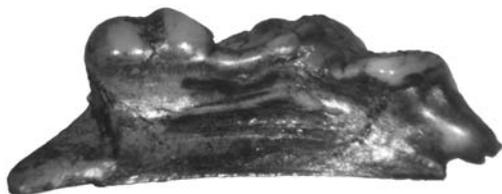
***Laemonema goodebeanorum***

Meléndez C. and Markle 1997

**Distribution and habitat.** Western Atlantic: off Canada to off southern Brazil. Mid-sized (TL < 500 mm) benthopelagic marine species. It is occasionally caught and discarded on board by bottom trawls on the upper continental slope at depth over 300 m along southern Brazil.

**Exploitation.** Not targeted by any fishery.

**References.** Menezes et al. (2003); Bernardes et al. (2006). Haimovici et al. (2008).



(a) 6.4 mm OL, 257 mm TL

**Description.** *Shape* trapezoidal. *Distal face* slightly convex. *Proximal face* slightly convex. *Anterior margin* angled. *Posterior margin* angled. *Dorsal margin* convex, smooth. *Ventral margin* flattened, smooth. *Rostrum* present, prominent. *Antirostrum* present. *Sulcus acusticus* opening mode not applicable. *Ostium* irregular. *Cauda* irregular. *Crista* absent.

**Material.** Otoliths from 1 specimen of 257 mm TL, 71.9 g TW, 6.43 mm OL and 2.25 mm OH.

**Relationships.** Insufficient data.

### Family Phycidae

#### *Urophycis brasiliensis* (Kaup 1858)

**Distribution and habitat.** Southwest Atlantic: southern Brazil, Uruguay, and Argentina. A commercially important mid-sized (TL > 600 mm) brackish water and demersal marine species. It is present in the inner coastal shelf at depth under 100 m along southern Brazil.

**Exploitation.** Commercially fished by bottom trawls and gillnets.

**References.** Haimovici et al. (1996); Menezes et al. (2003).

terior margin. *Ostium* same width and length of cauda, shallow, tubular. *Cauda* shallow, tubular-straight. *Crista* absent.

**Material.** Otoliths from 82 specimens ranging between 44 to 586 mm TL, 0.2 to 1,520 g TW, 2.2 to 16.5 mm OL, and 0.8 to 6.4 mm OH.

#### Relationships.

$$TL = 9.1631 OL^{1.457} \quad R^2 = 0.98$$

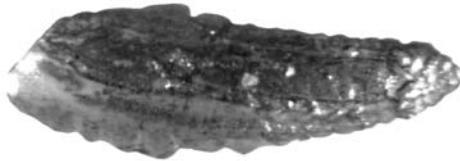
$$TL = 0.060 OH^{0.728} \quad R^2 = 0.99$$

$$TW = 0.001 OL^{4.961} \quad R^2 = 0.98$$

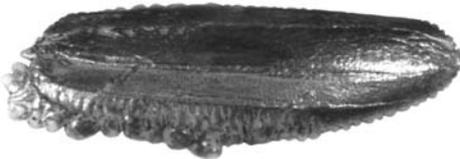
$$TW = 0.423 OH^{4.599} \quad R^2 = 0.99$$

$$TW = 8E-07 TL^{3.391} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.27\text{-max. } 0.42$$



(a) 2.9 mm OL, 44 mm TL

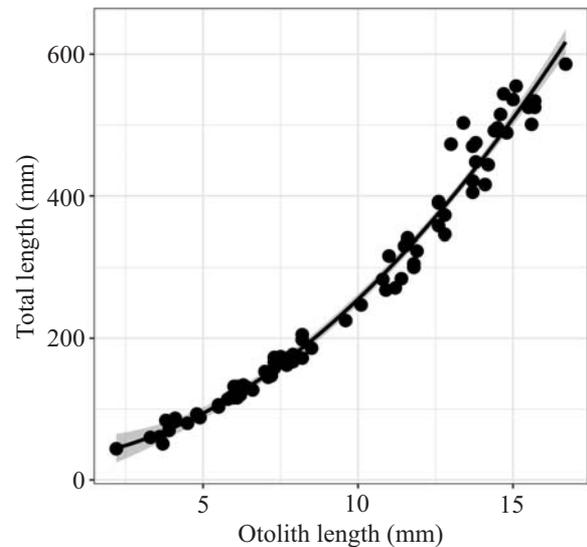


(b) 8.4 mm OL, 205 mm TL



(c) 16.5 mm OL, 544 mm TL

**Description.** *Shape* spindle-shaped. *Distal face* slightly concave. *Proximal face* slightly convex. *Anterior margin* oblique. *Posterior margin* round. *Dorsal margin* flattened, sinuate to smooth. *Ventral margin* convex, sinuate to smooth. *Rostrum* absent. *Antirostrum* absent. *Sulcus acusticus* opened at the anterior region, opened at pos-



*Urophycis mystacea* Miranda Ribeiro 1903

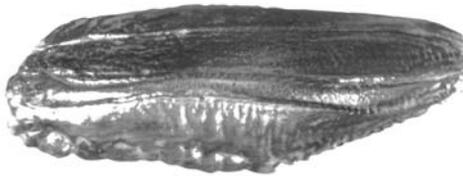
**Distribution and habitat.** Southwest Atlantic, Rio de Janeiro, Brazil to Argentina. Mid-sized (TL > 600 mm) demersal marine species. It is present in the upper continental slope (200-600 m) along the southeastern and southern Brazil.

**Exploitation.** Commercially fished with bottom trawls and gillnets.

**References.** Haimovici et al. (1994, 2008); Menezes et al. (2003).



(a) 6.4 mm OL, 130 mm TL



(b) 9.4 mm OL, 225 mm TL



(c) 18.7 mm OL, 581 mm TL

**Description.** Shape spindle-shaped. Distal face slightly concave. Proximal face convex. Anterior margin oblique to round. Posterior margin round. Dorsal margin flattened, lobate to smooth. Ventral margin convex, lobate to smooth. Rostrum absent. Antirostrum absent. Sulcus acus-

*ticus* opened at the anterior region, opened at posterior margin. Ostium same width and length of cauda, shallow, tubular. Cauda shallow, tubular-straight. Crista absent.

**Material.** Otoliths from 65 specimens ranging between 124 to 438 mm TL, 12.5 to 720 g TW, 5.7 to 14.8 mm OL, and 2.1 to 5.65 mm OH.

**Relationships.**

$$TL = 9.9293 OL^{1.390} \quad R^2 = 0.97$$

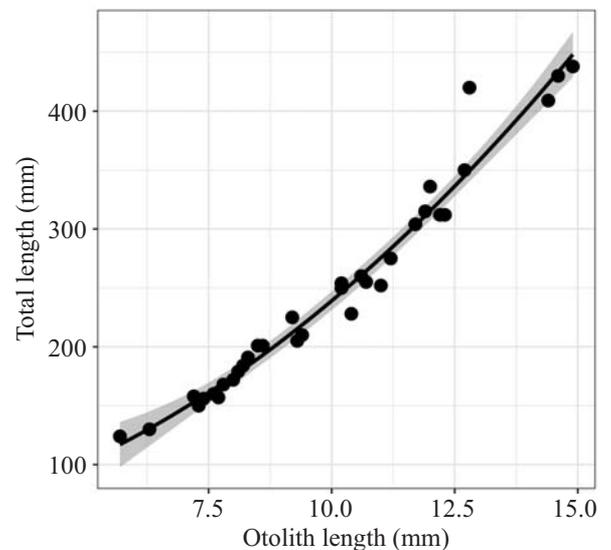
$$TL = 44.884 OH^{1.309} \quad R^2 = 0.98$$

$$TW = 0.003 OL^{4.492} \quad R^2 = 0.96$$

$$TW = 0.498 OH^{4.225} \quad R^2 = 0.96$$

$$TW = 2E-06 TL^{3.227} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.33\text{-max. } 0.42$$



### Order Lophiiformes

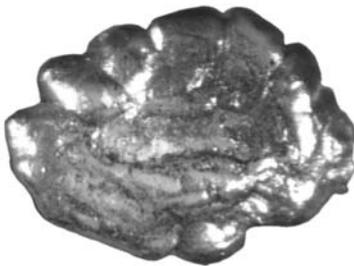
#### Family Lophiidae

#### *Lophius gastrophysus* Miranda Ribeiro 1915

**Distribution and habitat.** Western Atlantic: North Carolina, USA to Argentina. Large-sized (TL > 800 mm) bathydemersal marine species. It is present in the outer shelf and upper continental slope along southeastern and southern Brazil.

**Exploitation.** Commercially valuable species. It is targeted with bottom gillnets and incidentally fished with bottom trawls.

**References.** Menezes et al. (2003); Pérez et al. (2005).



(a) 2.2 mm OL, 80 mm TL



(b) 6.7 mm OL, 430 mm TL



(c) 10.8 mm OL, 890 mm TL

**Description.** *Shape* semicircular to irregular. *Distal face* slightly convex concave. *Proximal face* convex. *Anterior margin* round to angled. *Posterior margin* round to angled. *Dorsal margin* convex, lobate to irregular. *Ventral margin* convex, lobate to smooth. *Rostrum* absent. *Antirostrum* absent. *Sulcus acusticus* opening mode not applicable. *Ostium* irregular. *Cauda* irregular. *Crista* absent.

**Material.** Otoliths from 46 specimens ranging between 133 to 760 mm TL, 47 to 8,620 g TW, 5.7 to 14.8 mm OL, and 2.1 to 5.65 mm OH.

#### Relationships.

$$TL = 23.596 OL^{1.526} \quad R^2 = 0.89$$

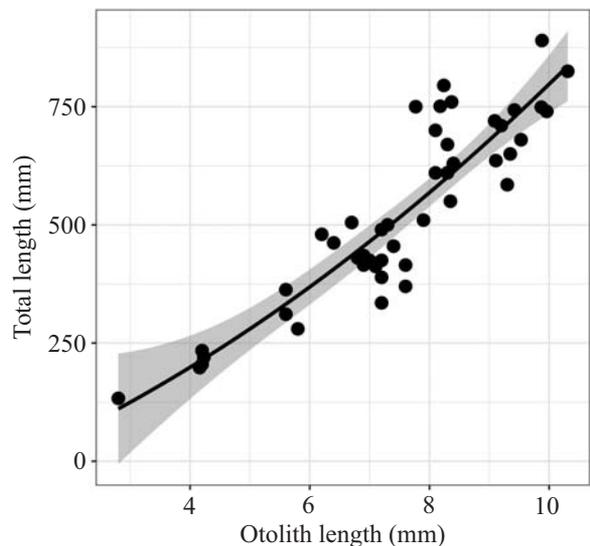
$$TL = 51.604 OH^{1.394} \quad R^2 = 0.92$$

$$TW = 0.185 OL^{4.642} \quad R^2 = 0.87$$

$$TW = 2.006 OH^{4.238} \quad R^2 = 0.91$$

$$TW = 1E-05 TL^{3.061} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.56\text{-max. } 0.85$$



**Order Mugiliformes**  
**Family Mugilidae**  
*Mugil liza* Valenciennes 1836

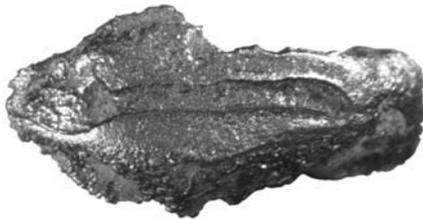
**Distribution and habitat.** Western Atlantic to Argentina. Mid-sized (TL < 600 mm) catadromous, freshwater, brackish and marine species.

**Exploitation.** It is commercially fished with gill-nets, beach nets and purse seines in estuaries and coastal waters along southern Brazil.

**References.** Menezes et al. (2003); Mai et al. (2014).



(a) 6.8 mm OL, 267 mm TL



(b) 10.3 mm OL, 470 mm TL



(c) 11.9 mm OL, 570 mm TL

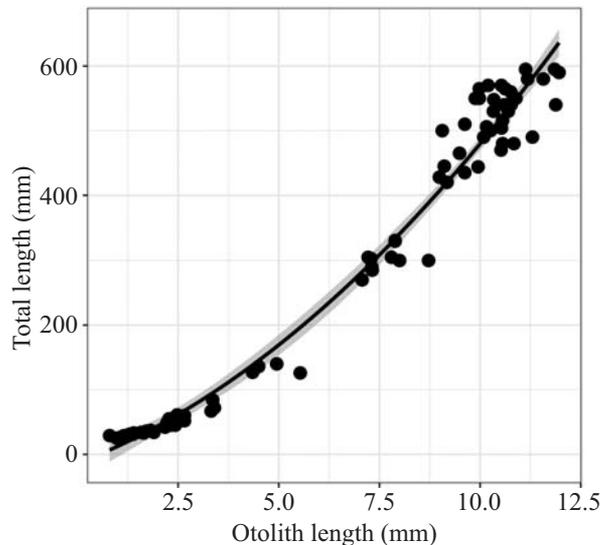
**Description.** Shape arrow-shaped. Distal face concave. Proximal face convex. Anterior margin angled. Posterior margin oblique to flattened. Dorsal margin angled, sinuate. Ventral margin

convex to flattened, sinuate. *Rostrum* present, prominent. *Antirostrum* absent. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* broader and shorter than cauda, shallow, rectangular to undefined. *Cauda* shallow, tubular-slightly curved ventrally. *Crista* present.

**Material.** Otoliths from 82 specimens ranging between 25 to 595 mm TL, 0.2 to 2,378.9 g TW, 0.97 to 11.96 mm OL, and 0.6 to 5.45 mm OH.

**Relationships.**

$$\begin{aligned} TL &= 20.252 OL^{1.346} & R^2 &= 0.96 \\ TL &= 39.412 OH^{1.616} & R^2 &= 0.98 \\ TW &= 0.102 OL^{3.955} & R^2 &= 0.96 \\ TW &= 0.714 OH^{4.756} & R^2 &= 0.98 \\ TW &= 1E-05 TL^{2.961} & R^2 &= 0.99 \\ OH/OL &= \text{min. } 0.39\text{-max. } 0.67 \end{aligned}$$



**Order Myctophiformes**  
**Family Myctophidae**  
*Diaphus dumerilii* (Bleeker 1856)

**Distribution and habitat.** Atlantic and western Pacific oceans. In the western Atlantic: from Cape to Argentina (51° N-36° S). Very small-sized (TL < 130 mm) mesopelagic marine species. Abundant on the upper continental slope (200-600 m) along southern Brazil, frequently caught in small numbers by bottom trawls and discarded on board.

**Exploitation.** Not targeted by any fishery.

**References.** Menezes et al. (2003); Haimovici et al. (1994, 2008).



(a) 3.1 mm OL, 64 mm TL



(b) 4.4 mm OL, 96 mm TL

**Description.** Shape oval. Distal face slightly convex. Proximal face straight. Anterior margin double-peaked. Posterior margin round. Dorsal margin convex, smooth. Ventral margin convex, smooth. Rostrum present, short. Antirostrum present. Sulcus acusticus opened at the anterior

region, closed at posterior margin. Ostium broader and same length of cauda, shallow, tubular. Cauda shallow, tubular-straight. Crista absent.

**Material.** Otoliths from 19 specimens ranging between 64 to 98 mm TL, 1.6 to 6.2 g TW, 3.1 to 4.6 mm OL, and 2.1 to 3.05 mm OH.

**Relationships.**

$$TL = 17.585 OL^{1.145} \quad R^2 = 0.91$$

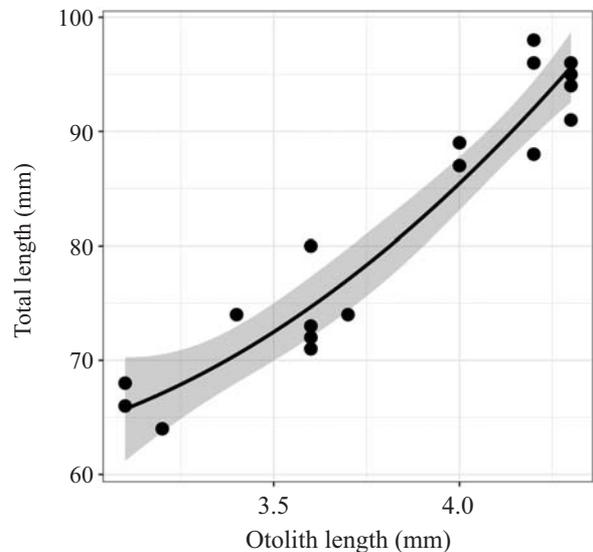
$$TL = 23.109 OH^{1.327} \quad R^2 = 0.76$$

$$TW = 0.022 OL^{3.763} \quad R^2 = 0.94$$

$$TW = 0.048 OH^{4.495} \quad R^2 = 0.79$$

$$TW = 3E-06 TL^{3.141} \quad R^2 = 0.96$$

$$OH/OL = \text{min. } 0.61\text{-max. } 0.72$$



**Order Ophidiiformes****Family Ophidiidae*****Genypterus brasiliensis* Regan 1903**

**Distribution and habitat.** Southwest Atlantic: Rio de Janeiro, Brazil to Argentina. Large-sized (TL > 1,000 mm) demersal marine species. It is present in the outer shelf and upper continental slope along southern Brazil.

**Exploitation.** Valuable species. It is fished with hook and line and occasionally with bottom trawls.

**References.** Menezes et al. (2003); Haimovici et al. (2004, 2008).



(a) 8 mm OL, 232 mm TL



(b) 15.9 mm OL, 625 mm TL



(c) 21.9 mm OL, 985 mm TL

**Description.** *Shape* oblong to elliptic. *Distal face* concave. *Proximal face* convex. *Anterior margin*

angled to double-peaked. *Posterior margin* angled to round. *Dorsal margin* convex, dentate. *Ventral margin* convex, sinuate to smooth. *Rostrum* present, short. *Antirostrum* absent or present. *Sulcus acusticus* closed at the anterior region, closed at posterior margin. *Ostium* same width and larger than cauda, shallow, round-oval to rectangular. *Cauda* shallow, tubular-straight. *Crista* present.

**Material.** Otoliths from 44 specimens ranging between 232 to 985 mm TL, 50 to 5,600 g TW, 8.01 to 20.83 mm OL, and 3.68 to 10.43 mm OH.

**Relationships.**

$$TL = 11.896 OL^{1.431} \quad R^2 = 0.96$$

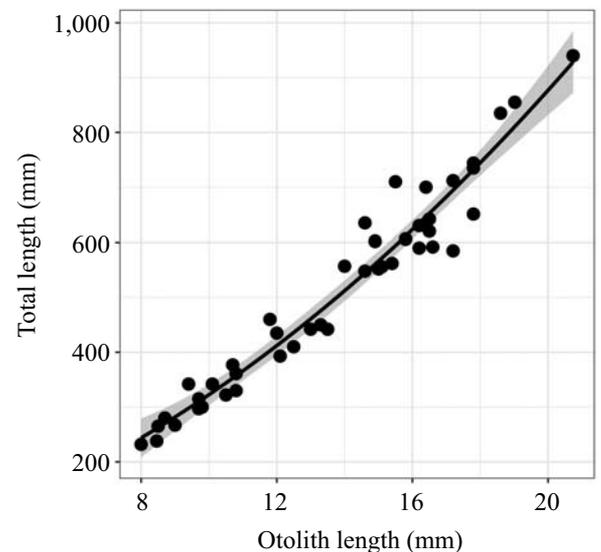
$$TL = 42.109 OH^{1.337} \quad R^2 = 0.97$$

$$TW = 0.001 OL^{4.871} \quad R^2 = 0.96$$

$$TW = 0.123 OH^{4.568} \quad R^2 = 0.97$$

$$TW = 4E-07 TL^{3.406} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.42\text{-max. } 0.55$$



***Raneya brasiliensis*** (Kaup 1856)

**Distribution and habitat.** Southwest Atlantic: Rio de Janeiro to northern Patagonia. Small-sized (TL > 300 mm) demersal marine species. It is incidentally caught and discarded on board of bottom trawlers fishing on outer the continental shelf along southern Brazil.

**Exploitation.** Not targeted by any fishery.

**References.** Haimovici et al. (1996); Menezes et al. (2003); Bernardes et al. (2005).



(a) 2.7 mm OL, 84 mm TL



(b) 5.5 mm OL, 173 mm TL



(c) 9.5 mm OL, 300 mm TL

**Description.** Shape oval to pentagonal. Distal face straight. Proximal face slightly convex. Anterior margin angled to round. Posterior margin angled. Dorsal margin angled, smooth. Ventral margin angled to convex, smooth. Rostrum absent. Antirostrum absent. Sulcus acusticus closed at the anterior region, closed at posterior margin. Ostium same length and width of cauda, shallow, tubular. Cauda shallow, tubular-straight. Crista present.

**Material.** Otoliths from 33 specimens ranging between 172 to 300 mm TL, 22.4 to 185 g TW, 5.5 to 9.5 mm OL, and 4.85 to 8.3 mm OH.

**Relationships.**

$$TL = 30.601 OL^{1.012} \quad R^2 = 0.95$$

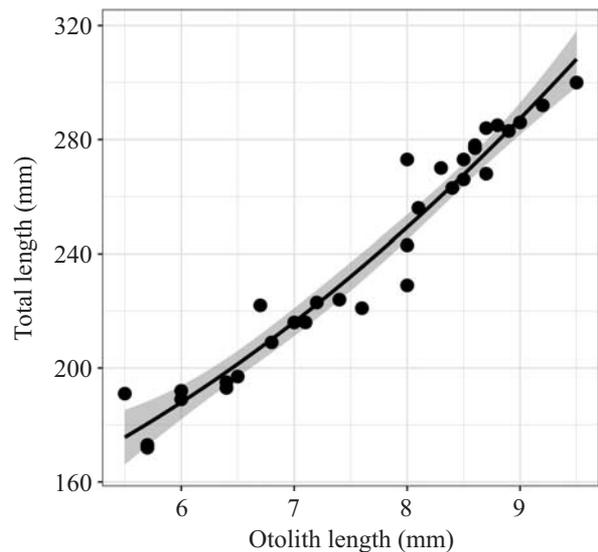
$$TL = 40.099 OH^{0.961} \quad R^2 = 0.95$$

$$TW = 0.044 OL^{3.671} \quad R^2 = 0.95$$

$$TW = 0.118 OH^{3.478} \quad R^2 = 0.93$$

$$TW = 3E-07 TL^{3.561} \quad R^2 = 0.98$$

$$OH/OL = \text{min. } 0.77\text{-max. } 0.94$$



**Order Perciformes**  
**Family Anthiadidae**  
*Pronotogrammus martinicensis*  
(Guichenot 1868)

**Distribution and habitat.** Western Atlantic: Florida, USA to southern Brazil. Small-sized (TL < 200 mm) demersal marine species. It is incidentally caught and discarded on board of bottom trawlers on outer continental shelf and shelf break along southern Brazil.

**Exploitation.** Not targeted by any fishery.

**References.** Menezes et al. (2003); Bernardes et al. (2005); Haimovici et al. (2008).



(a) 3.7 mm OL, 127 mm TL

**Description.** *Shape* elliptic. *Distal face* straight. *Proximal face* convex. *Anterior margin* angled. *Posterior margin* round. *Dorsal margin* convex, sinuate. *Ventral margin* convex, sinuate. *Rostrum* present, prominent. *Antirostrum* absent. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* broader and shorter than cauda, deep, funnel-like. *Cauda* deep, tubular-slightly curved ventrally. *Crista* present.

**Material.** Otoliths from 2 specimens ranging between 118 and 127 mm TL, 33 and 34 g TW, 6.3 and 6.4 mm OL and 3.64 and 3.8 mm OH.

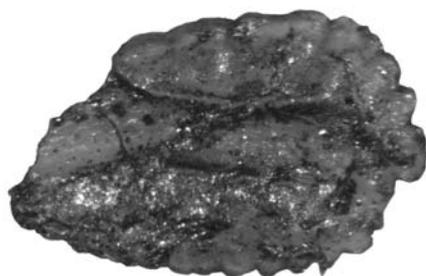
**Relationships.** Insufficient data.

**Family Ariommatidae**  
***Ariomma bondi* Fowler 1930**

**Distribution and habitat.** In the western Atlantic: Canada to Maine, USA and northern Gulf of Mexico to Uruguay (45° N-36° S) and eastern Atlantic from Senegal to Angola. Small-sized (TL < 300 mm) demersal marine, ocean-odromous or bathypelagic species. It is incidentally caught and discarded on board by bottom trawlers fishing in the outer shelf and upper continental slope (50-600 m) along southern Brazil.

**Exploitation.** Not targeted by any fishery.

**References.** Menezes et al. (2003); Haimovici et al. (2008).



(a) 1.9 mm OL, 70 mm TL



(b) 4.7 mm OL, 177 mm TL

**Description.** *Shape* cuneiform to lanceolate. *Distal face* straight. *Proximal face* straight. *Anterior margin* angled to oblique. *Posterior margin* round to oblique. *Dorsal margin* convex to angled, sinuate. *Ventral margin* slightly convex, sinuate. *Rostrum* present, prominent. *Antirostrum* absent. *Sulcus acusticus* opened at the anterior region,

closed at posterior margin. *Ostium* broader and shorter than cauda, shallow, funnel-like. *Cauda* deep, tubular-straight. *Crista* present.

**Material.** Otoliths from 24 specimens ranging between 70 to 183 mm TL, 3.1 to 73 g TW, 1.92 to 5.12 mm OL and 1.02 to 2.64 mm OH.

**Relationships.**

$$TL = -0.942 + 37.552 OL \quad R^2 = 0.94$$

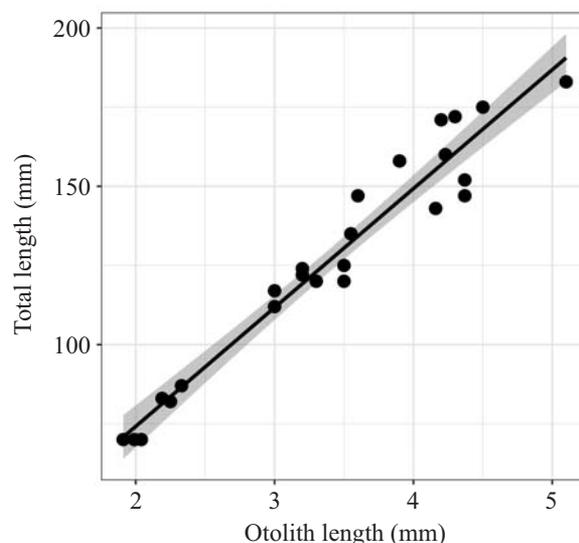
$$TL = 66.220 OH^{1.021} \quad R^2 = 0.96$$

$$TW = 0.393 OL^{3.260} \quad R^2 = 0.95$$

$$TW = 2.687 OH^{3.307} \quad R^2 = 0.94$$

$$TW = 6E-06 TL^{3.139} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.49\text{-max. } 0.60$$

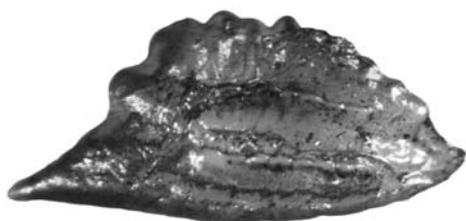


**Family Callionymidae*****Synchiropus agassizii* (Goode and Bean 1888)**

**Distribution and habitat.** Western Atlantic Ocean. Venezuela to Uruguay. Small-sized (TL < 300 mm) demersal marine species. It is occasionally fished and discarded on board by bottom trawlers in the upper continental slope along southern Brazil.

**Exploitation.** Not targeted by any fishery.

**References.** Menezes et al. (2003); Bernardes et al. (2005); Haimovici et al. (2008).



(a) 3.5 mm OL, 205 mm TL

**Description.** *Shape* pyriform. *Distal face* straight. *Proximal face* slightly convex. *Anterior margin* angled. *Posterior margin* angled. *Dorsal margin* convex, sinuate. *Ventral margin* convex to flattened, smooth. *Rostrum* present, prominent. *Antirostrum* present. *Sulcus acusticus* closed at the anterior region, closed at posterior region. *Ostium* same width and length of cauda, shallow, tubular. *Cauda* shallow, tubular-straight. *Crista* present.

**Material.** Otoliths from 1 specimen of 205 mm TL, 37 g TW, 3.53 mm OL and 1.83 mm OH.

**Relationships.** Insufficient data.

**Family Carangidae**  
*Caranx crysos* (Mitchill 1815)

**Distribution and habitat.** Western and eastern Atlantic. Mid-sized (TL < 700 mm). Estuarine and marine reef-associated species. Small specimens are occasionally caught by bottom trawlers in coastal waters (< 50 m) along southern Brazil. Usually discarded on board.

**Exploitation.** Not targeted by any fishery.

**References.** Haimovici et al. (1996); Menezes et al. (2003).



(a) 3 mm OL, 163 mm TL

**Description.** *Shape* trapezoidal. *Distal face* straight. *Proximal face* straight. *Anterior margin* oblique. *Posterior margin* oblique. *Dorsal margin* flattened, lobate. *Ventral margin* flattened, dentate. *Rostrum* present, prominent. *Antirostrum* present. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* broader and shorter than cauda, deep, funnel-like. *Cauda* shallow, tubular-strongly curved ventrally. *Crista* present.

**Material.** Otoliths from 1 specimen of 163 mm TL, 51 g TW, 2.95 mm OL and 1.58 mm OH.

**Relationships.** Insufficient data.

*Chloroscombrus chrysurus* (Linnaeus 1766)

**Distribution and habitat.** Eastern Atlantic: Spain to Angola and western Atlantic: Massachusetts to Argentina. Mid-sized (TL < 650 mm) pelagic-neritic marine species. Is occasionally fished in the inner shelf (< 100 m) along southern Brazil.

**Exploitation.** Not targeted by any fishery.

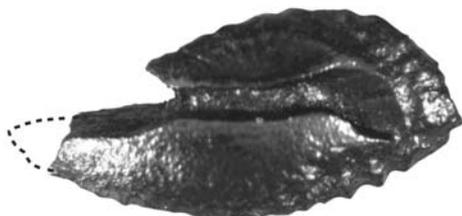
**References.** Haimovici et al. (1996), Menezes et al. (2003).

**Material.** Otoliths from 4 specimens ranging between 155 to 258 mm TL, 39.6 to 159 g TW, 3.52 to 4.82 mm OL, and 1.98 to 2.52 mm OH.

**Relationships.** Insufficient data.



(a) 3.5 mm OL, 155 mm TL



(b) 4.5 mm OL, 226 mm TL

**Description.** *Shape* elliptic. *Distal face* slightly concave. *Proximal face* slightly convex. *Anterior margin* angled to flattened. *Posterior margin* angled. *Dorsal margin* convex, sinuate. *Ventral margin* convex, sinuate. *Rostrum* present, prominent. *Antirostrum* present. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* broader and shorter than cauda, deep, funnel-like. *Cauda* deep, tubular-strongly curved ventrally. *Crista* absent.

*Decapterus punctatus* (Cuvier 1829)

**Distribution and habitat.** Western Atlantic Ocean: from Nova Scotia to southern Brazil. Small-sized (TL > 300 mm) pelagic marine species. It is occasionally caught in the shelf and upper continental slope along southern Brazil.

**Exploitation.** Not targeted by any fishery.

**References.** Haimovici et al. (1996); Figueiredo et al. (2002); Menezes et al. (2003).



(a) 4.2 mm OL, 191 mm TL

**Description.** Shape elliptic. Distal face slightly concave. Proximal face slightly convex. Anterior margin angled. Posterior margin angled. Dorsal margin convex, sinuate. Ventral margin convex, sinuate. Rostrum present, prominent. Antirostrum present. Sulcus acusticus opened at the anterior region, closed at posterior region. Ostium broader and shorter than cauda, deep, funnel-like to undefined. Cauda shallow, tubular-strongly curved ventrally. Crista present.

**Material.** Otoliths from 1 specimen of 191 mm TL, 52 g TW, 4.2 mm OL and 2.25 mm OH.

**Relationships.** Insufficient data.

*Selene setapinnis* (Mitchill 1815)

**Distribution and habitat.** Western Atlantic: Nova Scotia, Canada to Mar del Plata, Argentina. Mid-sized (TL > 400 mm) brackish water and benthopelagic marine species. It is incidentally caught in small quantities and discarded on board by bottom trawlers fishing in coastal waters along southern Brazil.

**Exploitation.** Not targeted by any fishery.

**References.** Menezes et al. (2003); Fischer et al. (2011).



(a) 2.6 mm OL, 182 mm TL

**Description.** *Shape* rectangular. *Distal face* slightly concave. *Proximal face* slightly convex. *Anterior margin* flattened. *Posterior margin* flattened. *Dorsal margin* flattened, sinuate. *Ventral margin* convex, sinuate. *Rostrum* present, prominent. *Antirostrum* present. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* broader and shorter than cauda, deep, funnel-like to undefined. *Cauda* deep, tubular-strongly curved ventrally. *Crista* absent.

**Material.** Otoliths from 2 specimens ranging between 179 and 182 mm TL, 4 and 4.13 g TW, 4.06 and 4.17 mm OL, and 2.56 and 2.57 mm OH.

**Relationships.** Insufficient data.

### *Trachinotus marginatus* Cuvier 1832

**Distribution and habitat.** Southwest Atlantic from Rio de Janeiro to Argentina. Mid-sized brackish and benthopelagic marine species. It is occasionally caught by trawls and purse-seiners in coastal waters along southern Brazil.

**Exploitation.** Occasionally fished with gillnets by small scale fishers.

**References.** Menezes et al. (2003); Lemos et al. (2011).



(a) 8.1 mm OL, 49 mm TL

**Description.** Shape trapezoidal. Distal face slightly concave. Proximal face is straight. Anterior margin oblique. Posterior margin oblique. Dorsal margin convex, sinuate. Ventral margin convex, sinuate. Rostrum present, prominent. Antirostrum absent. Sulcus acusticus opened at the anterior region, closed at posterior region. Ostium broader and shorter than cauda, deep, rectangular to undefined. Cauda deep, tubular-strongly curved ventrally. Crista present.

**Material.** Otoliths from 65 specimens ranging between 145 to 490 mm TL, 39.1 to 1,250 g TW, 3.03 to 7.77 mm OL, and 1.2 to 3.22 mm OH.

### Relationships.

$$TL = -30.12 + 64.416 OL \quad R^2 = 0.81$$

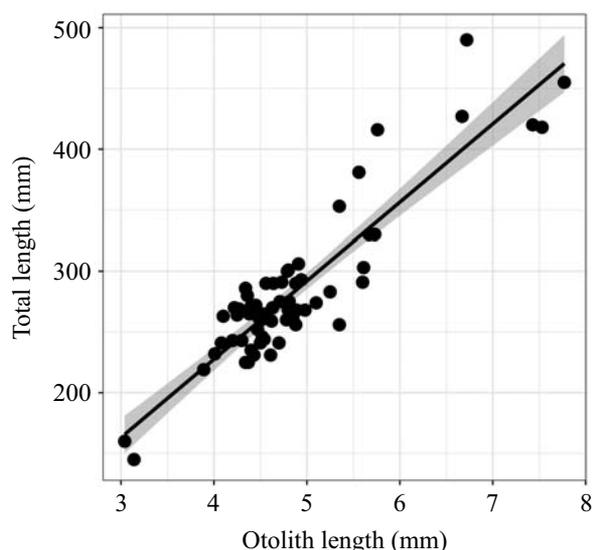
$$TL = 135.80 OH^{1.1251} \quad R^2 = 0.78$$

$$TW = 1.761 OL^{3.208} \quad R^2 = 0.83$$

$$TW = 34.19 OH^{3.231} \quad R^2 = 0.80$$

$$TW = 2E-05 TL^{2.916} \quad R^2 = 0.98$$

$$OH/OL = \text{min. } 0.34\text{-max. } 0.48$$



*Trachurus lathami* Nichols 1920

**Distribution and habitat.** Western Atlantic: Canada to northern Argentina. Small-sized (TL < 300 mm) benthopelagic marine species. It is commonly found in the continental shelf along southern Brazil. It is fished by bottom trawls and mostly discarded on board.

**Exploitation.** Not targeted by any fishery in the region.

**References.** Haimovici et al. (1996, 2008); Menezes et al. (2003).



(a) 3.9 mm OL, 99 mm TL



(b) 7.4 mm OL, 204 mm TL

**Description.** *Shape* elliptic to rhomboidal. *Distal face* slightly concave. *Proximal face* slightly convex. *Anterior margin* angled. *Posterior margin* angled. *Dorsal margin* convex, lobate to sinuate. *Ventral margin* convex, lobate to sinuate. *Rostrum* present, prominent. *Antirostrum* absent. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* broader and shorter than cauda, deep, funnel-like. *Cauda* deep, tubular-slightly curved ventrally. *Crista* present.

**Material.** Otoliths from 39 specimens ranging between 108 to 216 mm TL, 10 to 82.7 g TW, 4.2 to 7.68 mm OL, and 2.4 to 3.68 mm OH.

**Relationships.**

$$TL = -16.98 + 30.010 OL \quad R^2 = 0.75$$

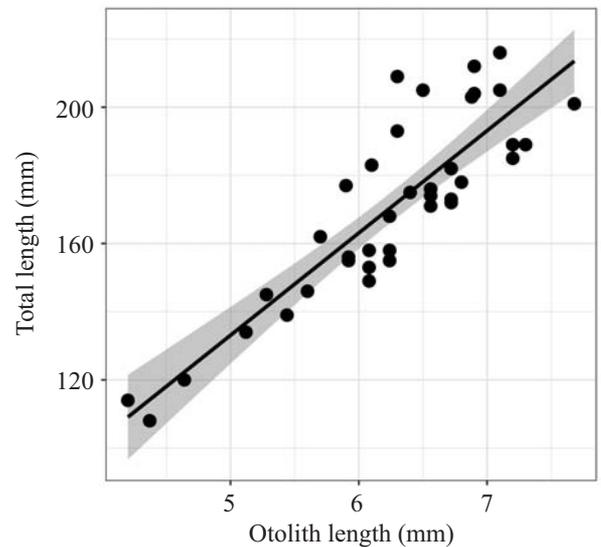
$$TL = 26.891 OH^{1.574} \quad R^2 = 0.84$$

$$TW = 0.083 OL^{3.307} \quad R^2 = 0.93$$

$$TW = 0.133 OH^{4.840} \quad R^2 = 0.84$$

$$TW = 5E-06 TL^{3.080} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.47\text{-max. } 0.59$$



**Family Centrolophidae**  
***Centrolophus niger*** (Gmelin 1789)

**Distribution and habitat.** Circumglobal in temperate waters. Large-sized (TL > 1,500 mm) epipelagic and mesopelagic marine species. It is fished by offshore longliners usually discarded on board along southern Brazil.

**Exploitation.** Not targeted by any fishery.

**References.** Menezes et al. (2003). Haimovici et al. (2008).



(a) 28.8 mm OL, 770 mm TL

**Description.** *Shape* elliptic. *Distal face* slightly concave. *Proximal face* slightly convex. *Anterior margin* round. *Posterior margin* round. *Dorsal margin* flattened, sinuate. *Ventral margin* convex, smooth. *Rostrum* present, prominent. *Antirostrum* present. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* broader and same length of cauda, shallow, tubular. *Cauda* shallow, tubular-straight. *Crista* absent.

**Material.** Otoliths from 3 specimens ranging between 750 to 860 mm TL, 4,200 to 5,100 g TW, 28.93 to 30.31 mm OL and 12.53 to 14.11 mm OH.

**Relationships.** Insufficient data.

**Family Cheilodactylidae**  
***Nemadactylus bergi*** (Norman 1937)

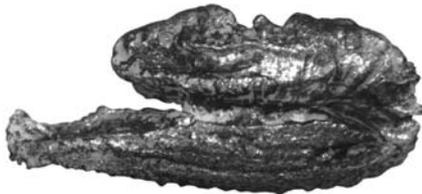
**Distribution and habitat.** From Rio de Janeiro, Brazil to the Argentine and Chilean Patagonia. Mid-sized (TL < 500 mm) demersal marine species. It is incidentally caught but mostly discarded on board of bottom trawlers fishing in the outer shelf and upper continental slope (100-300 m) along southern Brazil.

**Exploitation.** Not targeted by any fishery in the region.

**References.** Menezes et al. (2003); Bernardes et al. (2006); Haimovici et al. (2008).



(a) 7.9 mm OL, 372 mm TL



(b) 11.8 mm OL, 550 mm TL

**Description.** *Shape* elliptic to lanceolate. *Distal face* concave. *Proximal face* convex. *Anterior margin* double-peaked. *Posterior margin* angled to flattened. *Dorsal margin* flattened, sinuate to lobate. *Ventral margin* convex, smooth to sinuate. *Rostrum* present, prominent. *Antirostrum* present. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* broader and shorter than cauda, deep, funnel-like to undefined. *Cauda* shallow, tubular-slightly curved ventrally. *Crista* present.

**Material.** Otoliths from 19 specimens ranging between 205 to 376 mm TL, 4.3 to 7.8 g TW, 4.3 to 7.85 mm OL, and 2.17 to 3.85 mm OH.

**Relationships.**

$$TL = 14.15 + 45.444 OL \quad R^2 = 0.78$$

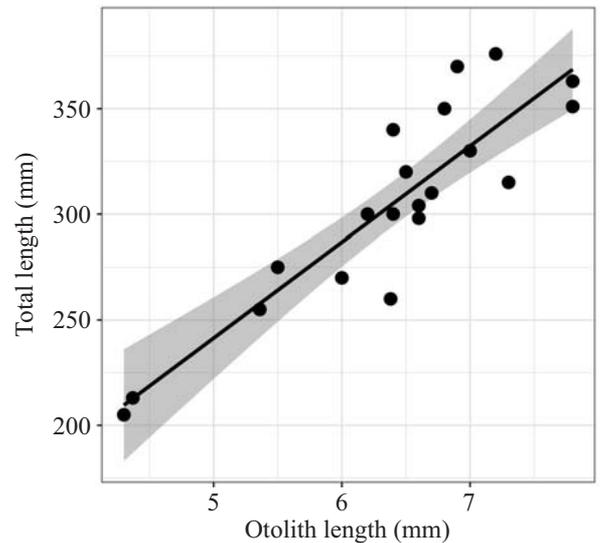
$$TL = 82.044 OH^{1.170} \quad R^2 = 0.91$$

$$TW = 2.025 OL^{2.674} \quad R^2 = 0.87$$

$$TW = 6.243 OH^{3.477} \quad R^2 = 0.90$$

$$TW = 1E-05 TL^{2.981} \quad R^2 = 0.97$$

$$OH/OL = \text{min. } 0.38\text{-max. } 0.53$$



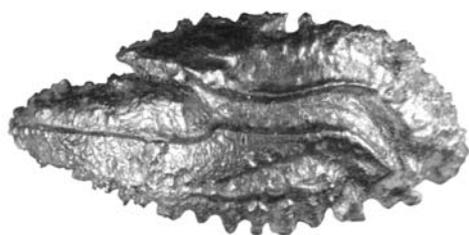
### Family Epinephelidae

#### *Epinephelus marginatus* (Lowe 1834)

**Distribution and habitat.** Atlantic and western Indian oceans and the Mediterranean. In the western Atlantic from southern Brazil to Argentina. Very large (TL > 1,400 mm) rocky bottoms and reef-associated demersal marine species. It is frequent on biodetritic shelf bottoms at depth up to 200 m along southern Brazil.

**Exploitation.** Fished with hook and line on hard bottoms. IUCN status: Vulnerable (2016).

**References.** Menezes et al. (2003); Condini et al. (2018).



(a) 10.1 mm OL, 360 mm TL



(b) 21.4 mm OL, 1,000 mm TL

**Description.** *Shape* cuneiform to trapezoidal. *Distal face* concave. *Proximal face* convex. *Anterior margin* peaked. *Posterior margin* oblique. *Dorsal margin* convex, dentate. *Ventral margin* convex, dentate. *Rostrum* present, prominent. *Antirostrum* present. *Sulcus acusticus* opened at the anterior region, opened at posterior region. *Ostium* broader and shorter than cauda, deep, funnel-like. *Cauda* deep, tubular-strongly curved ventrally. *Crista* present.

**Material.** Otoliths from 23 specimens ranging between 11.8 to 42 mm TL, 28.1 to 7,240 g TW, 4.2 to 18.15 mm OL, and 2.1 to 8.45 mm OH.

#### Relationships.

$$TL = 15.475 OL^{1.360} \quad R^2 = 0.97$$

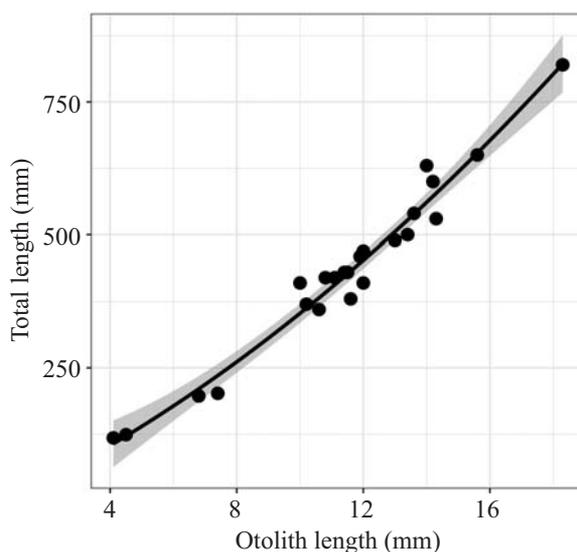
$$TL = 45.225 OH^{1.301} \quad R^2 = 0.98$$

$$TW = 0.258 OL^{3.201} \quad R^2 = 0.99$$

$$TW = 1.684 OH^{3.788} \quad R^2 = 0.98$$

$$TW = 8E-06 TL^{3.163} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.41\text{-max. } 0.57$$



***Hyporthodus flavolimbatus*** (Poey 1865)

**Distribution and habitat.** Western Atlantic: North Carolina, USA to southern Brazil. Large-sized (TL > 1,100 mm) demersal marine species. It is commercially valuable species occasionally fished with hook and line in the upper continental slope along southern Brazil.

**Exploitation.** IUCN status: Vulnerable (2016).

**References.** Menezes et al. (2003); Haimovici et al. (2004); Bernardes et al. (2006).

between 820 to 1,245 mm TL, 10,650 to 28,730 g TW, 7.64 to 9.19 mm OL and 8.60 to 9.21 mm OH.

**Relationships.** Insufficient data.



(a) 8.6 mm OL, 820 mm TL



(b) 9.2 mm OL, 1,245 mm TL

**Description.** *Shape* elliptic to irregular. *Distal face* concave. *Proximal face* convex. *Anterior margin* angled. *Posterior margin* round to oblique. *Dorsal margin* convex, dentate. *Ventral margin* convex, dentate to smooth. *Rostrum* present, prominent. *Antirostrum* present. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* broader and shorter than cauda, deep, funnel-like. *Cauda* deep, tubular-strongly curved ventrally. *Crista* absent.

**Material.** Otoliths from 3 specimens ranging

*Hyporthodus niveatus* (Valenciennes 1828)

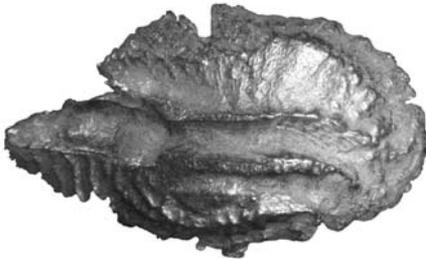
**Distribution and habitat.** Western Atlantic: Canada to southern Brazil. Large-sized (TL > 1,200 mm) demersal marine species. It is commercially valuable species occasionally fished with hook and line in the upper continental slope along southern Brazil.

**Exploitation.** IUCN status: Vulnerable (2016).

**References.** Menezes et al. (2003); Haimovici et al. (2004); Bernardes et al. (2006).



(a) 6.4 mm OL, 157 mm TL



(b) 16.5 mm OL, 575 mm TL



(c) 24 mm OL, 962 mm TL

**Description.** Shape lanceolate. Distal face concave. Proximal face convex. Anterior margin angled. Posterior margin round. Dorsal margin convex, dentate. Ventral margin convex, dentate to smooth.

*Rostrum* present, prominent. *Antirostrum* present. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* broader and shorter than cauda, deep, funnel-like. *Cauda* deep, tubular-slightly curved ventrally. *Crista* present.

**Material.** Otoliths from 27 specimens ranging between 108 to 1,090 mm TL, 23.6 to 21,200 g TW, 4.7 to 26.2 mm OL, and 2.5 to 12.7 mm OH.

**Relationships.**

$$TL = 12.491 OL^{1.367} \quad R^2 = 0.99$$

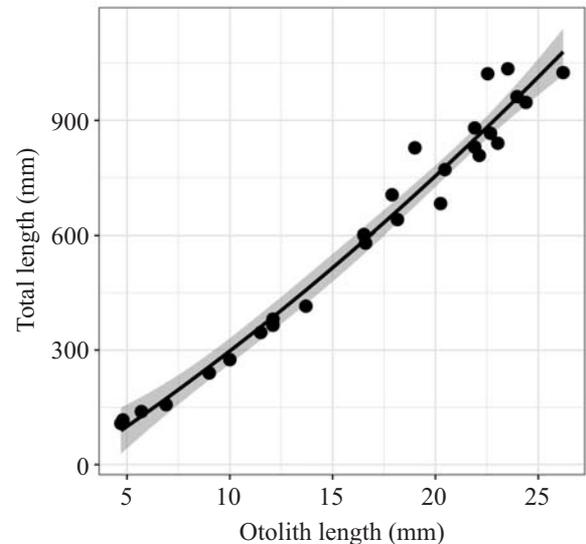
$$TL = 23.370 OH^{1.515} \quad R^2 = 0.96$$

$$TW = 0.043 OL^{3.983} \quad R^2 = 0.99$$

$$TW = 0.274 OH^{4.407} \quad R^2 = 0.96$$

$$TW = 3E-05 TL^{2.910} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.42\text{-max. } 0.59$$



**Family Gempylidae*****Promethichthys prometheus*** (Cuvier 1832)

**Distribution and habitat.** Tropical and warm temperate waters of all oceans. Present along all the Brazilian coast. Large-sized (TL > 1,000 mm) benthopelagic marine species. It is present in the upper continental slope along southern Brazil.

**Exploitation.** Not targeted by any fishery in the region.

**References.** Menezes et al. (2003); Bernardes et al. (2005); Haimovici et al. (2008).



(a) 10.1 mm OL, 645 mm TL

**Description.** *Shape* cuneiform. *Distal face* concave. *Proximal face* convex. *Anterior margin* angled. *Posterior margin* oblique to round. *Dorsal margin* flattened, sinuate. *Ventral margin* convex, dentate. *Rostrum* present, prominent. *Antirostrum* present. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* same width and length of cauda, shallow, tubular. *Cauda* shallow, tubular-straight. *Crista* present.

**Material.** Otoliths from 1 specimen of 645 mm TL, 1,413 g TW, 10.1 mm OL and 4.74 mm OH.

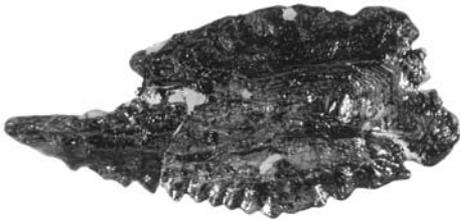
**Relationships.** Insufficient data.

*Thyrsitops lepidopoides* (Cuvier 1832)

**Distribution and habitat.** Southwest Atlantic: from Rio de Janeiro to Argentina, and Chile in the southeast Pacific. Small-sized benthopelagic marine species. It is incidentally caught and discarded on board of bottom trawlers fishing in the continental shelf and upper continental slope (< 400 m) along southern Brazil.

**Exploitation.** Not targeted by any fishery in the region.

**References.** Menezes et al. (2003); Haimovici et al. (1996, 2008).



(a) 6.6 mm OL, 275 mm TL

**Description.** *Shape* rectangular. *Distal face* slightly concave. *Proximal face* slightly convex. *Anterior margin* flattened to double-peaked. *Posterior margin* flattened to double-peaked. *Dorsal margin* convex, dentate. *Ventral margin* convex, sinuate. *Rostrum* present, short. *Antirostrum* present. *Sulcus acusticus* opened at the anterior region, opened at posterior region. *Ostium* same width and length of cauda, deep, tubular. *Cauda* shallow, tubular-straight. *Crista* present.

**Material.** Otoliths from 15 specimens ranging between 150 to 382 mm TL, 14.5 to 300.7 g TW, 3.85 to 8.9 mm OL and 1.85 to 4.1 mm OH.

**Relationships.**

$$TL = -23.87 + 45.583 OL \quad R^2 = 0.96$$

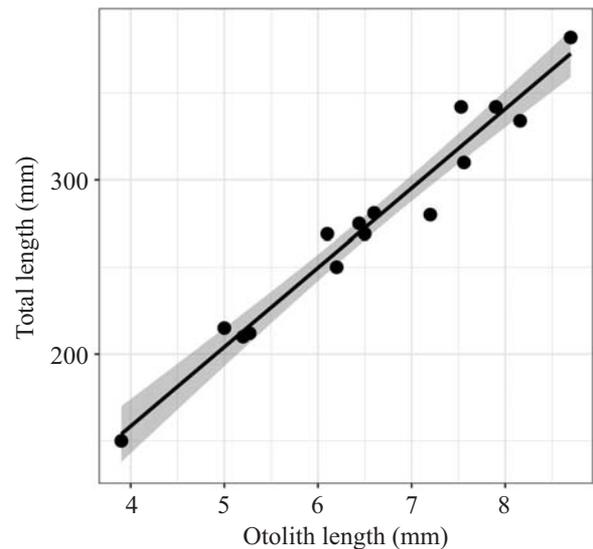
$$TL = 76.387 OH^{1.113} \quad R^2 = 0.90$$

$$TW = 0.156 OL^{3.524} \quad R^2 = 0.96$$

$$TW = 1.605 OH^{3.802} \quad R^2 = 0.92$$

$$TW = 4E-07 TL^{3.480} \quad R^2 = 0.98$$

$$OH/OL = \text{min. } 0.44\text{-max. } 0.50$$



**Family Gerreidae*****Eucinostomus argenteus*** Baird and Girard 1855

**Distribution and habitat.** Western Atlantic from New Jersey to southern Brazil. Small-sized (TL < 350 mm) estuarine and marine species. Uncommon along southern Brazil.

**Exploitation.** Not targeted by any fishery.

**References.** Menezes et al. (2003).

**Material.** Otoliths from 6 specimens ranging between 130 to 215 mm TL, 29 to 131 g TW, 4.15 to 6.5 mm OL, and 2.35 to 3.65 mm OH.

**Relationships.**

$$TL = 1.2603 + 31.485 OL \quad R^2 = 0.95$$

$$TL = 51.388 OH^{1.065} \quad R^2 = 0.70$$

$$TW = 0.566 OL^{2.847} \quad R^2 = 0.81$$

$$TW = 1.757 OH^{3.257} \quad R^2 = 0.72$$

$$TW = 1E-05 TL^{2.991} \quad R^2 = 0.98$$

$$OH/OL = \text{min. } 0.53\text{-max. } 0.65$$

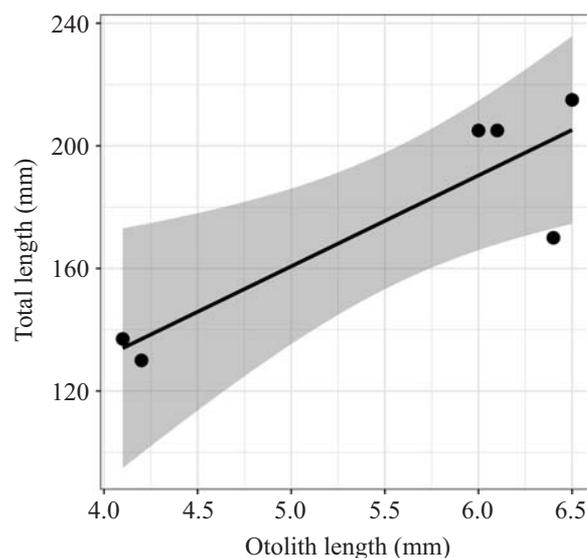


(a) 4.1 mm OL, 130 mm TL



(b) 6.8 mm OL, 215 mm TL

**Description.** *Shape* semicircular to cuneiform. *Distal face* concave. *Proximal face* convex. *Anterior margin* round to angled. *Posterior margin* round to double-peaked. *Dorsal margin* flattened, smooth, with protuberance. *Ventral margin* angled, sinuate. *Rostrum* absent or present, short. *Antirostrum* absent. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* broader and same length of cauda, shallow, rectangular. *Cauda* deep, tubular-strongly curved ventrally. *Crista* present.



*Eucinostomus gula* (Quoy and Gaimard 1824)

**Distribution and habitat.** Western Atlantic from Massachusetts to Argentina. Small-sized (TL < 250 mm) coastal estuarine and marine species. It is occasionally present in estuarine and coastal waters along southern Brazil.

**Exploitation.** Not targeted by any fishery on the region.

**References.** Menezes et al. (2003); Fisher et al. (2011).



(a) 6.5 mm OL, 158 mm TL

**Description.** *Shape* elliptic to cuneiform. *Distal face* concave. *Proximal face* convex. *Anterior margin* angled. *Posterior margin* double-peaked. *Dorsal margin* convex, smooth to sinuate, with protuberance. *Ventral margin* convex, sinuate. *Rostrum* present, short. *Antirostrum* absent. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* broader and same length of cauda, deep, undefined. *Cauda* deep, tubular-strongly curved ventrally. *Crista* present.

**Material.** Otoliths from 1 specimen of 158 mm TL, 96.5 g TW, 6.48 mm OL and 3.38 mm OH.

**Relationships.** Insufficient data.

### Family Haemulidae

#### *Boridia grossidens* Cuvier 1830

**Distribution and habitat.** Southwestern Atlantic Ocean: from Rio de Janeiro to northern Argentina (22° S-41° S). Small-sized (TL < 300 mm) demersal marine species. It is caught in small numbers by bottom trawlers in the inner shelf (< 100 m) along southern Brazil.

**Exploitation.** Not targeted by any fishery on the region.

**References.** Haimovici et al. (1996); Menezes et al. (2003).



(a) 15.3 mm OL, 412 mm TL

**Description.** Shape spindle-shaped. Distal face concave. Proximal face convex. Anterior margin round to angled. Posterior margin round. Dorsal margin angled, smooth, with protuberance. Ventral margin convex, smooth. Rostrum absent. Antirostrum absent. Sulcus acusticus opened at the anterior region, opened at posterior region. Ostium broader and shorter than cauda, deep, tubular. Cauda deep, tubular-strongly curved ventrally. Crista present.

**Material.** Otoliths from 12 specimens ranging between 210 to 290 mm TL, 130 to 320 g TW, 7.7 to 10.8 mm OL, and 4.5 to 6.35 mm OH.

### Relationships.

$$TL = -0.243 + 27.024 OL \quad R^2 = 0.93$$

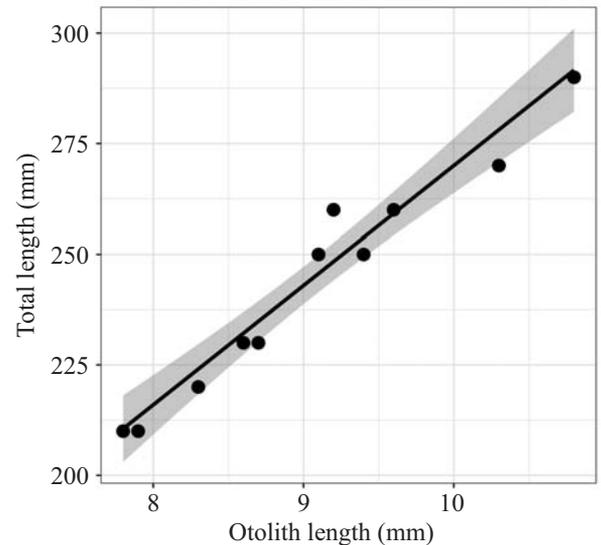
$$TL = 54.390 OH^{0.927} \quad R^2 = 0.64$$

$$TW = 0.285 OL^{2.996} \quad R^2 = 0.89$$

$$TW = 3.509 OH^{2.527} \quad R^2 = 0.58$$

$$TW = 5E-05 TL^{2.775} \quad R^2 = 0.95$$

$$OH/OL = \text{min. } 0.50\text{-max. } 0.59$$



*Conodon nobilis* (Linnaeus 1758)

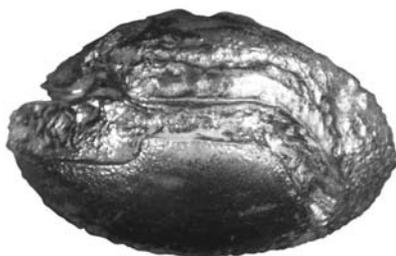
**Distribution and habitat.** Western Atlantic: from Florida (USA) to northern Argentina (30° N-36° S). Small-sized (TL < 350 mm) demersal marine coastal species on soft bottoms. It is occasionally fished along southern Brazil.

**Exploitation.** Not targeted by any fishery on the region.

**References.** Menezes et al. (2003).

**Material.** Otoliths from 2 specimens ranging between 204 and 365 mm TL, 126 and 760 g TW, 9.56 and 15.1 mm OL and 6.13 and 9.69 mm OH.

**Relationships.** Insufficient data.



(a) 9.6 mm OL, 204 mm TL



(b) 15.1 mm OL, 365 mm TL

**Description.** *Shape* elliptic. *Distal face* concave. *Proximal face* convex. *Anterior margin* round. *Posterior margin* round. *Dorsal margin* convex, sinuate. *Ventral margin* convex, smooth. *Rostrum* present short. *Antirostrum* present. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* broader and shorter than cauda, deep, rectangular. *Cauda* deep, tubular-strongly curved ventrally. *Crista* present.

*Haemulopsis corvinaeformis*  
(Steindachner 1868)

**Distribution and habitat.** Western Atlantic: from Mexico to southern Brazil. Small-sized (TL < 250 mm) brackish coastal and demersal marine species. It is incidentally caught by bottom trawlers in the inner continental shelf along southern Brazil.

**Exploitation.** Not targeted by any fishery in the region.

**References.** Menezes et al. (2003).



(a) 6.7 mm OL, 130 mm TL



(b) 9.6 mm OL, 195 mm TL

**Description.** Shape elliptic. Distal face concave. Proximal face convex. Anterior margin round. Posterior margin angled. Dorsal margin convex, smooth to sinuate. Ventral margin convex, sinuate. Rostrum present, short. Antirostrum present. Sulcus acusticus opened at the anterior region, closed at posterior region. Ostium broader and shorter than cauda, deep, rectangular. Cauda deep, tubular-strongly curved ventrally. Crista absent.

**Material.** Otoliths from 20 specimens ranging between 130 to 195 mm TL, 33 to 110 g TW, 6.5 to 9.1 mm OL, and 4.55 to 6.47 mm OH.

**Relationships.**

$$TL = -17.58 + 22.152 OL \quad R^2 = 0.90$$

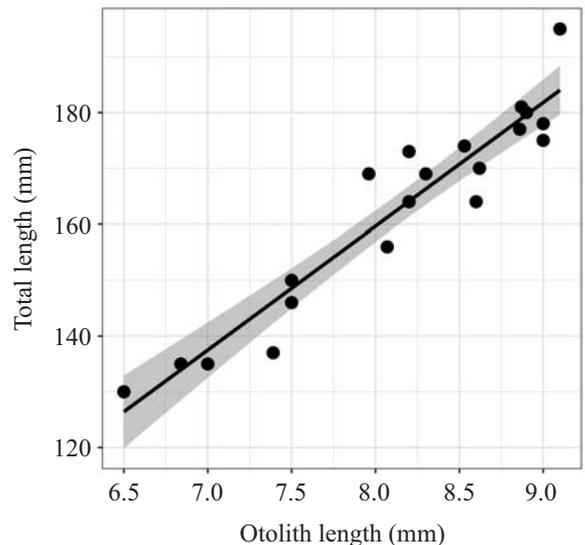
$$TL = 26.010 OH^{1.066} \quad R^2 = 0.85$$

$$TW = 0.042 OL^{3.533} \quad R^2 = 0.94$$

$$TW = 0.212 OH^{3.372} \quad R^2 = 0.86$$

$$TW = 9E-06 TL^{3.117} \quad R^2 = 0.97$$

$$OH/OL = \text{min. } 0.63\text{-max. } 0.73$$



### *Orthopristis rubra* (Cuvier 1830)

**Distribution and habitat.** Western Atlantic: Honduras to Brazil. Small-sized (TL < 400 mm) brackish and demersal marine species. It is incidentally caught by bottom trawlers in the inner continental shelf along southern Brazil.

**Exploitation.** Not targeted by any fishery on the region.

**References.** Haimovici et al. (1996); Menezes et al. (2003).



(a) 5.7 mm OL, 145 mm TL



(b) 11.4 mm OL, 325 mm TL

**Description.** *Shape* rhomboidal to elliptic. *Distal face* slightly concave. *Proximal face* convex. *Anterior margin* round to angled. *Posterior margin* round to angled. *Dorsal margin* convex, smooth to sinuate. *Ventral margin* convex, smooth to sinuate. *Rostrum* present, short. *Antirostrum* absent. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* broader and shorter than cauda, deep, rectangular. *Cauda* deep, tubular-strongly curved ventrally. *Crista* present.

**Material.** Otoliths from 34 specimens ranging between 145 to 284 mm TL, 44 to 335 g TW, 6.15 to 10.47 mm OL, and 3.5 to 5.77 mm OH.

#### Relationships.

$$TL = -36.35 + 31.757 OL \quad R^2 = 0.85$$

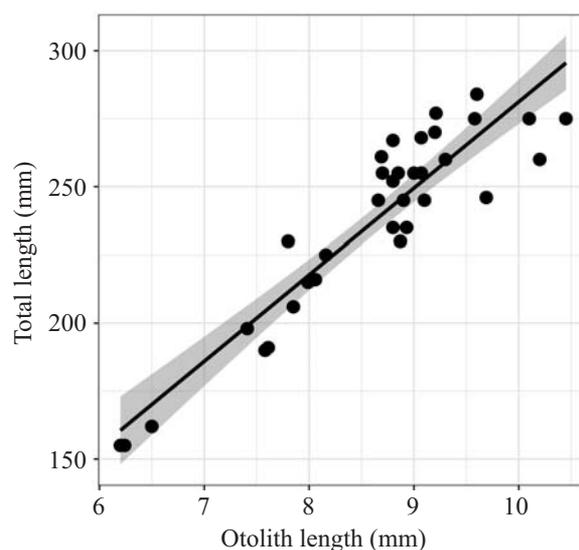
$$TL = 22.968 OH^{1.489} \quad R^2 = 0.72$$

$$TW = 0.125 OL^{3.398} \quad R^2 = 0.80$$

$$TW = 0.247 OH^{4.237} \quad R^2 = 0.61$$

$$TW = 4E-05 TL^{2.822} \quad R^2 = 0.96$$

$$OH/OL = \text{min. } 0.51\text{-max. } 0.63$$



**Family Liopropomatidae**  
*Bathyanthias roseus* Günther 1880

**Distribution and habitat.** Southwestern Atlantic Ocean: Brazil and Uruguay. Small-sized (TL < 350 mm) bathydemersal marine species. It is incidentally caught in small numbers and mostly discarded by bottom trawlers fishing in the outer shelf and upper continental slope (100-300 m) along southern Brazil.

**Exploitation.** Not targeted by any fishery.

**References.** Menezes et al. (2003); Bernardes et al. (2005); Haimovici et al. (2008) as *Pinkea rosea*.



(a) 5.7 mm OL, 98 mm TL



(b) 9.5 mm OL, 165 mm TL

**Description.** Shape cuneiform to elliptic. Distal face straight. Proximal face slightly convex. Anterior margin angled. Posterior margin round. Dorsal margin flattened, smooth to sinuate. Ventral margin convex, smooth. Rostrum present, prominent. Antirostrum absent. Sulcus acusticus opened at the anterior region, closed at posterior region. Ostium broader and shorter than cauda, deep, funnel-like. Cauda deep, tubular-slightly curved ventrally. Crista present.

**Material.** Otoliths from 8 specimens ranging between 98 to 165 mm TL, 13 to 52 g TW, 5.78 to 9.25 mm OL, and 2.86 to 4.22 mm OH.

**Relationships.**

$$TL = -1.524 + 17.524 OL \quad R^2 = 0.99$$

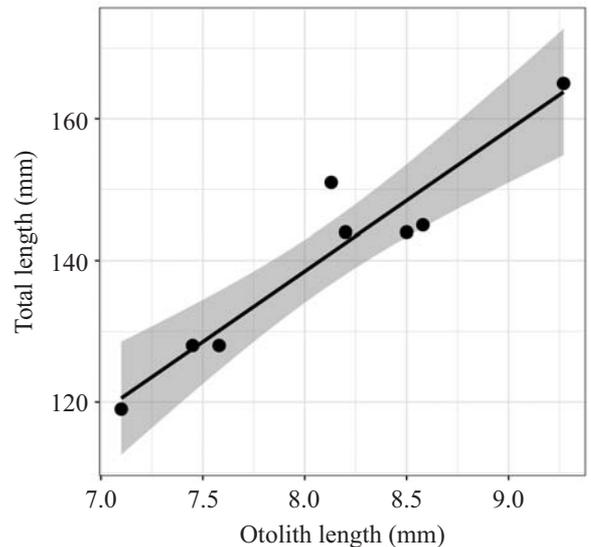
$$TL = 25.275 OH^{1.263} \quad R^2 = 0.95$$

$$TW = 0.056 OL^{3.066} \quad R^2 = 0.95$$

$$TW = 0.287 OH^{3.521} \quad R^2 = 0.91$$

$$TW = 3E-05 TL^{2.813} \quad R^2 = 0.98$$

$$OH/OL = \text{min. } 0.46\text{-max. } 0.49$$



**Family Lobotidae**  
***Lobotes surinamensis*** (Bloch 1790)

**Distribution and habitat.** Tropical to temperate waters of all oceans. Large-sized (TL > 800 mm) brackish and benthopelagic marine species. Currently rare, formerly frequent in shallow waters along southern Brazil.

**Exploitation.** Occasionally fished with gill nets.

**References.** Menezes and Figueiredo (1980); Menezes et al. (2003).



(a) 12 mm OL, 445 mm TL

**Description.** *Shape* cuneiform. *Distal face* slightly concave. *Proximal face* slightly convex. *Anterior margin* round to oblique. *Posterior margin* round to oblique. *Dorsal margin* flattened, sinuate. *Ventral margin* flattened, sinuate to dentate. *Rostrum* present, prominent. *Antirostrum* absent. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* broader and shorter than cauda, shallow, undefined. *Cauda* deep, tubular-strongly curved ventrally. *Crista* absent.

**Material.** Otoliths from 1 specimen of 445 mm TL, 1,740 g TW, 12 mm OL and 6.15 mm OH.

**Relationships.** Insufficient data.

### Family Lutjanidae

#### *Pristipomoides freemani* Anderson 1966

**Distribution and habitat.** Western Atlantic from Panama to Uruguay. Small-sized (TL < 300 mm) demersal marine species. It is incidentally caught and discarded on board of bottom trawlers fishing in the outer continental shelf and shelf break (< 300 m) along southern Brazil.

**Exploitation.** Not targeted by any fishery.

**References.** Menezes et al. (2003); Bernardes et al. (2005); Haimovici et al. (2008).



(a) 6 mm OL, 145 mm TL



(b) 10 mm OL, 252 mm TL

**Description.** Shape elliptic to pentagonal. Distal face straight. Proximal face slightly convex. Anterior margin round to angled. Posterior margin round to angled. Dorsal margin convex, smooth to sinuate. Ventral margin convex, sinuate. Rostrum present, short. Antirostrum absent. Sulcus acusticus opened at the anterior region,

opened at posterior region. Ostium broader and shorter than cauda, deep, rectangular. Cauda deep, tubular-slightly curved ventrally. Crista present.

**Material.** Otoliths from 15 specimens ranging between 72 to 280 mm TL, 3.5 to 270 g TW, 5.68 to 9.6 mm OL and 3.98 to 6.31 mm OH.

#### Relationships.

$$TL = 21.230 OL^{1.074} \quad R^2 = 0.93$$

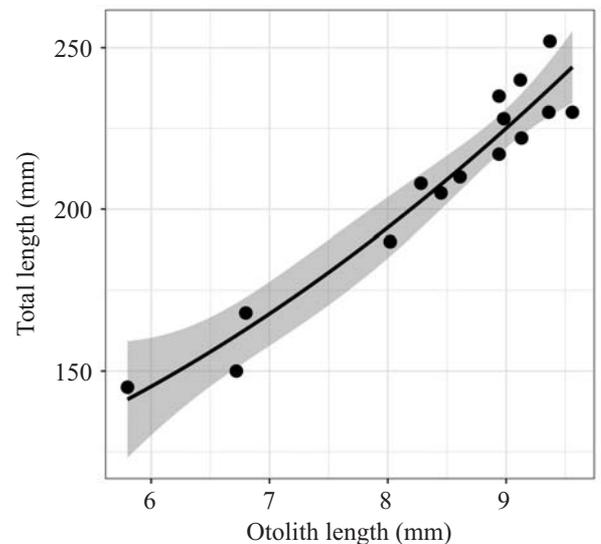
$$TL = 27.586 OH^{1.198} \quad R^2 = 0.88$$

$$TW = 0.093 OL^{3.249} \quad R^2 = 0.93$$

$$TW = 0.191 OH^{3.669} \quad R^2 = 0.91$$

$$TW = 1E-05 TL^{2.997} \quad R^2 = 0.98$$

$$OH/OL = \text{min. } 0.61\text{-max. } 0.70$$



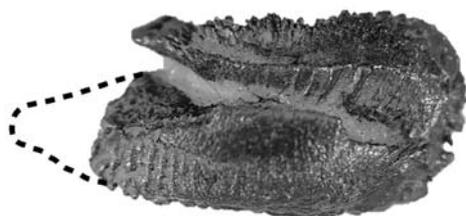
### Family Malacanthidae

#### *Caulolatilus chrysops* (Valenciennes 1833)

**Distribution and habitat.** North Carolina to southern Brazil (36° N-35° S). Mid-sized (TL < 500 mm) demersal marine species on rubble bottoms. It is fished in small numbers by bottom trawlers in outer shelf and upper continental slope (100-300 m) along southeastern Brazil.

**Exploitation.** Not targeted by any fishery.

**References.** Doodley (1978); Haimovici et al. (1996); Menezes et al. (2003).



(a) 6.9 mm OL, 350 mm TL



(b) 11.2 mm OL, 612 mm TL

**Description.** *Shape* cuneiform. *Distal face* concave. *Proximal face* convex. *Anterior margin* angled. *Posterior margin* flattened to oblique. *Dorsal margin* flattened, lobate to sinuate. *Ventral margin* convex, sinuate. *Rostrum* present, prominent. *Antirostrum* present. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* broader and shorter than cauda, deep, funnel-like. *Cauda* deep, tubular-straight. *Crista* present.

**Material.** Otoliths from 11 specimens ranging

between 270 to 585 mm TL, 223 to 2,420 g TW, 6 to 10.8 mm OL and 3 to 5.04 mm OH.

#### Relationships.

$$TL = -70.32 + 60.812 OL \quad R^2 = 0.81$$

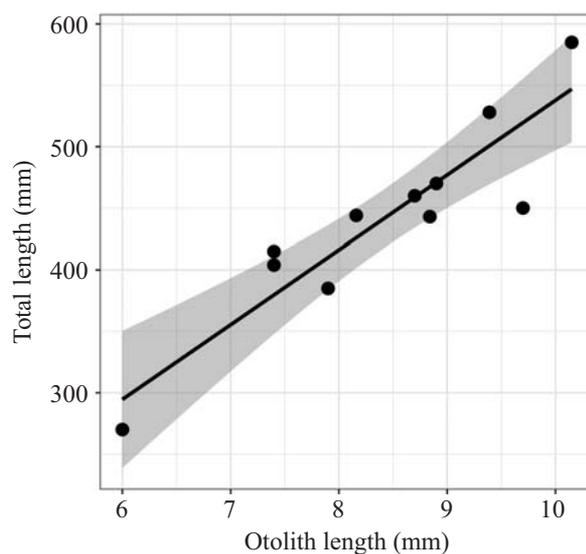
$$TL = 76.151 OH^{1.304} \quad R^2 = 0.87$$

$$TW = 0.245 OL^{3.928} \quad R^2 = 0.88$$

$$TW = 4.053 OH^{4.121} \quad R^2 = 0.85$$

$$TW = 5E-06 TL^{3.156} \quad R^2 = 0.98$$

$$OH/OL = \text{min. } 0.43\text{-max. } 0.50$$



***Lopholatilus villarii*** Miranda Ribeiro 1915

**Distribution and habitat.** Southwest Atlantic: Brazil, Uruguay, Argentina. Large-sized (TL > 800 mm) bathydemersal marine species. It is present in the outer shelf and upper continental slope (150-400 m) along southern Brazil.

**Exploitation.** Highly valuable species, fished hook and line.

**References.** Figueiredo and Menezes (1980); Haimovici et al. (2004); Ávila-da-Silva and Haimovici (2005).

**Description.** Shape cuneiform to pyriform. Distal face concave. Proximal face convex. Anterior margin angled. Posterior margin flattened. Dorsal margin convex, dentate. Ventral margin convex, smooth to sinuate. Rostrum present, prominent. Antirostrum present. Sulcus acusticus opened at the anterior region, opened at posterior region. Ostium broader and shorter than cauda, deep, funnel-like. Cauda deep, tubular-straight. Crista present.

**Material.** Otoliths from 14 specimens ranging between 248 to 778 mm TL, 160 to 6,450 g TW, 8.55 to 17.1 mm OL, and 4.97 to 10 mm OH.

**Relationships.**

$$TL = 16.334 OL^{1.288} \quad R^2 = 0.98$$

$$TL = 39.371 OH^{1.191} \quad R^2 = 0.96$$

$$TW = 0.025 OL^{4.157} \quad R^2 = 0.96$$

$$TW = 0.418 OH^{3.854} \quad R^2 = 0.98$$

$$TW = 3E-06 TL^{3.234} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.55\text{-max. } 0.63$$



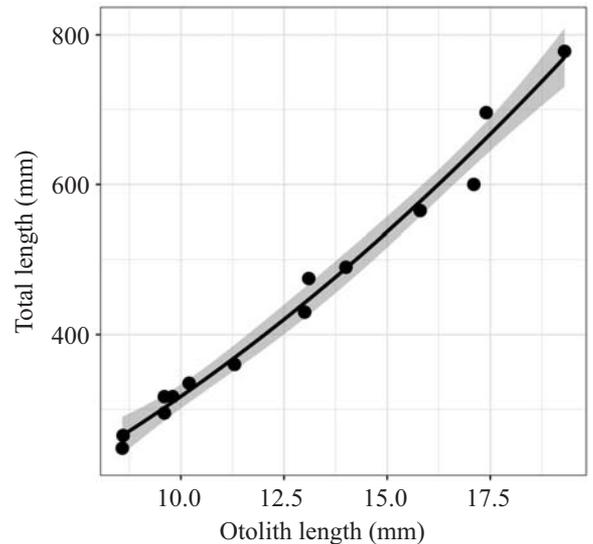
(a) 8.8 mm OL, 270 mm TL



(b) 14 mm OL, 490 mm TL



(c) 21 mm OL, 825 mm TL



### Family Mullidae

#### *Mullus argentinae* Hubbs and Marini 1933

**Distribution and habitat.** Southwest Atlantic: Brazil, Uruguay to northern Argentina. Small (TL < 300 mm) demersal marine species. It is incidentally caught mostly discarded on board by bottom trawlers fishing in the outer shelf and upper continental slope (50 to 300 m) along southern Brazil.

**Exploitation.** Not targeted by any fishery in the region.

**References.** Menezes et al. (2003); Bernardes et al. (2006); Haimovici et al. (2008).



(a) 4.4 mm OL, 221 mm TL

**Description.** *Shape* trapezoidal. *Distal face* straight. *Proximal face* convex. *Anterior margin* oblique. *Posterior margin* oblique. *Dorsal margin* convex, dentate. *Ventral margin* convex, dentate. *Rostrum* present, prominent. *Antirostrum* present. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* broader and shorter than cauda, deep, undefined. *Cauda* deep, tubular-strongly curved ventrally, expanded at end. *Crista* present.

**Material.** Otoliths from 39 specimens ranging between 119 to 221 mm TL, 20.3 to 196 g TW, 2.95 to 4.5 mm OL and 1.9 to 3 mm OH.

### Relationships.

$$TL = -51.05 + 62.481 OL \quad R^2 = 0.76$$

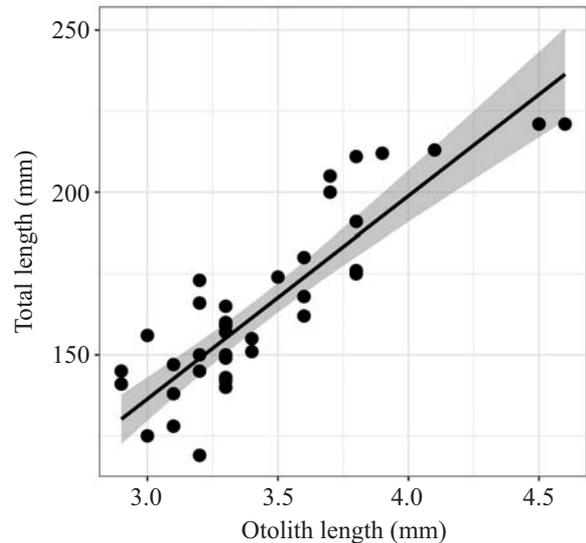
$$TL = 50.427 OH^{1.399} \quad R^2 = 0.73$$

$$TW = 0.228 OL^{4.601} \quad R^2 = 0.73$$

$$TW = 1.009 OH^{5.050} \quad R^2 = 0.80$$

$$TW = 8E-06 TL^{3.127} \quad R^2 = 0.88$$

$$OH/OL = \text{min. } 0.60\text{-max. } 0.77$$



*Upeneus parvus* Poey 1852

**Distribution and habitat.** Western Atlantic: North Carolina USA to Santa Catarina, Brazil. Small-sized (TL < 250 mm) demersal marine species. It is fished in small quantities by bottom trawlers in the outer continental shelf in southern Brazil.

**Exploitation.** Not targeted by any fishery.

**References.** Menezes and Figueiredo (1985); Bernardes et al. (2005).

**Description.** Shape trapezoidal to irregular. Distal face concave. Proximal face convex. Anterior margin angled. Posterior margin oblique. Dorsal margin slightly convex, sinuate. Ventral margin convex, sinuate. Rostrum present, short. Antirostrum underdeveloped. Sulcus acusticus opened at the anterior region, closed at posterior region. Ostium broader and shorter than cauda, deep, funnel-like. Cauda deep, tubular-strongly curved ventrally, expanded at end. Crista present.

**Material.** Otoliths from 14 specimens ranging between 77 to 237 mm TL, 3.6 to 167 g TW, 2.29 to 4.23 mm OL, and 1.37 to 2.74 mm OH.

**Relationships.**

$$TL = 25.217 OL^{1.480} \quad R^2 = 0.82$$

$$TL = 48.035 OH^{1.478} \quad R^2 = 0.88$$

$$TW = 0.101 OL^{4.856} \quad R^2 = 0.82$$

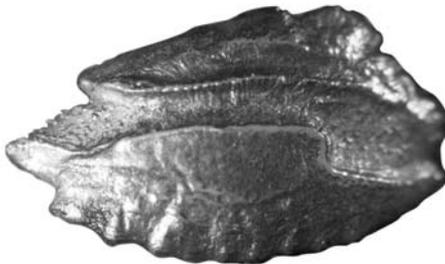
$$TW = 0.816 OH^{4.857} \quad R^2 = 0.82$$

$$TW = 3E-06 TL^{3.245} \quad R^2 = 0.98$$

$$OH/OL = \text{min. } 0.58\text{-max. } 0.76$$



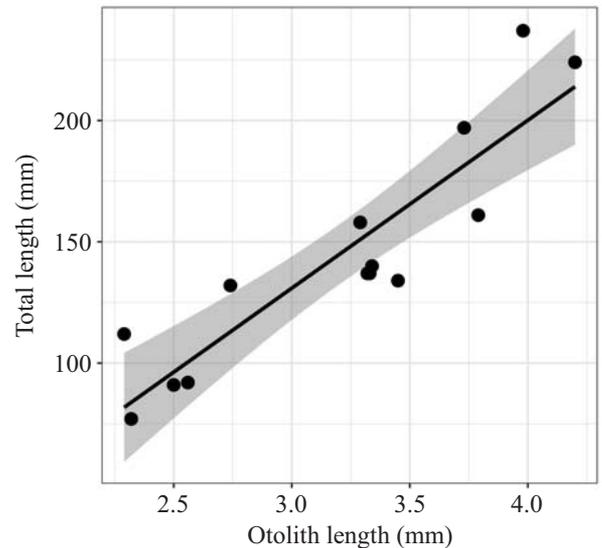
(a) 2 mm OL, 77 mm TL



(b) 3.3 mm OL, 161 mm TL



(c) 4.3 mm OL, 237 mm TL



**Family Opisthognathidae**  
***Lonchopisthus lemur*** (Myers 1935)

**Distribution and habitat.** Western central Atlantic: Puerto Rico to southern Brazil. Small-sized (TL < 100 mm) bathydemersal marine species. It is occasionally caught in the shelf break (100-200 m) along southern Brazil.

**Exploitation.** Not targeted by any fishery.

**References.** Menezes et al. (2003); Bernardes et al. (2006) as *L. meadi*.



(a) 4.2 mm OL, 78 mm TL

**Description.** *Shape* elliptic. *Distal face* slightly convex. *Proximal face* convex. *Anterior margin* angled. *Posterior margin* round. *Dorsal margin* convex, smooth. *Ventral margin* convex, smooth. *Rostrum* present, short. *Antirostrum* present. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* same width and larger than cauda, deep, tubular. *Cauda* shallow, elliptic. *Crista* present.

**Material.** Otoliths from 1 specimen of 78 mm TL, 3.2 g TW, 4.23 mm OL and 2.68 mm OH.

**Relationships.** Insufficient data.

**Family Polyprionidae*****Polyprion americanus***

(Bloch and Schneider 1801)

**Distribution and habitat.** Northern and southern Atlantic, southwest Pacific. In the southwestern Atlantic Ocean from Canada to Argentina. Very large (TL > 1,500 mm) marine epipelagic juveniles and demersal adults. It was an important commercial species fished with hook and line in the continental slope (200-600 m) along southern Brazil until the early 2000s.

**Exploitation.** Its fishery is considered collapsed in Brazil. Fishing forbidden since 2005.

**References.** Menezes et al. (2003); Haimovici et al. (2004); Bernardes et al. (2006).



(a) 6 mm OL, 200 mm TL



(b) 12.7 mm OL, 480 mm TL



(c) 19.2 mm OL, 775 mm TL

**Description.** *Shape* lanceolate. *Distal face* slightly concave. *Proximal face* convex. *Anterior margin* peaked. *Posterior margin* round. *Dorsal margin* flattened, sinuate to dentate. *Ventral margin* angled to flattened, smooth to sinuate. *Rostrum* present, prominent. *Antirostrum* present. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* broader and shorter than cauda, deep, funnel-like. *Cauda* deep, tubular-slightly curved ventrally. *Crista* present.

**Material.** Otoliths from 29 specimens ranging between 441 to 1130 mm TL, 1,200 to 24,100 g TW, 10.2 to 25.2 mm OL, and 4.6 to 11.4 mm OH.

**Relationships.**

$$TL = 24.128 OL^{1.175} \quad R^2 = 0.92$$

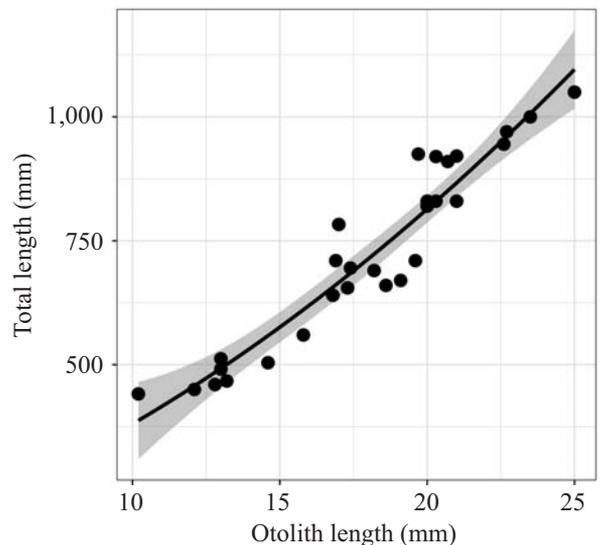
$$TL = 47.146 OH^{1.338} \quad R^2 = 0.78$$

$$TW = 0.111 OL^{3.784} \quad R^2 = 0.78$$

$$TW = 1.347 OH^{4.156} \quad R^2 = 0.82$$

$$TW = 4E-09 TL^{3.216} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.36\text{-max. } 0.53$$



### Family Pomatomidae

#### *Pomatomus saltatrix* (Linnaeus 1766)

**Distribution and habitat.** Circumglobal. In the western Atlantic from Canada to Argentina. Large-sized (TL > 800 mm) brackish and pelagic marine species.

**Exploitation.** It is a commercially important species fished with purse-seiners, gillnets and occasionally by bottom trawlers in the continental shelf along southern Brazil.

**References.** Haimovici and Krug (1996); Menezes et al. (2003).



(a) 5.3 mm OL, 147 mm TL



(b) 8.3 mm OL, 257 mm TL

**Description.** *Shape* lanceolate. *Distal face* slightly concave. *Proximal face* slightly convex. *Anterior margin* peaked. *Posterior margin* oblique. *Dorsal margin* flattened, lobate to sinuate. *Ventral margin* convex, sinuate to dentate. *Rostrum* present, prominent. *Antirostrum* present. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* broader and shorter than cauda, deep, funnel-like. *Cauda* deep, tubular-slightly curved ventrally. *Crista* present.

**Material.** Otoliths from 36 specimens ranging between 72 to 594 mm TL, 3.1 to 1,920 g TW, 2.95 to 15.7 mm OL and 1.4 to 5 mm OH.

### Relationships.

$$TL = 18.828 OL^{1.235} \quad R^2 = 0.99$$

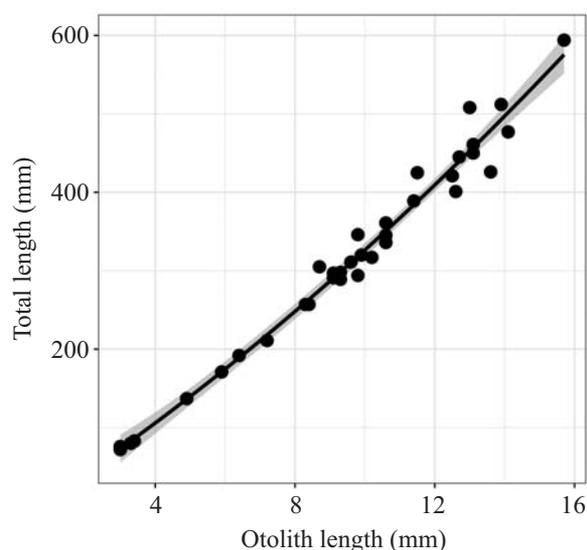
$$TL = 41.482 OH^{1.601} \quad R^2 = 0.98$$

$$TW = 0.048 OL^{3.810} \quad R^2 = 0.99$$

$$TW = 0.571 OH^{4.922} \quad R^2 = 0.99$$

$$TW = 6E-06 TL^{3.076} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.32\text{-max. } 0.49$$



### Family Priacanthidae

#### *Heteropriacanthus cruentatus* (Lacepède 1801)

**Distribution and habitat.** Circumglobal. In the western Atlantic Ocean from New York in USA to Argentina. Mid-sized (TL < 600 mm) benthopelagic marine species. It is occasionally fished by bottom trawls in the outer shelf and upper continental slope (100-300 m) along southern Brazil.

**Exploitation.** Not targeted by any fishery.

**References.** Menezes et al. (2003) as *Cookeous japonicus*; Bernardes et al. (2006); Haimovici et al. (2008).

**Description.** Shape pentagonal to rectangular. Distal face straight. Proximal face slightly convex. Anterior margin angled to double-peaked. Posterior margin round to flattened. Dorsal margin convex, dentate. Ventral margin angled to convex, dentate. Rostrum present, prominent. Antirostrum present. Sulcus acusticus opened at the anterior region, opened at posterior margin. Ostium broader and shorter than cauda, deep, funnel-like. Cauda deep, tubular-strongly curved ventrally. Crista present.

**Material.** Otoliths from 28 specimens ranging between 227 to 540 mm TL, 228 to 2,294 g TW, 5.72 to 9.91 mm OL, and 4.36 to 7.11 mm OH.

#### Relationships.

$$TL = 14.417 OL^{1.581} \quad R^2 = 0.83$$

$$TL = 13.163 OH^{1.885} \quad R^2 = 0.77$$

$$TW = 0.188 OL^{4.072} \quad R^2 = 0.82$$

$$TW = 0.154 OH^{4.837} \quad R^2 = 0.74$$

$$TW = 2E-04 TL^{2.578} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.65\text{-max. } 0.84$$



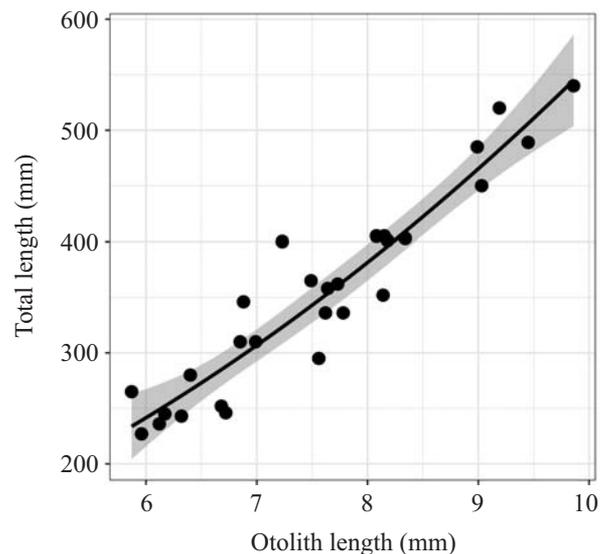
(a) 5.7 mm OL, 228 mm TL



(b) 8 mm OL, 388 mm TL



(c) 9.9 mm OL, 540 mm TL



### Family Sciaenidae

#### *Ctenosciaena gracilicirrhus* (Metzelaar 1919)

**Distribution and habitat.** Caribe and southwestern Atlantic Ocean: from Nicaragua to southern Brazil (10° N-34° S). Small-sized (TL < 250 mm) demersal marine species. It is fished and discarded on board by bottom trawlers mostly at depth of 50 to 100 m along southern Brazil.

**Exploitation.** Not targeted by any fishery.

**References.** Haimovici et al. (1996); Menezes et al. (2003).



(a) 4 mm OL, 82 mm TL



(b) 9.2 mm OL, 192 mm TL

**Description.** *Shape* discoidal to oblong. *Distal face* convex. *Proximal face* convex. *Anterior margin* round. *Posterior margin* round. *Dorsal margin* convex, smooth. *Ventral margin* convex, smooth. *Rostrum* absent. *Antirostrum* absent. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* broader and shorter than cauda, shallow, lateral. *Cauda* deep, tubular-curved ventrally. *Crista* present.

**Material.** Otoliths from 49 specimens ranging between 82 to 192 mm TL, 7.5 to 102 g TW, 3.95 to 8.85 mm OL and 3.5 to 6.45 mm OH.

#### Relationships.

$$TL = 20.591 OL^{1.004} \quad R^2 = 0.98$$

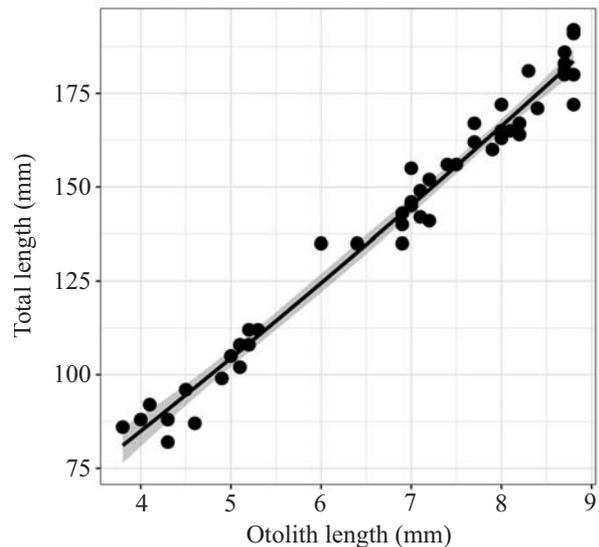
$$TL = 12.990 OH^{1.433} \quad R^2 = 0.96$$

$$TW = 0.081 OL^{3.248} \quad R^2 = 0.98$$

$$TW = 0.013 OH^{4.822} \quad R^2 = 0.97$$

$$TW = 9E-06 TL^{3.107} \quad R^2 = 0.98$$

$$OH/OL = \text{min. } 0.70\text{-max. } 0.92$$



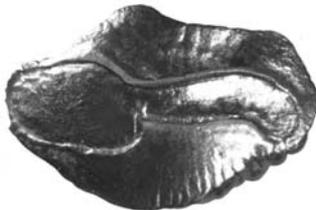
*Cynoscion guatucupa* (Cuvier 1830)

**Distribution and habitat.** Southwestern Atlantic Ocean: from southeastern Brazil to northern Argentina (22° S-42° S). Medium-sized (TL < 600 mm) benthopelagic marine and coastal species. It inhabits the inner and outer shelf at depth up to 150 m, on sandy and muddy bottoms along southern Brazil.

**Exploitation.** An important target of bottom trawl and gillnet fisheries along southern Brazil.



(a) 1.6 mm OL, 24 mm TL



(b) 6.9 mm OL, 141 mm TL



(c) 10.6 mm OL, 236 mm TL



(d) 20.5 mm OL, 520 mm TL

**References.** Haimovici et al. (1996); Menezes et al. (2003); Miranda and Haimovici (2007); Mendonça et al. (2022).

**Description.** *Shape* elliptic to rhomboidal. *Distal face* convex. *Proximal face* convex. *Anterior margin* round. *Posterior margin* round. *Dorsal margin* convex to angled, lobate to smooth, with protuberance. *Ventral margin* convex, lobate to smooth. *Rostrum* absent. *Antirostrum* absent. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* broader and shorter than cauda, shallow, pear-like. *Cauda* deep, tubular-strongly curved ventrally. *Crista* present.

**Material.** Otoliths from 78 specimens ranging between 21 to 448 mm TL, 0.07 to 1,105 g TW, 1.3 to 17.8 mm OL, and 1 to 8.9 mm OH.

**Relationships.**

$$TL = 13.799 OL^{1.201} \quad R^2 = 0.99$$

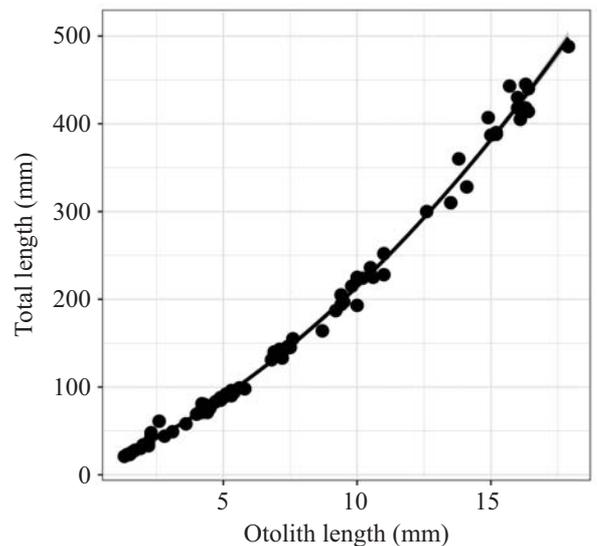
$$TL = 18.406 OH^{1.423} \quad R^2 = 0.96$$

$$TW = 0.018 OL^{3.739} \quad R^2 = 0.99$$

$$TW = 0.044 OH^{4.458} \quad R^2 = 0.98$$

$$TW = 6E-06 TL^{3.093} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.45\text{-max. } 0.78$$



*Cynoscion jamaicensis*  
(Vaillant and Bocourt 1883)

**Distribution and habitat.** Caribe and southwestern Atlantic Ocean: from Nicaragua to southern Brazil. Small-sized (TL < 350 mm) benthopelagic marine and coastal species inhabiting sandy and muddy bottoms of the inner shelf (20-100 m). Incidentally caught in the bottom trawl fishery along southern Brazil.

**Exploitation.** Fished mostly with bottom trawler.

**References.** Haimovici et al. (1996); Menezes et al. (2003); Alves et al. (2020); Mendonça et al. (2022).



(a) 3.7 mm OL, 60 mm TL



(b) 7.9 mm OL, 145 mm TL



(c) 15.7 mm OL, 318 mm TL

**Description.** Shape elliptic to oblong. Distal face convex. Proximal face convex. Anterior margin round. Posterior margin oblique. Dorsal margin convex to flattened, sinuate to smooth. Ventral margin convex, sinuate to smooth. Rostrum absent. Antirostrum absent. Sulcus acusticus opened at the anterior region, closed at posterior region. Ostium broader and shorter than cauda, shallow, round-oval to lateral. Cauda deep, tubular-strongly curved ventrally. Crista present.

**Material.** Otoliths from 38 specimens ranging between 140 to 325 mm TL, 25 to 456 g TW, 7.5 to 16.2 mm OL and 4.2 to 7.55 mm OH.

**Relationships.**

$$TL = 13.515 OL^{1.146} \quad R^2 = 0.98$$

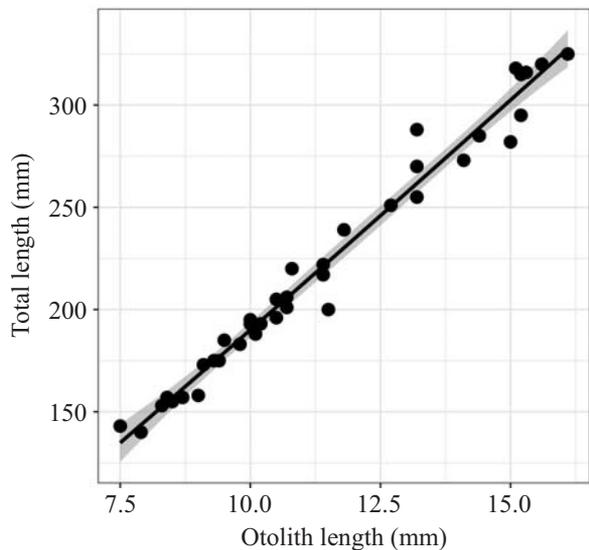
$$TL = 15.487 OH^{1.509} \quad R^2 = 0.97$$

$$TW = 0.016 OL^{3.661} \quad R^2 = 0.97$$

$$TW = 0.025 OH^{4.815} \quad R^2 = 0.96$$

$$TW = 4E-06 TL^{3.203} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.46\text{-max. } 0.60$$



***Isopisthus parvipinnis*** (Cuvier 1830)**Relationships.** Insufficient data.**Distribution and habitat.** Western Atlantic: Costa Rica to southern Brazil. Small-sized (TL < 250 mm) brackish and demersal marine species.**Exploitation.** Not targeted by any fishery in southern Brazil.**References.** Menezes et al. (2003).

(a) 6.9 mm OL, 160 mm TL



(b) 7.7 mm OL, 177 mm TL

**Description.** *Shape* semicircular. *Distal face* convex. *Proximal face* convex. *Anterior margin* round. *Posterior margin* round to flattened. *Dorsal margin* flattened, smooth to sinuate. *Ventral margin* convex, smooth. *Rostrum* absent. *Antirostrum* absent. *Sulcus acusticus* closed at posterior region. *Ostium* broader and shorter than cauda, shallow, round-oval to lateral. *Cauda* shallow, tubular-strongly curved ventrally. *Crista* present.**Material.** Otoliths from 4 specimens ranging between 160 to 177 mm TL, 38.4 to 54.5 g TW, 6.87 to 7.67 mm OL and 4.29 to 4.57 mm OH.

*Larimus breviceps* Cuvier 1830

**Distribution and habitat.** Caribe and southwestern Atlantic Ocean: from Costa Rica to southern Brazil. Small-sized (TL > 250 mm) demersal estuarine, costal and marine species inhabiting sandy and muddy bottoms in brackish estuaries and shallow coastal waters of the inner shelf. It is incidentally caught by the shrimp trawl fisheries in coastal waters along southern Brazil during the warm season, and discarded on board.

**Exploitation.** Not targeted by any fishery.

**References.** Menezes et al. (2003); Haimovici et al. (2005).



(a) 7.2 mm OL, 1,146 mm TL



(b) 12.4 mm OL, 231 mm TL

**Description.** Shape oval to oblong. Distal face convex. Proximal face convex. Anterior margin round. Posterior margin round. Dorsal margin convex, smooth. Ventral margin convex, smooth. Rostrum absent. Antirostrum absent. Sulcus acusticus opened at the anterior region, closed at posterior region. Ostium broader and shorter than

cauda, shallow, lateral. Cauda deep, tubular-curved ventrally. Crista absent.

**Material.** Otoliths from 20 specimens ranging between 116 to 292 mm TL, 23 to 350 g TW, 7.2 to 14.95 mm OL and 4.65 to 9.7 mm OH.

**Relationships.**

$$TL = -44.37 + 22.263 OL \quad R^2 = 0.99$$

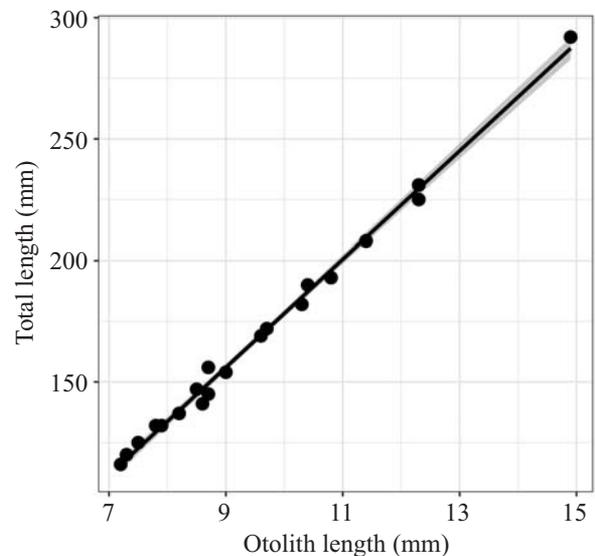
$$TL = 15.255 OH^{1.298} \quad R^2 = 0.98$$

$$TW = 0.012 OL^{3.817} \quad R^2 = 0.99$$

$$TW = 0.046 OH^{3.958} \quad R^2 = 0.98$$

$$TW = 1E-05 TL^{3.040} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.63\text{-max. } 0.70$$



*Macrodon atricauda* (Günther 1880)

**Distribution and habitat.** Southeastern Brazil to northern Argentina (22° S-40° S). Mid-sized (TL < 500 mm) estuarine, coastal demersal marine species. It inhabits the inner shelf at depth of up to 60 m on sandy and muddy bottoms along southern Brazil. An important target of bottom trawl and gillnet fisheries along southern Brazil and Uruguay.

**Exploitation.** An important target of bottom trawl and gillnet fisheries along southern Brazil.



(a) 2.6 mm OL, 37 mm TL



(b) 7.5 mm OL, 157 mm TL



(c) 10.1 mm OL, 232 mm TL



(d) 15.6 mm OL, 415 mm TL

**References.** Haimovici et al. (1996); Menezes et al. (2003).

**Description.** *Shape* elliptic to oblong. *Distal face* concave. *Proximal face* convex. *Anterior margin* round. *Posterior margin* round. *Dorsal margin* convex, sinuate to smooth. *Ventral margin* convex, smooth to dentate. *Rostrum* absent. *Antirostrum* absent. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* broader and shorter than cauda, shallow, rectangular. *Cauda* shallow, tubular-strongly curved ventrally, expanded at end. *Crista* present.

**Material.** Otoliths from 59 specimens ranging between 248 to 778 mm TL, 160 to 6,450 g TW, 2.3 to 14.55 mm OL and 1.2 to 7.8 mm OH.

**Relationships.**

$$TL = 10.597 OL^{1.335} \quad R^2 = 0.99$$

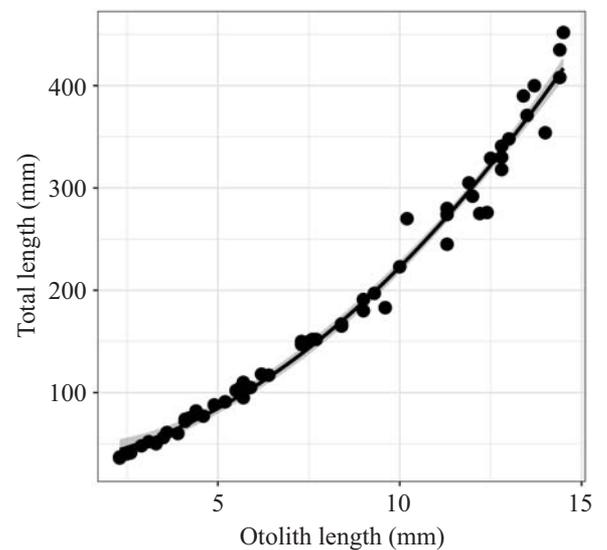
$$TL = 31.390 OH^{1.301} \quad R^2 = 0.99$$

$$TW = 0.198 OL^{0.587} \quad R^2 = 0.99$$

$$TW = 0.199 OH^{4.029} \quad R^2 = 0.98$$

$$TW = 5E-06 TL^{3.084} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.40\text{-max. } 0.54$$



*Menticirrhus americanus* (Linnaeus 1758)

**Distribution and habitat.** Western Atlantic from northern USA to northern Argentina (43° N-42° S). Mid-sized (TL > 500 mm) estuarine, coastal and demersal marine species. It inhabits the inner shelf at depth of up to 60 m on sandy and muddy bottoms along southern Brazil.

**Exploitation.** Fished and landed in small quantities by bottom trawl and gillnet fisheries.

**References.** Haimovici et al. (1996); Menezes et al. (2003).



(a) 4 mm OL, 94 mm TL



(b) 6.9 mm OL, 192 mm TL



(c) 12.3 mm OL, 414 mm TL

**Description.** Shape elliptic to irregular. Distal face slightly concave. Proximal face convex. Anterior margin round to angled. Posterior margin angled. Dorsal margin convex, smooth. Ventral margin convex, smooth to sinuate. Rostrum

absent. *Antirostrum* absent. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* broader and shorter than cauda, shallow, pear-like. *Cauda* shallow, tubular-curved ventrally. *Crista* present.

**Material.** Otoliths from 28 specimens ranging between 94 to 430 mm TL, 6.1 to 1,100 g TW, 3.95 to 12.6 mm OL, and 1.8 to 4.75 mm OH.

**Relationships.**

$$TL = 15.141 OL^{1.318} \quad R^2 = 0.99$$

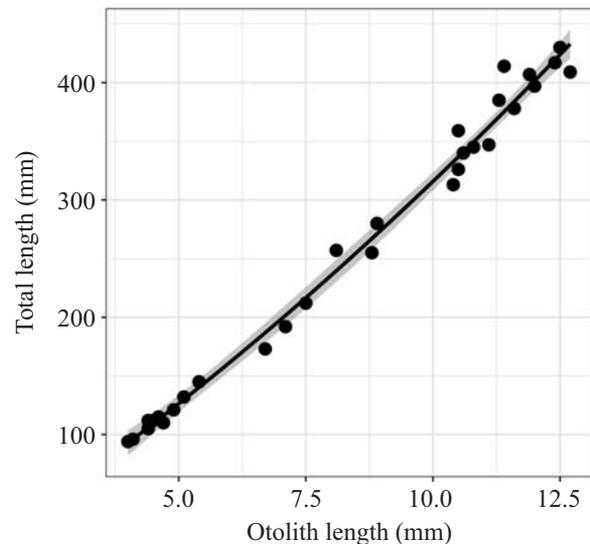
$$TL = 34.069 OH^{1.734} \quad R^2 = 0.98$$

$$TW = 0.013 OL^{4.434} \quad R^2 = 0.99$$

$$TW = 0.202 OH^{5.819} \quad R^2 = 0.97$$

$$TW = 1E-06 TL^{3.360} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.32\text{-max. } 0.47$$



*Menticirrhus littoralis* (Holbrook 1847)

**Distribution and habitat.** Western Atlantic from northern USA to northern Argentina (38° N-33° S). Mid-sized (TL > 500 mm) estuarine, coastal and demersal marine species. It inhabits from the surf zone to 60 m deep. On the inner shelf it is found at depth of up to 60 m on sandy and muddy bottoms along southern Brazil.

**Exploitation.** It is fished in small quantities by bottom trawl and gillnet fisheries.

**References.** Haimovici et al. (1996); Menezes et al. (2003).



(a) 5.3 mm OL, 151 mm TL



(b) 12.2 mm OL, 425 mm TL

**Description.** *Shape* elliptic to irregular. *Distal face* slightly concave. *Proximal face* convex. *Anterior margin* round. *Posterior margin* angled. *Dorsal margin* flattened, smooth. *Ventral margin* flattened, smooth. *Rostrum* absent. *Antirostrum* absent. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* broader and shorter than cauda, shallow, pear-like. *Cauda* shallow, tubular-curved ventrally. *Crista* present.

**Material.** Otoliths from 42 specimens ranging

between 100 to 470 mm TL, 8.3 to 1,120 g TW, 3.65 to 13.65 mm OL, and 1.6 to 4.85 mm OH.

**Relationships.**

$$TL = 18.901 OL^{1.245} \quad R^2 = 0.99$$

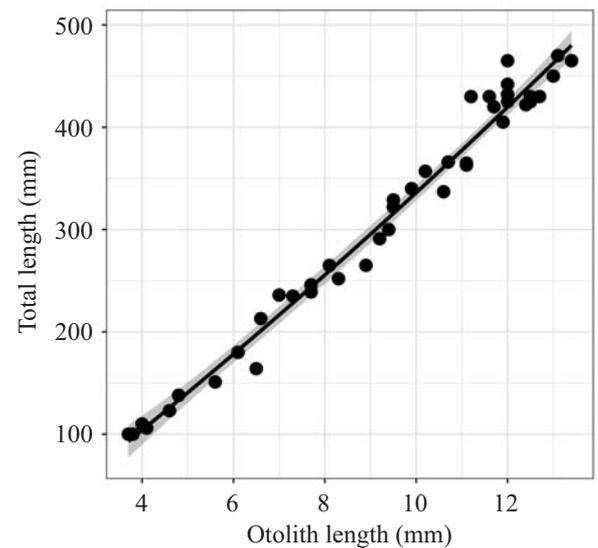
$$TL = 48.102 OH^{1.469} \quad R^2 = 0.97$$

$$TW = 0.040 OL^{3.946} \quad R^2 = 0.98$$

$$TW = 0.777 OH^{4.652} \quad R^2 = 0.96$$

$$TW = 4E-06 TL^{3.168} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.31\text{-max. } 0.46$$



***Micropogonias furnieri*** (Desmarest 1823)

**Distribution and habitat.** Southeastern Brazil to northern Argentina (22° S-41° 30' S). Mid-sized (TL < 450 mm) demersal marine species. It inhabits estuaries and the inner and outer shelf at depth of up to 100 m, on sandy and muddy bottoms along southern Brazil.

**Exploitation.** It is the most important target of bottom trawl and gillnet, small and large scale fisheries along southern Brazil, Uruguay and Argentina.

**References.** Haimovici et al. (1996); Menezes et al. (2003); Cousseau and Perrota (2013).



(a) 6.5 mm OL, 145 mm TL



(b) 12.7 mm OL, 300 mm TL



© 22.2 mm OL, 549 mm TL

**Description.** Shape rhomboidal. Distal face convex. Proximal face convex. Anterior margin round. Posterior margin round. Dorsal margin flattened, smooth to dentate. Ventral margin convex, smooth. Rostrum absent. Antirostrum absent. Sulcus acusticus opened at the anterior region, opened at posterior region. Ostium broader and shorter than cauda, shallow, lateral. Cauda shallow, tubular-curved ventrally. Crista present.

**Material.** Otoliths from 153 specimens ranging between 30 to 705 mm TL, 0.2 to 5,906 g TW, 1.33 to 32.1 mm OL, and 1.2 to 29.0 mm OH.

**Relationships.**

$$TL = 19.198 OL^{1.081} \quad R^2 = 0.99$$

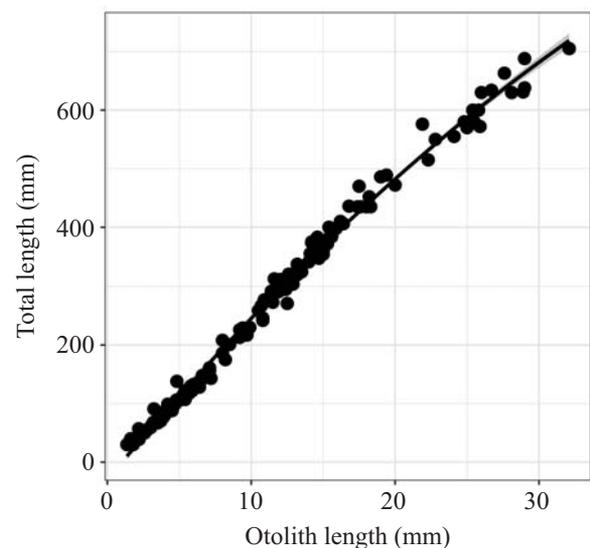
$$TL = 25.947 OH^{1.063} \quad R^2 = 0.98$$

$$TW = 0.042 OL^{3.546} \quad R^2 = 0.99$$

$$TW = 0.113 OH^{3.489} \quad R^2 = 0.98$$

$$TW = 3E-06 TL^{3.278} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.67\text{-max. } 1.00$$



***Paralonchurus brasiliensis*** (Steindachner 1875)

**Distribution and habitat.** Western Atlantic from Panama to northern Argentina (10° N-40° S). Small-sized (TL > 300 mm) estuarine, costal and demersal marine species. It is abundant in the inner shelf on sandy and muddy bottoms up to 50 m depth along southern Brazil.

**Exploitation.** Fished by bottom trawl fisheries, mostly discarded on board.

**References.** Haimovici et al. (1996); Menezes et al. (2003).

cauda, shallow, pear-like. *Cauda* shallow, tubular-curved ventrally. *Crista* absent.

**Material.** Otoliths from 80 specimens ranging between 32 to 227 mm TL, 0.3 to 127.5 g TW, 2.2 to 9.55 mm OL, and 1.4 to 3.5 mm OH.

**Relationships.**

$$TL = 15.352 OL^{1.201} \quad R^2 = 0.97$$

$$TL = 20.106 OH^{2.097} \quad R^2 = 0.94$$

$$TW = 0.010 OL^{4.171} \quad R^2 = 0.98$$

$$TW = 0.026 OH^{7.290} \quad R^2 = 0.95$$

$$TW = 9E-07 TL^{3.443} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.33\text{-max. } 0.64$$



(a) 3 mm OL, 58 mm TL

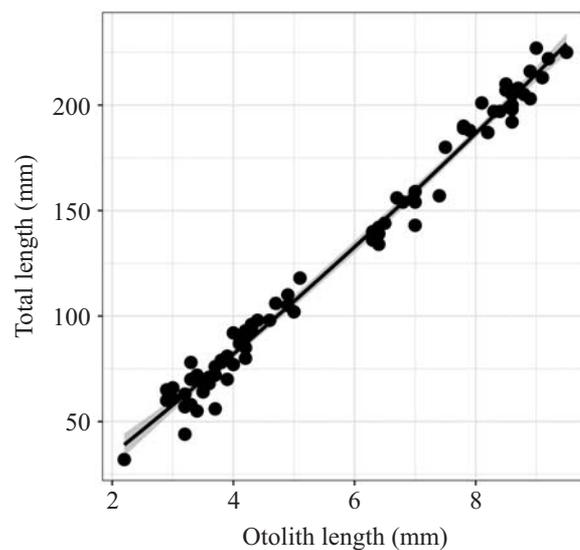


(b) 4.7 mm OL, 98 mm TL



(c) 9.4 mm OL, 225 mm TL

**Description.** *Shape* elliptic to rectangular. *Distal face* slightly convex. *Proximal face* slightly convex. *Anterior margin* round. *Posterior margin* round. *Dorsal margin* flattened, smooth to sinuate. *Ventral margin* flattened, smooth to sinuate. *Rostrum* absent. *Antirostrum* absent. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* broader and shorter than



***Pogonias courbina*** (Lacepède 1803)

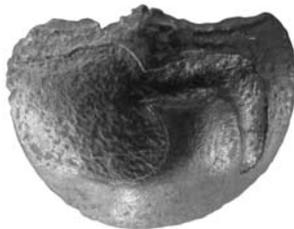
**Distribution and habitat.** Western Atlantic: from Nova Scotia to northern Argentina (45° N-42° S). Very large (TL < 1,600 mm) estuarine and demersal marine species, inhabiting the inner shelf up to 50 m depth. It is targeted by estuarine and coastal gillnets and occasionally by bottom trawls along southern Brazil.

**Exploitation.** Commercially valuable species. Its fishery in southern Brazil collapsed in the 1980s. Endangered. Fishing forbidden since 2014. IUCN status: Vulnerable (since 2020).

**References.** Haimovici et al. (1996); Menezes et al. (2003: 89); Haimovici and Cardoso (2017) as *P. cromis*; Azpelicueta et al. 2019.



(a) 12.7 mm OL, 300 mm TL



(b) 11.3 mm OL, 409 mm TL



(c) 19 mm OL, 930 mm TL

**Description.** Shape oval to semicircular. Distal face concave. Proximal face convex. Anterior margin round. Posterior margin round. Dorsal margin angled to flattened, smooth to sinuate. Ventral margin convex, smooth. Rostrum absent. Antirostrum absent. Sulcus acusticus opened at the anterior region, closed at posterior region. Ostium broader and shorter than cauda, shallow, pear-like. Cauda shallow, tubular-curved ventrally. Crista present.

**Material.** Otoliths from 83 specimens ranging between 164 to 1,330 mm TL, 64 to 31,700 g TW, 6.2 to 25.4 mm OL, and 5.1 to 16.8 mm OH.

**Relationships.**

$$TL = 8.619 OL^{1.589} \quad R^2 = 0.99$$

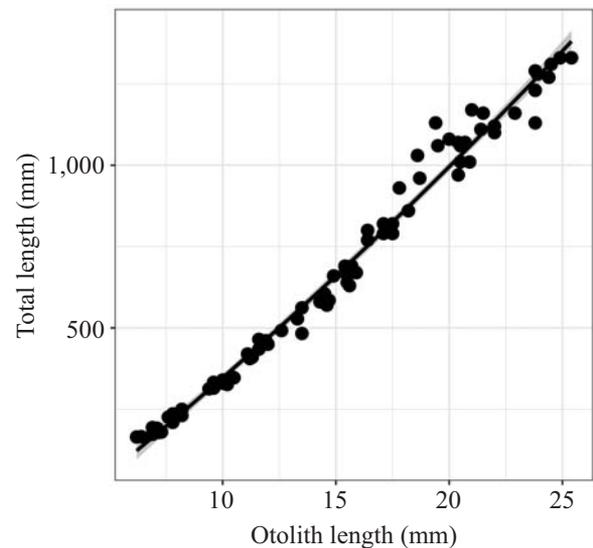
$$TL = 8.023 OH^{1.840} \quad R^2 = 0.99$$

$$TW = 0.011 OL^{4.654} \quad R^2 = 0.99$$

$$TW = 0.009 OH^{5.380} \quad R^2 = 0.98$$

$$TW = 2E-05 TL^{2.914} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.60\text{-max. } 0.84$$



*Stellifer rastrifer* (Jordan 1889)

**Distribution and habitat.** Caribe and southwestern Atlantic Ocean: from Colombia to southern Brazil. Small-sized (TL > 150 mm) estuarine, coastal and demersal marine species inhabiting in brackish estuaries on sandy and muddy bottoms of shallow waters on the inner shelf. Incidentally caught and discarded on board by the shrimp trawl fisheries during summer along southern Brazil.

**Exploitation.** Not targeted by any fishery.

**References.** Menezes et al. (2003); Haimovici et al. (2005).



(a) 1.7 mm OL, 32 mm TL



(b) 6.3 mm OL, 205 mm TL

**Description.** *Shape* irregular. *Distal face* slightly convex. *Proximal face* convex. *Anterior margin* flattened. *Posterior margin* round. *Dorsal margin* flattened, smooth. *Ventral margin* flattened, smooth. *Rostrum* absent. *Antirostrum* absent. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* absent. *Cauda* deep, tubular-strongly curved ventrally. *Crista* absent.

**Material.** Otoliths from 29 specimens ranging between 32 to 150 mm TL, 0.24 to 48.8 g TW, 1.8 to 4.95 mm OL, and 1.35 to 3.4 mm OH.

**Relationships.**

$$TL = 14.621 OL^{1.431} \quad R^2 = 0.89$$

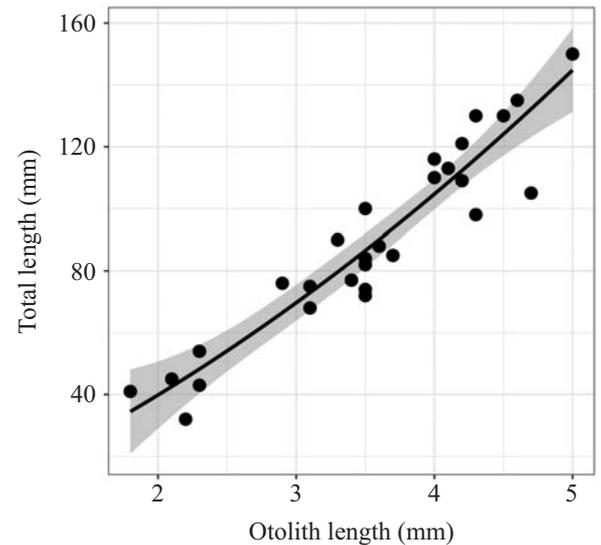
$$TL = 21.690 OH^{1.510} \quad R^2 = 0.93$$

$$TW = 0.018 OL^{4.769} \quad R^2 = 0.88$$

$$TW = 0.067 OH^{5.055} \quad R^2 = 0.93$$

$$TW = 2E-06 TL^{3.338} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.64\text{-max. } 0.77$$



### *Umbrina canosai* Berg 1895

**Distribution and habitat.** Southeastern Brazil to northern Argentina (22° S-41° 30' S). Mid-sized (TL < 450 mm) demersal and coastal marine species. It inhabits the inner and outer shelf at depth of up to 150 m on sandy and muddy bottoms along southern Brazil.

**Exploitation.** An important target of bottom trawl and gillnet fisheries along southern Brazil.



(a) 3.3 mm OL, 61 mm TL



(b) 6.2 mm OL, 138 mm TL



(c) 9.5 mm OL, 243 mm TL



(d) 15.7 mm OL, 466 mm TL

**References.** Haimovici et al. (1996); Menezes et al. (2003); Cousseau and Perrota (2013).

**Description.** *Shape* oval to elliptic. *Distal face* convex. *Proximal face* convex. *Anterior margin* round. *Posterior margin* round. *Dorsal margin* convex, smooth to sinuate. *Ventral margin* convex, smooth to sinuate. *Rostrum* absent. *Antirostrum* absent. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* broader and shorter than cauda, shallow, pear-like. *Cauda* deep, tubular-curved ventrally. *Crista* present.

**Material.** Otoliths from 77 specimens ranging between 61 to 466 mm TL, 2 to 1,237 g TW, 3.15 to 15.85 mm OL and 2.7 to 9.7 mm OH.

#### Relationships.

$$TL = 12.483 OL^{1.316} \quad R^2 = 0.99$$

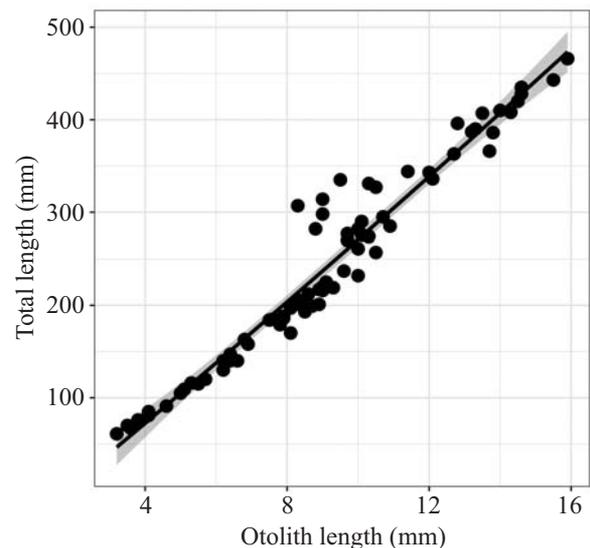
$$TL = 11.881 OH^{1.638} \quad R^2 = 0.97$$

$$TW = 0.019 OL^{4.093} \quad R^2 = 0.99$$

$$TW = 0.016 OH^{5.130} \quad R^2 = 0.97$$

$$TW = 8E-06 TL^{3.107} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.55\text{-max. } 0.89$$



**Family Serranidae*****Acanthistius brasilianus* (Cuvier 1828)**

**Distribution and habitat.** Southwestern Atlantic Ocean: central to southern Brazil. Mid-sized (TL < 400 mm) demersal marine species typically inhabiting hard bottoms. It is occasionally fished in small numbers by bottom trawlers in the continental shelf along southern Brazil.

**Exploitation.** Not targeted by any fishery.

**References.** Haimovici et al. (1996); Menezes et al. (2005).



(a) 11.2 mm OL, 266 mm TL

**Description.** *Shape* elliptic to fusiform. *Distal face* concave. *Proximal face* convex. *Anterior margin* angled. *Posterior margin* angled. *Dorsal margin* convex, sinuate. *Ventral margin* convex, sinuate. *Rostrum* absent. *Antirostrum* absent. *Sulcus acusticus* opened at the anterior region, opened at posterior region. *Ostium* broader and shorter than cauda, shallow, rectangular. *Cauda* shallow, tubular-straight. *Crista* present.

**Material.** Otoliths from 2 specimens ranging between 263 and 266 mm TL, 393 and 418 g TW, 11.1 and 11.2 mm OL and 5.12 and 5.28 mm OH.

**Relationships.** Insufficient data.

*Acanthistius patachonicus* (Jenyns 1840)

**Distribution and habitat.** Southwestern Atlantic Ocean from southeastern Brazil to southern Argentina (23° S-48° S). Large-sized (TL > 600 mm) demersal marine species typically inhabiting hard bottoms. It is fished in small numbers by bottom trawlers in the shelf along southern Brazil.

**Exploitation.** Not targeted by any fishery.

**References.** Haimovici et al. (1996); Menezes et al. (2005); Cousseau and Perrota (2013).



(a) 13 mm OL, 285 mm TL



(b) 18.1 mm OL, 433 mm TL

**Description.** Shape elliptic. Distal face concave. Proximal face convex. Anterior margin angled. Posterior margin angled. Dorsal margin convex, sinuate. Ventral margin convex, sinuate. Rostrum present, short. Antirostrum absent. Sulcus acusticus opened at the anterior region, opened at posterior region. Ostium broader and shorter than cauda, shallow, funnel-like. Cauda shallow, tubular-slightly curved ventrally. Crista present.

**Material.** Otoliths from 19 specimens ranging

between 277 to 433 mm TL, 372.5 to 1,475 g TW, 12.6 to 18.15 mm OL, and 6.05 to 8.45 mm OH.

**Relationships.**

$$TL = 11.344 OL^{1.257} \quad R^2 = 0.86$$

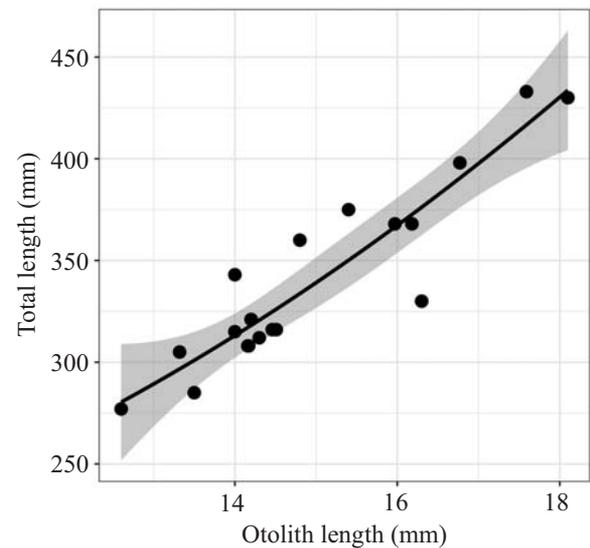
$$TL = 24.531 OH^{1.344} \quad R^2 = 0.82$$

$$TW = 0.022 OL^{3.797} \quad R^2 = 0.87$$

$$TW = 0.206 OH^{4.116} \quad R^2 = 0.86$$

$$TW = 2E-05 TL^{2.928} \quad R^2 = 0.95$$

$$OH/OL = \text{min. } 0.44\text{-max. } 0.51$$



*Diplectrum formosum* (Linnaeus 1766)

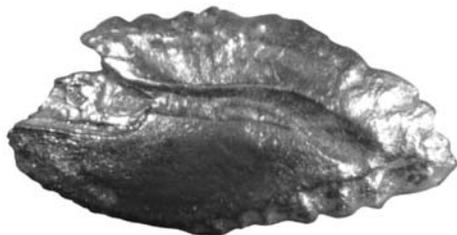
**Distribution and habitat.** Western Atlantic from Virginia, USA, to Uruguay (35° N and 36° S). Small-sized (TL > 300 mm) demersal neritic marine shallow water species. Uncommon along southern Brazil.

**Exploitation.** Not targeted by any fishery.

**References.** Menezes et al. (2003).



(a) 5.6 mm OL, 154 mm TL



(b) 7.9 mm OL, 203 mm TL

**Description.** *Shape* elliptic to fusiform. *Distal face* concave. *Proximal face* convex. *Anterior margin* angled. *Posterior margin* angled. *Dorsal margin* convex, sinuate. *Ventral margin* convex, sinuate. *Rostrum* present, short. *Antirostrum* present. *Sulcus acusticus* opened at the anterior region, opened at posterior region. *Ostium* broader and shorter than cauda, deep, funnel-like. *Cauda* deep, tubular-strongly curved ventrally. *Crista* present.

**Material.** Otoliths from 15 specimens ranging between 152 to 203 mm TL, 50.4 to 100 g TW, 5.65 to 7.86 mm OL, and 2.83 to 3.57 mm OH.

**Relationships.**

$$TL = 31.66 + 21.687 OL \quad R^2 = 0.90$$

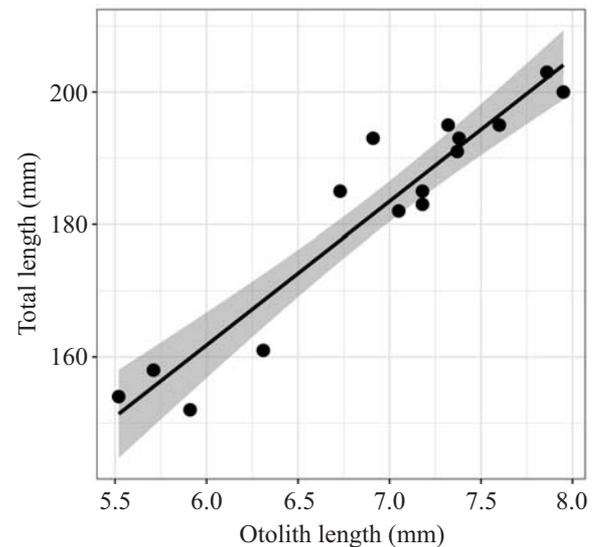
$$TL = 39.877 OH^{1.279} \quad R^2 = 0.88$$

$$TW = 0.798 OL^{2.383} \quad R^2 = 0.99$$

$$TW = 0.527 OH^{4.210} \quad R^2 = 0.89$$

$$TW = 2E-06 TL^{3.350} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.44\text{-max. } 0.52$$



***Diplectrum radiale*** (Quoy and Gaimard 1824)

**Distribution and habitat.** Western Atlantic: Florida to Uruguay. Small-sized (TL > 300 mm) estuarine, demersal marine shallow water species. Uncommon along southern Brazil.

**Exploitation.** Not targeted by any fishery.

**References.** Menezes et al. (2003)



(a) 5.8 mm OL, 152 mm TL



(b) 9 mm OL, 238 mm TL

**Description.** *Shape* fusiform. *Distal face* slightly concave. *Proximal face* convex. *Anterior margin* angled. *Posterior margin* angled. *Dorsal margin* convex, sinuate to lobate. *Ventral margin* convex, sinuate. *Rostrum* present, prominent. *Antirostrum* absent. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* broader and shorter than cauda, deep, funnel-like. *Cauda* deep, tubular-slightly curved ventrally. *Crista* present.

**Material.** Otoliths from 14 specimens ranging between 152 to 238 mm TL, 50.2 to 214 g TW, 5.81 to 8.75 mm OL, and 2.57 to 3.83 mm OH.

**Relationships.**

$$TL = -0.234 + 26.417 OL \quad R^2 = 0.91$$

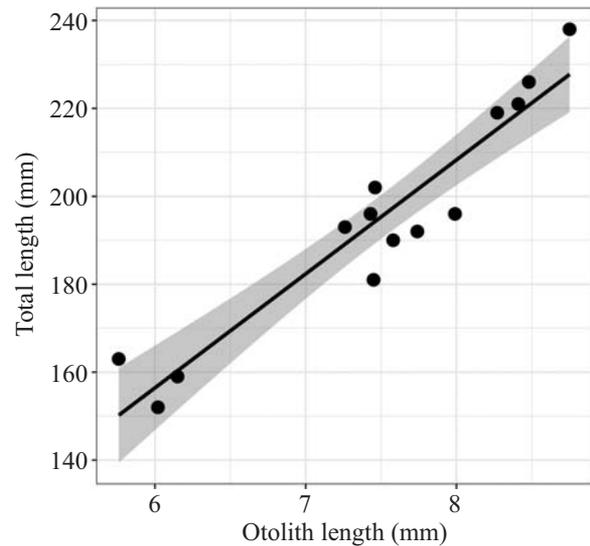
$$TL = 57.026 OH^{1.076} \quad R^2 = 0.90$$

$$TW = 0.186 OL^{3.167} \quad R^2 = 0.91$$

$$TW = 1.923 OH^{3.529} \quad R^2 = 0.93$$

$$WL = 2E-05 TL^{2.981} \quad R^2 = 0.97$$

$$OH/OL = \text{min. } 0.39\text{-max. } 0.48$$

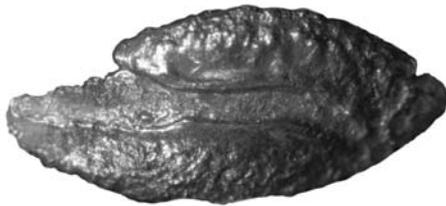


*Dules auriga* Cuvier 1829

**Distribution and habitat.** Southwest Atlantic: Espírito Santo, Brazil to northern Argentina. Small-sized (TL > 300 mm) demersal marine shallow water species. It is commonly caught and discarded on board by bottom trawlers in the shelf (< 150 m) along southern Brazil.

**Exploitation.** Not targeted by any fishery.

**References.** Menezes et al. (2003); Rovani and Cardoso (2018).



(a) 3.8 mm OL, 85 mm TL



(b) 7.4 mm OL, 172 mm TL

**Description.** *Shape* fusiform. *Distal face* concave. *Proximal face* convex. *Anterior margin* angled. *Posterior margin* angled. *Dorsal margin* convex, sinuate to lobate. *Ventral margin* convex, sinuate to serrate. *Rostrum* present, prominent. *Antirostrum* present. *Sulcus acusticus* opened at the anterior region, opened at posterior region. *Ostium* broader and shorter than cauda, deep, funnel-like. *Cauda* deep, tubular-strongly curved ventrally. *Crista* present.

**Material.** Otoliths from 24 specimens ranging between 77 to 172 mm TL, 6.3 to 91 g TW, 3.7 to 7.55 mm OL, and 1.85 to 3.25 mm OH.

**Relationships.**

$$TL = -3.791 + 23.621 OL \quad R^2 = 0.92$$

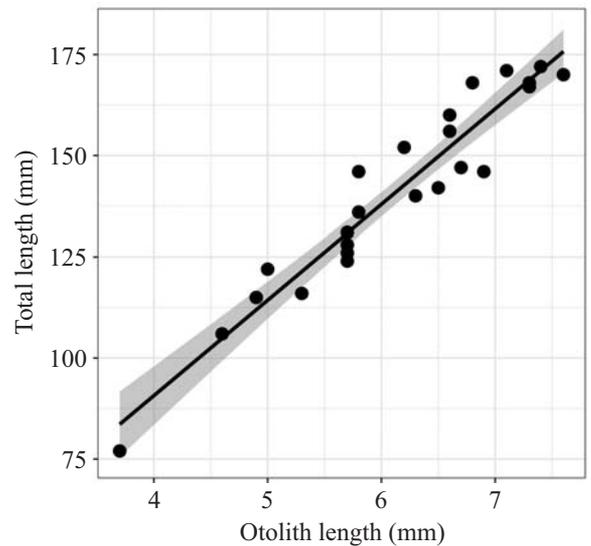
$$TL = 38.816 OH^{1.291} \quad R^2 = 0.86$$

$$TW = 0.054 OL^{3.707} \quad R^2 = 0.96$$

$$TW = 0.488 OH^{4.547} \quad R^2 = 0.90$$

$$TW = 2E-06 TL^{3.394} \quad R^2 = 0.97$$

$$OH/OL = \text{min. } 0.41\text{-max. } 0.50$$



*Serranus atrobranchus* (Cuvier 1829)

**Distribution and habitat.** Western Atlantic: Florida to southern Brazil. Small-sized (TL < 200 mm) demersal marine species. It is incidentally caught in small quantities and discarded on board by bottom trawlers fishing in the outer continental shelf and shelf break along southern Brazil.

**Exploitation.** Not targeted by any fishery.

**References.** Menezes et al. (2003); Bernardes et al. (2005); Haimovici et al. (2008).



(a) 5.4 mm OL, 135 mm TL



(b) 7.5 mm OL, 200 mm TL

**Description.** Shape elliptic to lanceolate. Distal face concave. Proximal face convex. Anterior margin angled. Posterior margin angled. Dorsal margin convex to flattened, smooth to sinuate. Ventral margin convex, smooth. Rostrum present, prominent. Antirostrum present. Sulcus acusticus opened at the anterior region, closed at posterior region. Ostium broader and shorter than cauda, deep, funnel-like. Cauda deep, tubular-slightly curved ventrally. Crista present.

**Material.** Otoliths from 12 specimens ranging between 74 to 200 mm TL, 5.2 to 105 g TW, 1.7 to 3.73 mm OL and 1.91 to 2.27 mm OH.

**Relationships.**

$$TL = -28.67 + 30.546 OL \quad R^2 = 0.95$$

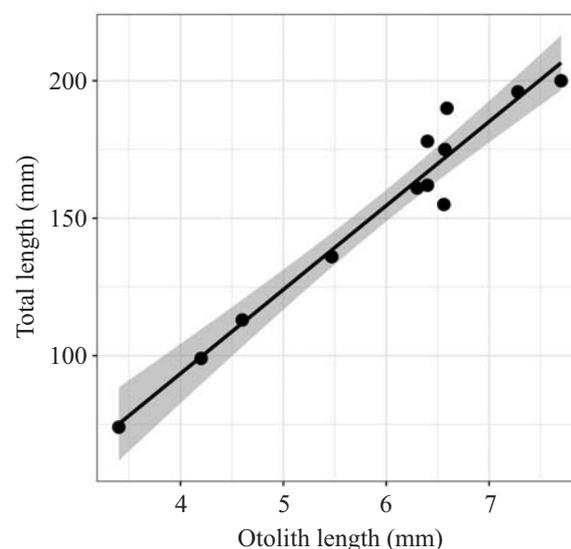
$$TL = 39.587 OH^{1.294} \quad R^2 = 0.96$$

$$TW = 0.067 OL^{3.644} \quad R^2 = 0.97$$

$$TW = 0.719 OH^{3.842} \quad R^2 = 0.97$$

$$TW = 8E-06 TL^{3.088} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.44\text{-max. } 0.52$$



### Family Sparidae

#### *Pagrus pagrus* (Linnaeus 1758)

**Distribution and habitat.** Western and eastern Atlantic and Mediterranean Sea. In the western Atlantic: from New York to Argentina. Mid to large-sized demersal marine species (TL > 600 mm). It inhabits the continental shelf on bottom reefs and biodetritic sediments. It is fished with hook and line and incidentally caught by bottom trawlers along southern Brazil.

**Exploitation.** Commercially valuable species. Its fishery in southern Brazil collapsed in the 1980s. Fished with hook and lines in small quantities.

**References.** Menezes et al. (2003); Bernardes et al. (2006); Haimovici et al. (2005, 2008, 2020).



(a) 3.3 mm OL, 66 mm TL



(b) 9.2 mm OL, 249 mm TL



(c) 13.6 mm OL, 410 mm TL

**Description.** *Shape* pentagonal to rhomboidal. *Distal face* concave. *Proximal face* convex. *Anterior margin* angled. *Posterior margin* angled. *Dorsal margin* convex, lobate. *Ventral margin* convex, sinuate to lobate. *Rostrum* present, prominent. *Antirostrum* present. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* broader and shorter than cauda, deep, funnel-like. *Cauda* deep, tubular-strongly curved ventrally. *Crista* present.

**Material.** Otoliths from 34 specimens ranging between 113 to 458 mm TL, 24 to 1,365 g TW, 3.67 to 14.3 mm OL, and 2.58 to 8.63 mm OH.

#### Relationships.

$$TL = 14.390 OL^{1.282} \quad R^2 = 0.99$$

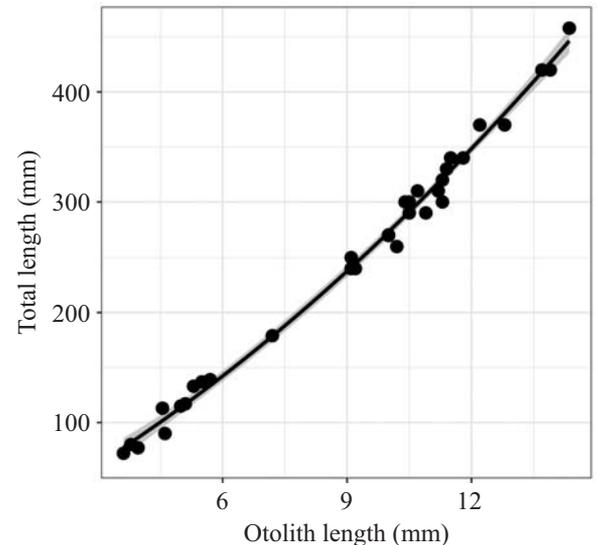
$$TL = 17.201 OH^{1.472} \quad R^2 = 0.99$$

$$TW = 0.078 OL^{3.613} \quad R^2 = 0.99$$

$$TW = 0.095 OH^{4.305} \quad R^2 = 0.98$$

$$TW = 2E-05 TL^{2.949} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.59\text{-max. } 0.75$$



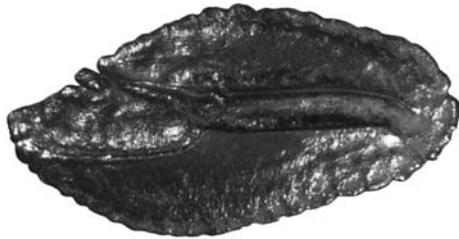
### Family Synagropidae

#### *Parascombrops spinosus* (Schultz 1940)

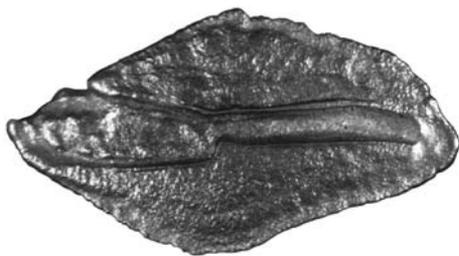
**Distribution and habitat.** Western Atlantic: Canada to Uruguay. Small-sized (TL < 150 mm) bathydemersal marine species. It is incidentally caught and discarded on board by bottom trawlers fishing in the outer shelf and upper continental slope (50-600 m) along southern Brazil.

**Exploitation.** Not targeted by any fishery.

**References.** Menezes et al. (2003) as *Synagrops spinosus*; Bernardes et al. (2005); Haimovici et al. (2008).



(a) 4.7 mm OL, 70 mm TL



(b) 8.3 mm OL, 144 mm TL

**Description.** *Shape* elliptic to pentagonal. *Distal face* straight. *Proximal face* slightly convex. *Anterior margin* angled. *Posterior margin* round to angled. *Dorsal margin* convex to angled, sinuate. *Ventral margin* convex to angled, sinuate to smooth. *Rostrum* present, prominent. *Antirostrum* absent. *Sulcus acusticus* opened at the anterior region, closed at posterior margin. *Ostium* broader and shorter than cauda, deep, funnel-like.

*Cauda* deep, tubular-slightly curved ventrally. *Crista* present.

**Material.** Otoliths from 35 specimens ranging between 70 to 149 mm TL, 3 to 29 g TW, 4.54 to 8.23 mm OL and 2.30 to 4.39 mm OH.

#### Relationships.

$$TL = 10.277 OL^{1.244} \quad R^2 = 0.94$$

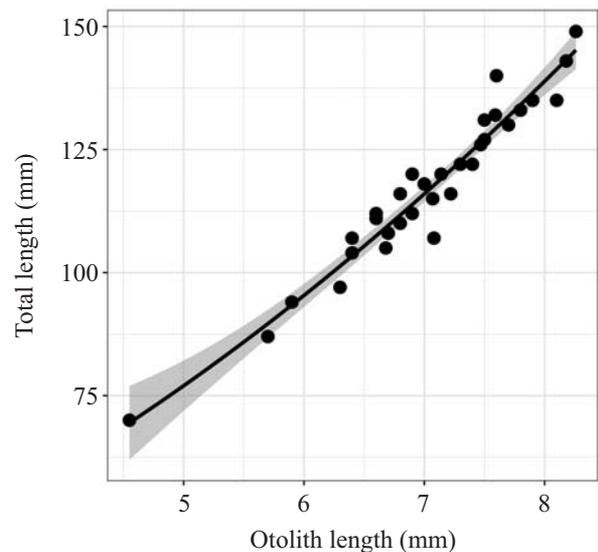
$$TL = 26.602 OH^{1.156} \quad R^2 = 0.92$$

$$TW = 0.010 OL^{3.768} \quad R^2 = 0.93$$

$$TW = 0.179 OH^{3.512} \quad R^2 = 0.90$$

$$TW = 1E-05 TL^{2.969} \quad R^2 = 0.95$$

$$OH/OL = \text{min. } 0.48\text{-max. } 0.54$$



*Synagrops bellus* (Goode and Bean 1896)

**Distribution and habitat.** Atlantic and western Pacific oceans. Small-sized marine (TL < 300 mm), bathydemersal species. It is incidentally caught and discarded on board by bottom trawlers fishing in the outer shelf and upper continental slope (50-600 m) along southern Brazil.

**Exploitation.** Not targeted by any fishery.

**References.** Menezes et al. (2003) Bernardes et al. (2005), Haimovici et al. (2008).

**Description.** Shape rectangular to oval. Distal face straight to slightly concave. Proximal face slightly convex. Anterior margin angled. Posterior margin oblique to flattened. Dorsal margin convex, sinuate. Ventral margin convex, sinuate. Rostrum present, short to prominent. Antirostrum absent. Sulcus acusticus opened at the anterior region, closed at posterior margin. Ostium broader and shorter than cauda, shallow, pear-like. Cauda shallow, tubular-curved ventrally. Crista present.

**Material.** Otoliths from 26 specimens ranging between 90 to 271 mm TL, 7 to 218.8 g TW, 3.27 to 6.75 mm OL and 1.85 to 4.46 mm OH.

**Relationships.**

$$TL = 6.324 OL^{1.915} \quad R^2 = 0.95$$

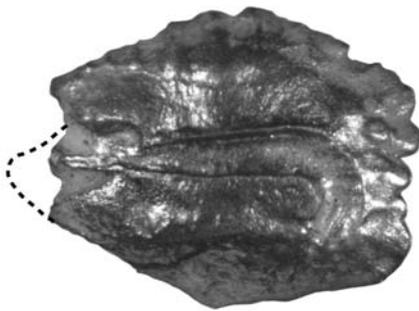
$$TL = 14.422 OH^{1.951} \quad R^2 = 0.92$$

$$TW = 0.002 OL^{5.743} \quad R^2 = 0.95$$

$$TW = 0.033 OH^{5.771} \quad R^2 = 0.92$$

$$TW = 2E-05 TL^{2.906} \quad R^2 = 0.98$$

$$OH/OL = \text{min. } 0.57\text{-max. } 0.70$$



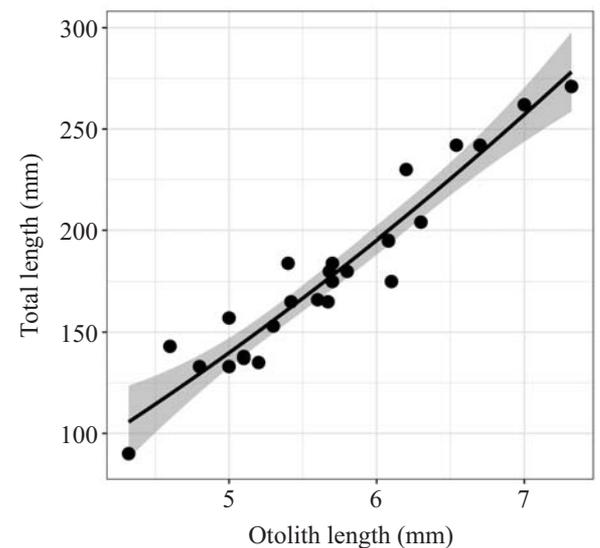
(a) 4.7 mm OL, 120 mm TL



(b) 6 mm OL, 198 mm TL



(c) 7.1 mm OL, 273 mm TL



**Family Trichiuridae**  
***Trichiurus lepturus* Linnaeus 1758**

**Distribution and habitat.** Circumtropical and temperate waters of the world. Large-sized (TL > 1,500 mm) brackish, marine, benthopelagic, amphidromous species. It is common in the continental shelf and upper slope along southern Brazil.

**Exploitation.** Fished by bottom trawls in the continental shelf and mostly discarded on board.

**References.** Nakamura and Parin (1993); Haimovici et al. (1996, 2008); Menezes et al. (2003).



(a) 1.4 mm OL, 134 mm TL

**Description.** *Shape* fusiform. *Distal face* straight. *Proximal face* slightly convex. *Anterior margin* double-peaked. *Posterior margin* angled. *Dorsal margin* convex, sinuate. *Ventral margin* flattened, sinuate. *Rostrum* present, prominent. *Antirostrum* present. *Sulcus acusticus* opened at the anterior region, opened at posterior region. *Ostium* broader and larger than cauda, shallow, undefined. *Cauda* shallow, elliptic. *Crista* absent.

**Material.** Otoliths from 49 specimens ranging between 184 to 1,340 mm TL, 2 to 1,780 g TW, 1.8 to 8.6 mm OL, and 0.7 to 3.3 mm OH.

**Relationships.**

$$TL = 84.378 OL^{1.302} \quad R^2 = 0.98$$

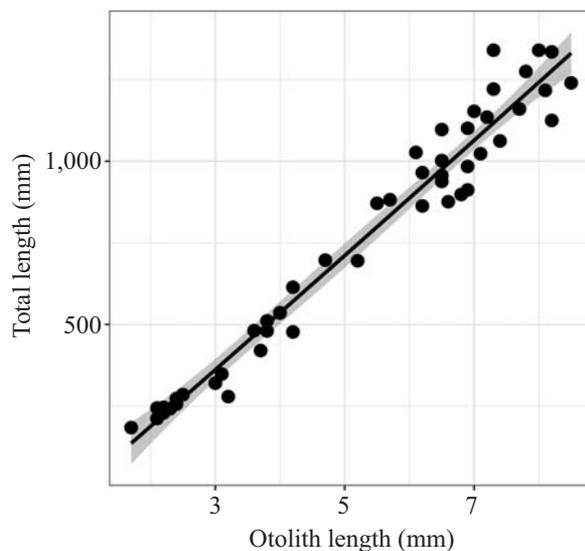
$$TL = 298.78 OH^{1.250} \quad R^2 = 0.97$$

$$TW = 0.109 OL^{4.526} \quad R^2 = 0.98$$

$$TW = 8.834 OH^{4.352} \quad R^2 = 0.98$$

$$TW = 3E-08 TL^{3.453} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.33\text{-max. } 0.48$$



**Family Zoarcidae*****Notolycodes schmidti* Gosztonyi 1977**

**Distribution and habitat.** Southwest Atlantic: Brazil and Argentina. Mid-sized (TL < 400 mm) bathydemersal marine species. It is incidentally caught and discarded on board by bottom trawlers fishing in the upper continental slope along southern Brazil.

**Exploitation.** Not targeted by any fishery.

**References.** Anderson and Federov (2004).



(a) 5.5 mm OL, 395 mm TL

**Description.** *Shape* semicircular. *Distal face* slightly convex. *Proximal face* slightly convex. *Anterior margin* round. *Posterior margin* round. *Dorsal margin* convex, smooth. *Ventral margin* convex, smooth. *Rostrum* absent. *Antirostrum* absent. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* same width and shorter than cauda, deep, tubular. *Cauda* deep, elliptic. *Crista* absent.

**Material.** Otoliths from 3 specimens ranging between 338 to 395 mm TL, 234 to 388 g TW, 5.18 to 5.47 mm OL, and 3.39 to 4 mm OH.

**Relationships.** Insufficient data.

## Order Pleuronectiformes

### Family Cynoglossidae

#### *Symphurus jenynsi* Evermann and Kendall 1906

**Distribution and habitat.** Southwest Atlantic: southeastern Brazil and central Argentina. Small-sized (TL < 350 mm) demersal marine species. Incidentally caught in small numbers by bottom trawlers fishing in the continental shelf along southern Brazil and discarded on board.

**Exploitation.** Not targeted by any fishery.

**References.** Haimovici et al. (1996); Menezes et al. (2003).



(a) 1.2 mm OL, 57 mm TL



(b) 2.1 mm OL, 138 mm TL



(c) 3.3 mm OL, 263 mm TL

**Description.** *Shape* discoidal to semicircular. *Distal face* slightly convex. *Proximal face* slightly convex. *Anterior margin* round to angled. *Posterior margin* round to flattened. *Dorsal margin* convex, smooth. *Ventral margin* convex, smooth to sinuate. *Rostrum* absent. *Antirostrum* absent. *Sulcus acusticus* opening mode not applicable. *Ostium* irregular. *Cauda* irregular. *Crista* absent.

**Material.** Otoliths from 31 specimens ranging between 52 to 355 mm TL, 1 to 394.1 g TW, 1.1 to 3.9 mm OL and 1.05 to 3.45 mm OH.

#### Relationships.

Left

$$TL = 45.627 OL^{1.449} \quad R^2 = 0.95$$

$$TL = 53.539 OH^{1.462} \quad R^2 = 0.94$$

$$TW = 0.500 OL^{4.651} \quad R^2 = 0.94$$

$$TW = 0.832 OH^{4.704} \quad R^2 = 0.93$$

$$TW = 2E-06 TL^{3.214} \quad R^2 = 0.98$$

$$OH/OL = \text{min. } 0.81\text{-max. } 0.97$$

Right

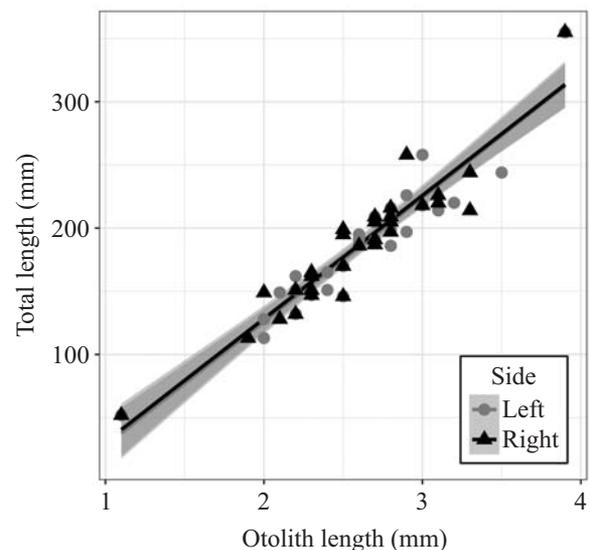
$$TL = 47.175 OL^{1.012} \quad R^2 = 0.93$$

$$TL = 47.776 OH^{1.583} \quad R^2 = 0.94$$

$$TW = 0.547 OL^{4.580} \quad R^2 = 0.93$$

$$TW = 0.574 OH^{5.091} \quad R^2 = 0.93$$

$$OH/OL = \text{min. } 0.76\text{-max. } 1.00$$



**Family Cyclopsettidae**  
***Etropus longimanus* Norman 1933**

**Distribution and habitat.** Southwestern Atlantic Ocean Rio de Janeiro, Brazil to Argentina. Very small-sized (TL < 150 mm) demersal marine species. It is occasionally fished and discarded on board by bottom trawlers in the continental shelf along southern Brazil.

**Exploitation.** Not targeted by any fishery.

**References.** Haimovici et al. (1996); Menezes et al. (2003).



(a) 2.2 mm OL, 85 mm TL



(b) 4.2 mm OL, 157 mm TL

**Description.** *Shape* discoidal to pyriform. *Distal face* slightly convex. *Proximal face* slightly convex. *Anterior margin* angled. *Posterior margin* round to flattened. *Dorsal margin* flattened to convex, smooth. *Ventral margin* convex, sinuate to smooth. *Rostrum* present, short. *Antirostrum* absent. *Sulcus acusticus* opening mode not applicable. *Ostium* irregular. *Cauda* irregular. *Crista* absent.

**Material.** Otoliths from 162 specimens ranging between 85 to 157 mm TL, 5 to 28.2 g TW, 2.4 to 4.1 mm OL, and 2 to 3.65 mm OH.

**Relationships.**

Left

$$TL = 11.101 + 34.370 OL \quad R^2 = 0.58$$

$$TL = 44.414 OH^{1.016} \quad R^2 = 0.63$$

$$TW = 0.536 OL^{2.466} \quad R^2 = 0.54$$

$$TW = 0.921 OH^{2.673} \quad R^2 = 0.58$$

$$TW = 4E-05 TL^{2.652} \quad R^2 = 0.93$$

$$OH/OL = \text{min. } 0.74\text{-max. } 0.91$$

Right

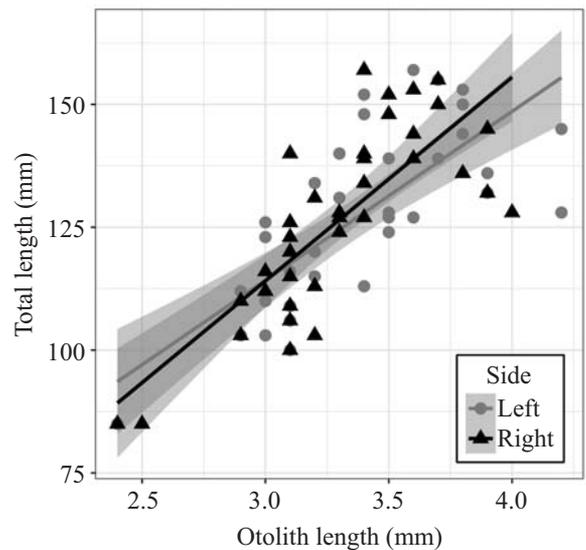
$$TL = -10.260 + 34.370 OL \quad R^2 = 0.61$$

$$TL = 51.216 OH^{0.881} \quad R^2 = 0.51$$

$$TW = 0.392 OL^{3.007} \quad R^2 = 0.60$$

$$TW = 1.211 OH^{2.413} \quad R^2 = 0.91$$

$$OH/OL = \text{min. } 0.72\text{-max. } 0.94$$



*Syacium papillosum* (Linnaeus 1758)

**Distribution and habitat.** Western Atlantic: North Carolina, USA and northern Gulf of Mexico to southern Brazil. Small-sized (TL < 399 mm) marine demersal, reef-associated species. It is incidentally fished along southern Brazil by trawlers in Santa Catarina.

**Exploitation.** Not targeted by any fishery, along southern Brazil fished rarely by trawlers.

**References.** Menezes et al. (2003); Bernardes et al. (2005); Haimovici et al. (2008).



(a) 3.8 mm OL, 128 mm TL



(b) 6.9 mm OL, 233 mm TL

**Description.** Shape discoidal to oval. Distal face concave. Proximal face convex. Anterior margin round. Posterior margin round to double-peaked. Dorsal margin convex, sinuate to smooth. Ventral margin convex, sinuate to smooth. Rostrum absent. Antirostrum absent. Sulcus acusticus opened at the anterior region, closed at posterior

region. Ostium same width and longer than cauda, shallow, undefined. Cauda shallow, elliptic. Crista present.

**Material.** Otoliths from 21 specimens ranging between 131 to 233 mm TL, 22.4 to 116 g TW, 3.9 to 7.2 mm OL, and 3 to 5.5 mm OH.

**Relationships.**

Left

$$TL = -2.651 + 33.937 OL \quad R^2 = 0.89$$

$$TL = 43.022 OH^{1.001} \quad R^2 = 0.88$$

$$TW = 0.262 OL^{3.235} \quad R^2 = 0.92$$

$$TW = 0.879 OH^{2.969} \quad R^2 = 0.84$$

$$TW = 7E-06 TL^{3.072} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.69\text{-max. } 0.86$$

Right

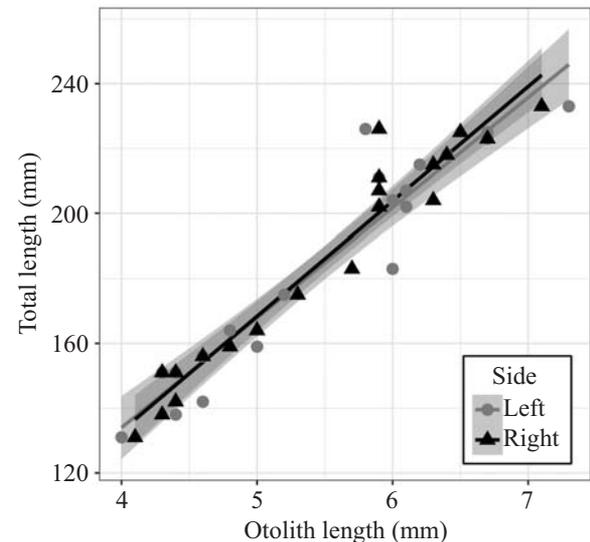
$$TL = -9.169 + 35.484 OL \quad R^2 = 0.95$$

$$TL = 42.855 OH^{1.025} \quad R^2 = 0.85$$

$$TW = 0.203 OL^{3.422} \quad R^2 = 0.97$$

$$TW = 0.434 OH^{3.579} \quad R^2 = 0.85$$

$$OH/OL = \text{min. } 0.67\text{-max. } 0.84$$



### Family Oncopteridae

#### *Oncopterus darwinii* Steindachner 1874

**Distribution and habitat.** Southwest Atlantic: Santa Catarina, Brazil to Golfo San Matías, Argentina. Small-sized (TL < 300 mm) demersal marine species. It is incidentally caught along southern Brazil and discarded on board of the bottom trawl fishery on the continental shelf.

**Exploitation.** Not targeted by any fishery.

**References.** Haimovici et al. (1996); Menezes et al. (2003).



(a) 2.7 mm OL, 285 mm TL

**Description.** *Shape* rectangular to irregular. *Distal face* straight. *Proximal face* slightly convex. *Anterior margin* double-peaked. *Posterior margin* round. *Dorsal margin* flattened, smooth to sinuate. *Ventral margin* convex, smooth to sinuate. *Rostrum* present, prominent. *Antirostrum* present. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* broader and shorter than cauda, deep, funnel-like. *Cauda* shallow, tubular-straight. *Crista* present.

**Material.** Otoliths from 24 specimens ranging between 103 to 285 mm TL, 14.2 to 264 g TW, 1.25 to 2.85 mm OL, and 1.2 to 2.45 mm OH.

### Relationships.

Left

$$TL = -40.23 + 118.94 OL \quad R^2 = 0.86$$

$$TL = 82.387 OH^{1.431} \quad R^2 = 0.93$$

$$TW = 5.864 OL^{3.851} \quad R^2 = 0.90$$

$$TW = 6.658 OH^{4.237} \quad R^2 = 0.94$$

$$TW = 2E-05 TL^{2.923} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.81\text{-max. } 1.00$$

Right

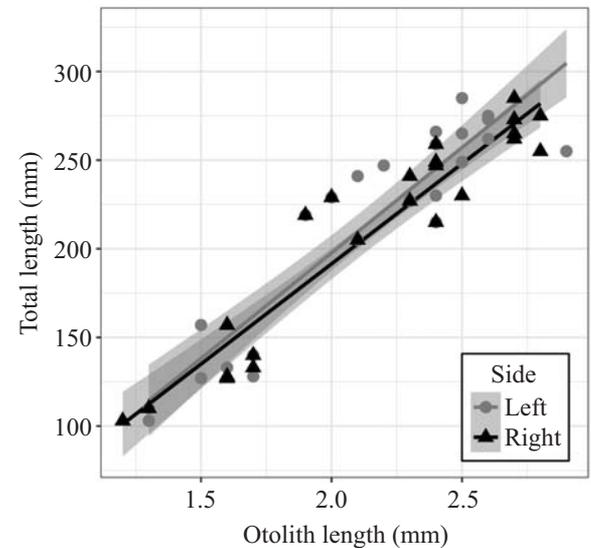
$$TL = -34.81 + 113.33 OL \quad R^2 = 0.91$$

$$TL = 80.421 OH^{1.441} \quad R^2 = 0.92$$

$$TW = 6.001 OL^{3.689} \quad R^2 = 0.95$$

$$TW = 6.242 OH^{4.251} \quad R^2 = 0.93$$

$$OH/OL = \text{min. } 0.81\text{-max. } 1.00$$



### Family Paralichthyidae

#### *Paralichthys isosceles* Jordan 1891

**Distribution and habitat.** Southwest Atlantic: Brazil to Argentina. Small-sized (TL > 400 mm) demersal marine species. It is incidentally caught along southern Brazil by the bottom trawl fishery in outer continental shelf and upper continental slope, mostly at depth between 50-200 m.

**Exploitation.** Fished by bottom trawlers on the continental shelf. Only larger specimens landed.

**References.** Haimovici et al. (1996, 2008); Meneses et al. (2003).



(a) 2.2 mm OL, 96 mm TL



(b) 5.2 mm OL, 228 mm TL



(c) 8.9 mm OL, 392 mm TL

**Description.** *Shape* discoidal to pyriform. *Distal*

*face* straight. *Proximal face* slightly convex. *Anterior margin* round to angled. *Posterior margin* flattened. *Dorsal margin* flattened, sinuate to smooth. *Ventral margin* convex, smooth. *Rostrum* present, short to prominent. *Antirostrum* absent. *Sulcus acusticus* opening mode not applicable. *Ostium* same width and larger than cauda, shallow, tubular. *Cauda* shallow, elliptic. *Crista* present.

**Material.** Otoliths from 62 specimens ranging between 95 to 358 mm TL, 4.2 to 400 g TW, 2.3 to 7.55 mm OL, and 2 to 5.25 mm OH.

#### Relationships.

Left

$$TL = -1.558 + 43.982 OL \quad R^2 = 0.98$$

$$TL = 36.144 OH^{1.328} \quad R^2 = 0.98$$

$$TW = 0.232 OL^{3.637} \quad R^2 = 0.98$$

$$TW = 0.146 OH^{4.683} \quad R^2 = 0.97$$

$$TW = 5E-07 TL^{3.511} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.68\text{-max. } 0.96$$

Right

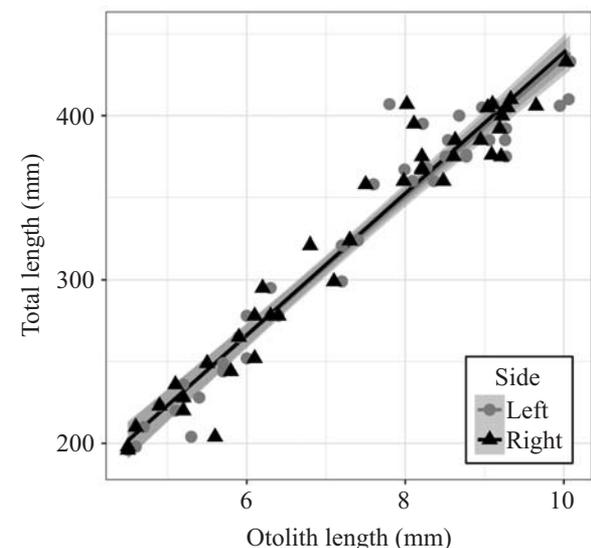
$$TL = -2.746 + 44.441 OL \quad R^2 = 0.98$$

$$TL = 35.349 OH^{1.369} \quad R^2 = 0.98$$

$$TW = 0.245 OL^{3.621} \quad R^2 = 0.98$$

$$TW = 0.139 OH^{4.811} \quad R^2 = 0.97$$

$$OH/OL = \text{min. } 0.67\text{-max. } 0.96$$



*Paralichthys orbignyanus* (Valenciennes 1839)

**Distribution and habitat.** Southwest Atlantic: Rio de Janeiro, Brazil to San Matias Gulf in Argentina. Large-sized (TL > 1,000 mm) demersal species. It inhabits brackish and marine coastal waters.

**Exploitation.** A valuable commercial species fished with gillnets in coastal lagoons, and with bottom trawls in shallow coastal waters along southern Brazil.

**References.** Menezes et al. (2003); Fischer et al. (2011); Cousseau and Perrota (2013).



(a) 2.7 mm OL, 131 mm TL



(b) 6.4 mm OL, 485 mm TL



(c) 10.5 mm OL, 880 mm TL

**Description.** Shape cuneiform. Distal face concave. Proximal face convex. Anterior margin angled. Posterior margin round to double-peaked. Dorsal margin flattened, smooth to sinu-

ate. Ventral margin convex, sinuate. Rostrum present, short. Antirostrum absent. Sulcus acusticus opened at the anterior region, closed at posterior region. Ostium broader and same length of cauda, shallow, tubular. Cauda shallow, tubular-straight. Crista present.

**Material.** Otoliths from 14 specimens ranging between 116 to 985 mm TL, 13.4 to 5,900 g TW, 2.5 to 12 mm OL, and 1.7 to 6 mm OH.

**Relationships.**

Left

$$TL = -135.1 + 96.843 OL \quad R^2 = 0.92$$

$$TL = 50.144 OH^{1.702} \quad R^2 = 0.91$$

$$TW = 0.342 OL^{3.610} \quad R^2 = 0.77$$

$$TW = 2.009 OH^{3.547} \quad R^2 = 0.66$$

$$TW = 5E-06 TL^{3.061} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.51\text{-max. } 0.77$$

Right

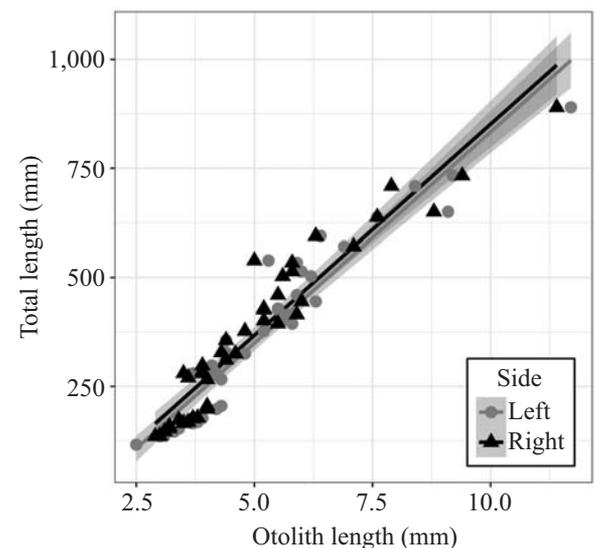
$$TL = -119.9 + 97.274 OL \quad R^2 = 0.91$$

$$TL = 53.627 OH^{1.701} \quad R^2 = 0.89$$

$$TW = 0.144 OL^{4.433} \quad R^2 = 0.88$$

$$TW = 1.721 OH^{3.860} \quad R^2 = 0.74$$

$$OH/OL = \text{min. } 0.49\text{-max. } 0.71$$



*Paralichthys patagonicus* Jordan 1889

**Distribution and habitat.** Southwest Atlantic: Rio de Janeiro, Brazil to San Jorge Gulf in Argentina. Mid-sized (TL > 600 mm) demersal marine species. It is present in the continental shelf along southern Brazil.

**Exploitation.** A valuable commercial species targeted by double rig bottom trawlers in the inner continental shelf (< 100 m).

**References.** Menezes et al. (2003); Cousseau and Perrota (2013).



(a) 2.5 mm OL, 131 mm TL



(b) 5.9 mm OL, 321 mm TL



(c) 11 mm OL, 607 mm TL

**Description.** Shape cuneiform. Distal face straight. Proximal face slightly convex. Anterior

margin angled. Posterior margin round to flattened. Dorsal margin convex, lobate to smooth. Ventral margin convex, lobate to smooth. Rosstrum present, short to prominent. Antirostrum present. Sulcus acusticus opened at the anterior region, closed at posterior region. Ostium broader and longer than cauda, shallow, tubular. Cauda shallow, elliptic. Crista present.

**Material.** Otoliths from 45 specimens ranging between 87 to 607 mm TL, 6.9 to 2,000 g TW, 2.1 to 12 mm OL, and 1.4 to 6.9 mm OH.

**Relationships.**

Left

$$TL = -5.622 + 55.764 OL \quad R^2 = 0.92$$

$$TL = 50.119 OH^{1.334} \quad R^2 = 0.92$$

$$TW = 0.316 OL^{3.630} \quad R^2 = 0.98$$

$$TW = 0.697 OH^{4.055} \quad R^2 = 0.96$$

$$TL = 3E-06 TW^{3.158} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.57\text{-max. } 0.77$$

Right

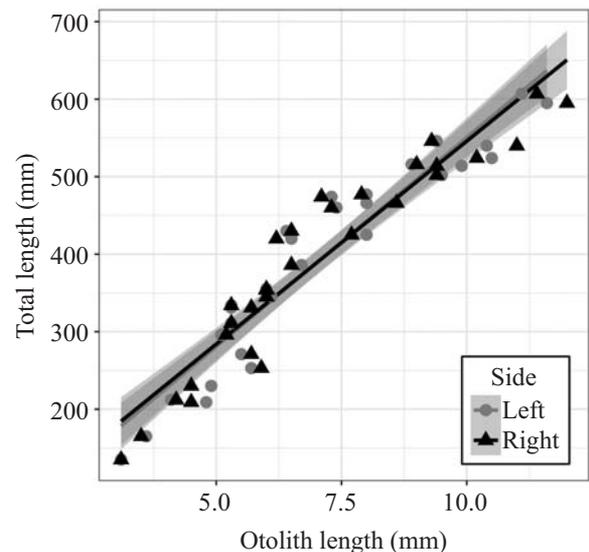
$$TL = -10.81 + 53.689 OL \quad R^2 = 0.91$$

$$TL = 53.085 OH^{1.314} \quad R^2 = 0.87$$

$$TW = 0.251 OL^{3.777} \quad R^2 = 0.99$$

$$TW = 0.433 OH^{4.400} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.55\text{-max. } 0.78$$



***Paralichthys triocellatus*** Miranda Ribeiro 1903

**Distribution and habitat.** Southwest Atlantic: Rio de Janeiro, Brazil to Uruguay. Small-sized (TL > 350 mm) demersal marine species. It occurs in the outer continental shelf and slope, mostly at depth between 100 and 300 m along southern Brazil.

**Exploitation.** Fished in small numbers by bottom trawlers. Only larger specimens landed.

**References.** Haimovici et al. (1996, 2008); Menezes et al. (2003).



(a) 4.3 mm OL, 188 mm TL



(b) 7.8 mm OL, 330 mm TL

**Description.** *Shape* cuneiform to pentagonal. *Distal face* straight. *Proximal face* slightly convex. *Anterior margin* round. *Posterior margin* flattened to angled. *Dorsal margin* flattened, smooth. *Ventral margin* convex, smooth. *Rostrum* present, short. *Antirostrum* absent. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* broader and longer than cauda, shallow, tubular. *Cauda* shallow, elliptic. *Crista* present.

**Material.** Otoliths from 29 specimens ranging between 161 to 323 mm TL, 36 to 383 g TW, 3.7 to 8 mm OL and 3 to 4.5 mm OH.

**Relationships.**

Left

$$TL = 15.557 + 40.088 OL \quad R^2 = 0.90$$

$$TL = 40.968 OH^{1.331} \quad R^2 = 0.84$$

$$TW = 0.542 OL^{3.183} \quad R^2 = 0.89$$

$$TW = 0.358 OH^{4.445} \quad R^2 = 0.84$$

$$TW = 2E-06 TL^{3.262} \quad R^2 = 0.98$$

$$OH/OL = \text{min. } 0.55\text{-max. } 0.81$$

Right

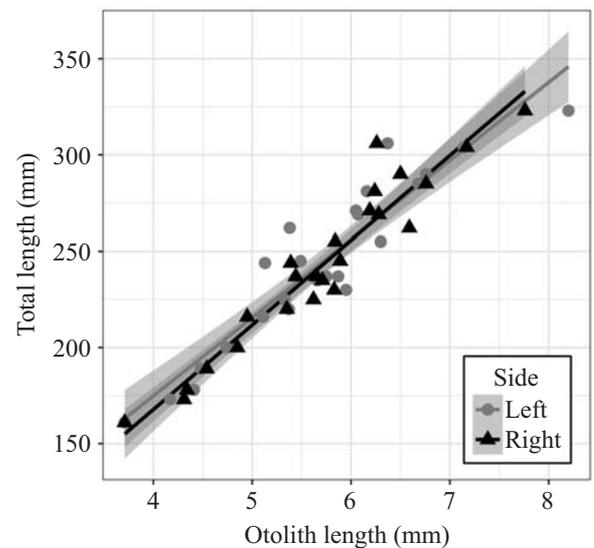
$$TL = -6.318 + 43.466 OL \quad R^2 = 0.92$$

$$TL = 39.291 OH^{1.368} \quad R^2 = 0.88$$

$$TW = 0.358 OL^{4.445} \quad R^2 = 0.85$$

$$TW = 0.365 OH^{4.453} \quad R^2 = 0.85$$

$$OH/OL = \text{min. } 0.54\text{-max. } 0.75$$



### *Xystreurys rasilis* (Jordan 1891)

**Distribution and habitat.** Southwest Atlantic: Rio de Janeiro, Brazil to Patagonia, Argentina. Mid-sized TL < 400 mm) demersal marine species. It occurs in the continental shelf along southern Brazil. Occasionally fished by bottom trawlers.

**Exploitation.** Larger specimens landed in small numbers.

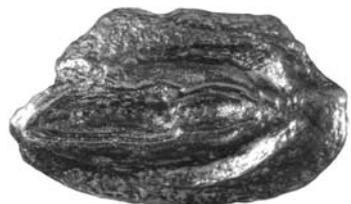
**References.** Haimovici et al. (1996) as *Verrecundum rasilie*; Menezes et al. (2003).



(a) 3.6 mm OL, 150 mm TL



(b) 5.5 mm OL, 256 mm TL



(c) 8.3 mm OL, 434 mm TL

**Description.** Shape cuneiform. Distal face straight. Proximal face slightly convex. Anterior margin angled. Posterior margin round to flat-

tened. Dorsal margin flattened, smooth to sinuate. Ventral margin convex, smooth. Rostrum present, short. Antirostrum present. Sulcus acusticus opened at the anterior region, closed at posterior region. Ostium same width and longer than cauda, shallow, tubular. Cauda shallow, elliptic. Crista present.

**Material.** Otoliths from 49 specimens ranging between 127 to 365 mm TL, 11.4 to 494 g TW, 3.2 to 7.4 mm OL, and 2.2 to 4.5 mm OH.

### Relationships.

Left

$$TL = 29.810 OL^{1.264} \quad R^2 = 0.90$$

$$TL = 54.647 OH^{1.255} \quad R^2 = 0.78$$

$$TW = 0.107 OL^{4.215} \quad R^2 = 0.87$$

$$TW = 0.719 OH^{4.287} \quad R^2 = 0.78$$

$$TW = 1E-06 TL^{3.371} \quad R^2 = 0.98$$

$$OH/OL = \text{min. } 0.52\text{-max. } 0.74$$

Right

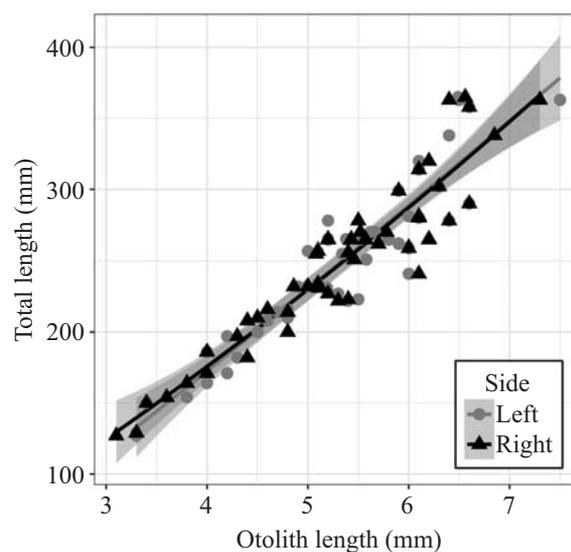
$$TL = 33.065 OL^{1.203} \quad R^2 = 0.92$$

$$TL = 51.319 OH^{1.339} \quad R^2 = 0.77$$

$$TW = 0.141 OL^{4.056} \quad R^2 = 0.90$$

$$TW = 0.583 OH^{4.566} \quad R^2 = 0.77$$

$$OH/OL = \text{min. } 0.50\text{-max. } 0.76$$



**Order Polymixiiformes**  
**Family Polymixiidae**  
*Polymixia lowei* Günther 1859

**Distribution and habitat.** Western Atlantic: Canada to Uruguay. Small-sized (TL < 300 mm) bathydemersal marine species. It is incidentally caught and discarded by bottom trawlers fishing in the outer shelf and upper continental slope (100-500 m) along southern Brazil.

**Exploitation.** Not targeted by any fishery.

**References.** Menezes et al. (2003); Bernardes et al. (2006). Haimovici et al. (2008).

**Description.** Shape rhomboidal to elliptic. *Distal face* straight. *Proximal face* slightly convex. *Anterior margin* angled. *Posterior margin* angled to round. *Dorsal margin* flattened to angled, lobate to smooth. *Ventral margin* convex, sinuate. *Rostrum* present, prominent. *Antirostrum* present. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* broader and shorter than cauda, deep, funnel-like. *Cauda* deep, tubular-strongly curved ventrally. *Crista* present.

**Material.** Otoliths from 48 specimens ranging between 73 to 242 mm TL, 6.3 to 186 g TW, 3.75 to 10.3 mm OL and 2.85 to 8.05 mm OH.

**Relationships.**

$$TL = -26.61 + 27.642 OL \quad R^2 = 0.97$$

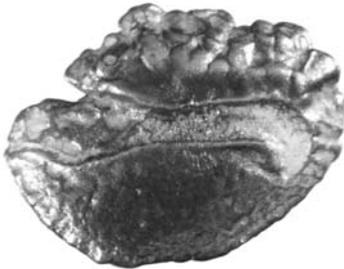
$$TL = 15.653 OH^{1.402} \quad R^2 = 0.95$$

$$TW = 0.066 OL^{3.535} \quad R^2 = 0.96$$

$$TW = 0.064 OH^{4.102} \quad R^2 = 0.95$$

$$TW = 2E-05 TL^{2.921} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.63\text{-max. } 0.87$$



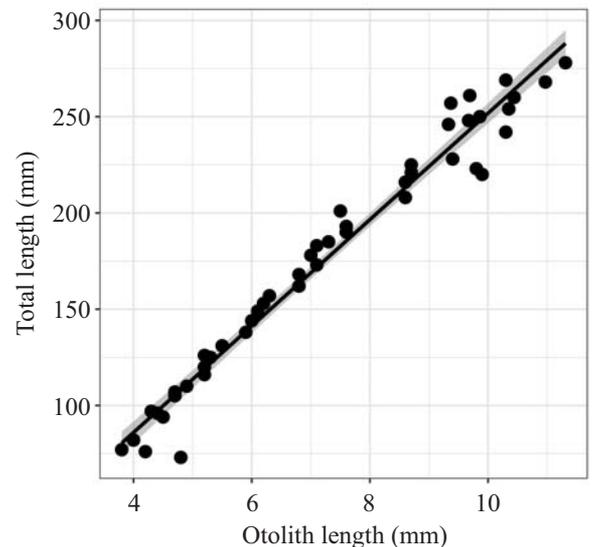
(a) 3.7 mm OL, 77 mm TL



(b) 6 mm OL, 140 mm TL



(c) 11.7 mm OL, 298 mm TL



**Order Scombriformes**  
**Family Sphyraenidae**  
*Sphyraena tome* Fowler 1903

**Distribution and habitat.** Rio de Janeiro and Rio Grande do Sul, Brazil to the north of Argentina. Small-sized (TL < 350 mm) pelagic-neritic marine species. It is incidentally caught and discarded on board by bottom trawlers in the continental shelf along southern Brazil.

**Exploitation.** Not targeted by any fishery.

**References.** Haimovici et al. (1996); Menezes et al. (2003).



(a) 3.8 mm OL, 130 mm TL



(b) 8.5 mm OL, 303 mm TL



(c) 9.1 mm OL, 325 mm TL

**Description.** *Shape* fusiform to cuneiform. *Distal face* slightly concave. *Proximal face* slightly convex. *Anterior margin* angled. *Posterior margin* oblique to flattened. *Dorsal margin* convex to flattened, sinuate to smooth. *Ventral margin* convex, sinuate to smooth. *Rostrum* present, short.

*Antirostrum* present. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* broader and shorter than cauda, shallow, funnel-like. *Cauda* shallow, tubular-slightly curved ventrally. *Crista* present.

**Material.** Otoliths from 5 specimens ranging between 130 to 325 mm TL, 7 to 150 g TW, 4.59 to 9.34 mm OL, and 1.97 to 3.43 mm OH.

**Relationships.**

$$TL = -10.08 + 36.737 OL \quad R^2 = 0.98$$

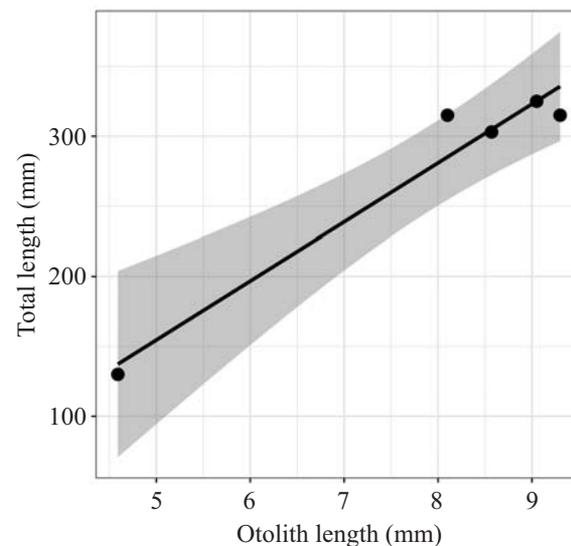
$$TL = 42.887 OH^{1.637} \quad R^2 = 0.99$$

$$TW = 0.006 OL^{4.669} \quad R^2 = 0.96$$

$$TW = 0.172 OH^{5.484} \quad R^2 = 0.99$$

$$TW = 7E-07 TL^{3.303} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.63\text{-max. } 0.87$$



**Family Stromateidae**  
*Peprilus paru* (Linnaeus 1758)

**Distribution and habitat.** Western Atlantic from Panama to Argentina. Small-sized (TL < 350 mm) brackish and benthopelagic marine species. It is incidentally caught by bottom trawl and gillnets boats fishing in the inner continental shelf along southern Brazil.

**Exploitation.** Larger specimens regularly landed.

**References.** Haimovici et al. (1996); Menezes et al. (2003).

**Description.** Shape oval to cuneiform. Distal face slightly concave. Proximal face slightly convex. Anterior margin angled. Posterior margin round to angled. Dorsal margin convex, dentate to sinuate. Ventral margin convex, dentate to sinuate. Rostrum present, prominent. Antirostrum present. Sulcus acusticus opened at the anterior region, closed at posterior region. Ostium broader and shorter than cauda, deep, funnel-like. Cauda deep, tubular-slightly curved ventrally. Crista present.

**Material.** Otoliths from 63 specimens ranging between 14 to 342 mm TL, 0.1 to 602 g TW, 0.9 to 12.2 mm OL, and 0.8 to 5.7 mm OH.

**Relationships.**

$$TL = 17.028 OL^{1.222} \quad R^2 = 0.99$$

$$TL = 22.120 OH^{1.484} \quad R^2 = 0.97$$

$$TW = 0.112 OL^{3.506} \quad R^2 = 0.98$$

$$TW = 0.240 OH^{4.252} \quad R^2 = 0.96$$

$$TWL = 3E-05 TL^{2.867} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.47\text{-max. } 0.89$$



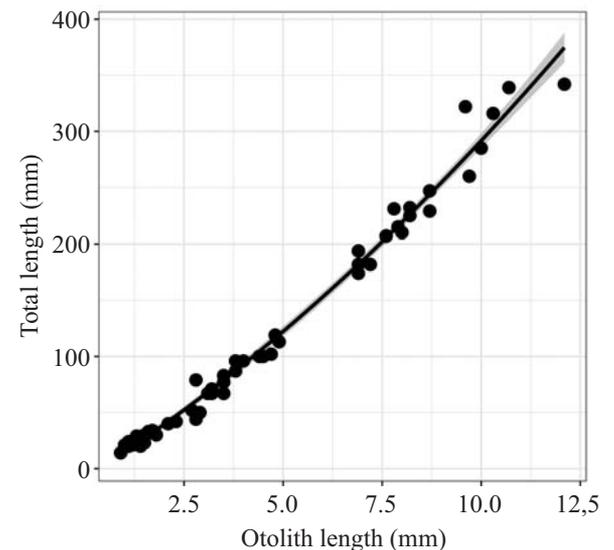
(a) 2.2 mm OL, 44 mm TL



(b) 4.7 mm OL, 113 mm TL



(c) 7.9 mm OL, 212 mm TL



*Stromateus brasiliensis* Fowler 1906

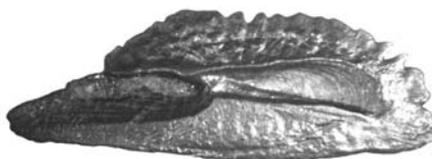
**Distribution and habitat.** Southwest Atlantic: southern Brazil to Tierra del Fuego, Argentina. Mid-sized (TL < 500 mm) benthopelagic marine species. It is incidentally caught and discarded on board by bottom trawlers fishing in winter in the continental shelf along southern Brazil.

**Exploitation.** Not targeted by any fishery.

**References.** Haimovici et al. (1996); Menezes et al. (2003); Cousseau and Perrota (2013).



(a) 4.3 mm OL, 149 mm TL



(b) 10.4 mm OL, 395 mm TL

**Description.** *Shape* lanceolate. *Distal face* straight. *Proximal face* straight. *Anterior margin* angled. *Posterior margin* oblique. *Dorsal margin* flattened, sinuate to smooth. *Ventral margin* flattened, smooth. *Rostrum* present, prominent. *Antirostrum* present. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* broader and shorter than cauda, deep, funnel-like to tubular. *Cauda* deep, tubular-straight. *Crista* present.

**Material.** Otoliths from 19 specimens ranging between 88 to 395 mm TL, 5.7 to 1,095.6 g TW, 2.8 to 9.8 mm OL, and 1.5 to 3.56 mm OH.

**Relationships.**

$$TL = 30.200 OL^{1.097} \quad R^2 = 0.97$$

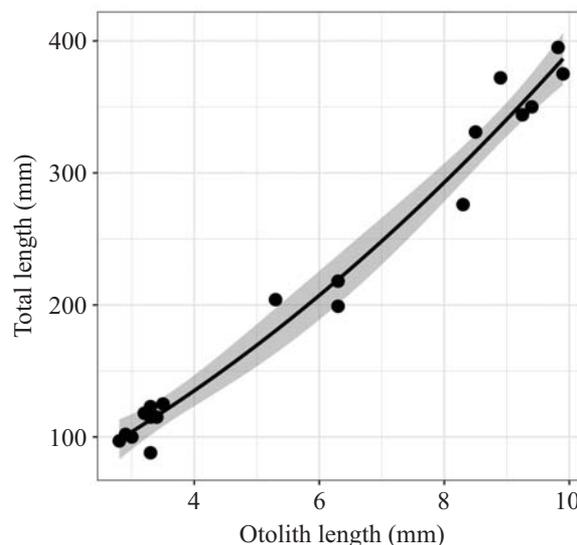
$$TL = 48.773 OH^{1.606} \quad R^2 = 0.96$$

$$TW = 0.141 OL^{3.802} \quad R^2 = 0.97$$

$$TW = 0.757 OH^{5.537} \quad R^2 = 0.96$$

$$TW = 1E-06 TL^{3.443} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.34\text{-max. } 0.54$$



**Order Scorpaeniformes****Family Peristediidae*****Peristedion altipinne* Regan 1903**

**Distribution and habitat.** Southwestern Atlantic: Rio de Janeiro to Rio Grande do Sul. Small-sized (TL < 300 mm) bathydemersal marine species. It is incidentally caught and discarded by bottom trawlers fishing in the outer shelf and upper continental slope along southern Brazil.

**Exploitation.** Not targeted by any fishery.

**References.** Menezes et al. (2003); Bernardes et al. (2005); Haimovici et al. (2008).



(a) 1.9 mm OL, 98 mm TL



(b) 4.3 mm OL, 240 mm TL

**Description.** *Shape* discoidal to elliptic. *Distal face* slightly concave. *Proximal face* convex. *Anterior margin* round to double-peaked. *Posterior margin* round. *Dorsal margin* convex, smooth. *Ventral margin* convex, smooth to sinuate. *Rostrum* present, short. *Antirostrum* present. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* broader and shorter than

*cauda*, deep, round-oval. *Cauda* deep, tubular-straight. *Crista* present.

**Material.** Otoliths from 35 specimens ranging between 98 to 240 mm TL, 7 to 133 g TW, 2 to 4.18 mm OL, and 1.59 to 2.86 mm OH.

**Relationships.**

$$TL = -14.74 + 59.871 OL \quad R^2 = 0.91$$

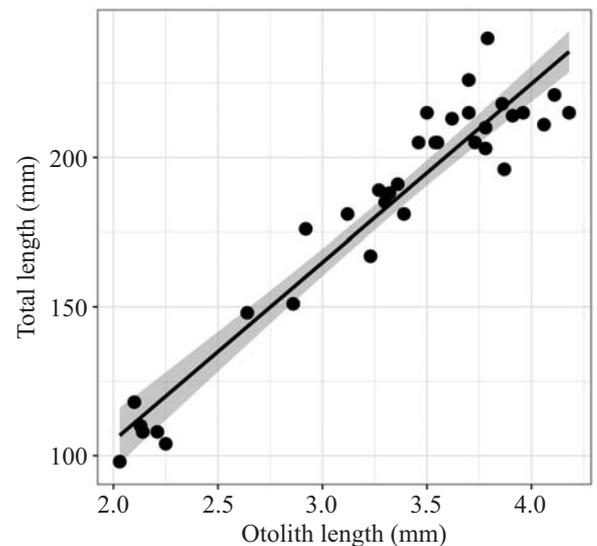
$$TL = 51.408 OH^{1.443} \quad R^2 = 0.92$$

$$TW = 0.765 OL^{3.686} \quad R^2 = 0.94$$

$$TW = 0.980 OH^{4.742} \quad R^2 = 0.94$$

$$TW = 3E-06 TL^{3.249} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.62\text{-max. } 0.84$$



*Peristedion gracile* Goode and Bean 1896

**Distribution and habitat.** Southwestern Atlantic: Rio de Janeiro to Rio Grande do Sul. Small-sized (TL < 250 mm) bathydemersal marine species. It is incidentally caught and discarded by bottom trawlers fishing in the outer shelf and upper continental slope along southern Brazil.

**Exploitation.** Not targeted by any fishery.

**References.** Menezes et al. (2003); Bernardes et al. (2005). Haimovici et al. (2008).



(a) 2.4 mm OL, 100 mm TL



(b) 4.8 mm OL, 223 mm TL

**Description.** *Shape* elliptic to fusiform. *Distal face* slightly concave *Proximal face* slightly convex. *Anterior margin* round to angled. *Posterior margin* angled. *Dorsal margin* convex, smooth. *Ventral margin* convex, sinuate. *Rostrum* present, short to prominent. *Antirostrum* absent. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* broader and shorter than cauda, deep, round-oval to funnel-like. *Cauda* deep, tubular-straight. *Crista* present.

**Material.** Otoliths from 17 specimens ranging

between 100 to 223 mm TL, 5 to 67 g TW, 2.4 to 4.8 mm OL, and 1.42 to 2.48 mm OH.

**Relationships.**

$$TL = -19.61 + 50.024 OL \quad R^2 = 0.96$$

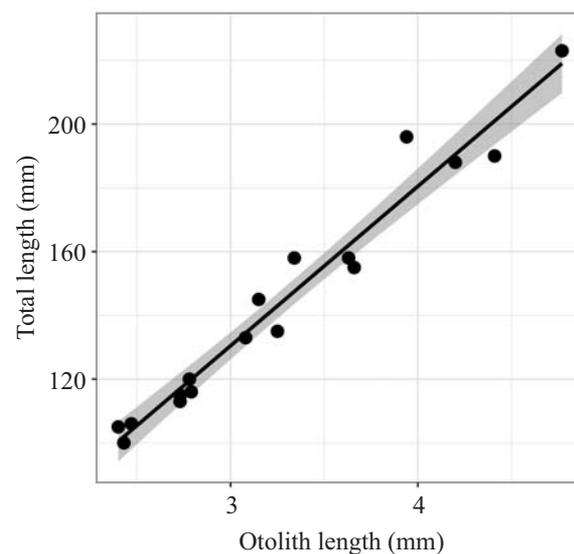
$$TL = 61.707 OH^{1.372} \quad R^2 = 0.90$$

$$TW = 0.180 OL^{3.785} \quad R^2 = 0.92$$

$$TW = 0.907 OH^{4.624} \quad R^2 = 0.84$$

$$TW = 7E-07 TL^{3.412} \quad R^2 = 0.96$$

$$OH/OL = \text{min. } 0.49\text{-max. } 0.69$$



**Family Sebastidae*****Helicolenus lahillei* Norman 1937**

**Distribution and habitat.** Southwestern Atlantic: central Brazil to northern Argentina; south of Rio Grande to Argentina. Mid-sized (TL < 500 mm) demersal marine species. It is fished and discarded on board by the trawlers or used as bait by hook and line fishing boats in the upper continental slope along southern Brazil.

**Exploitation.** Not targeted by any fishery.

**References.** Menezes et al. (2003); Fagundes et al. (2005); Haimovici et al. (2008).



(a) 4.2 mm OL, 83 mm TL



(b) 8.8 mm OL, 220 mm TL



(c) 14.6 mm OL, 435 mm TL

**Description.** *Shape* fusiform to lanceolate. *Distal face* straight. *Proximal face* convex. *Anterior*

*margin* angled. *Posterior margin* angled. *Dorsal margin* convex, smooth to dentate. *Ventral margin* convex, smooth to sinuate. *Rostrum* present, prominent. *Antirostrum* present. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* same width and shorter than cauda, deep, tubular to undefined. *Cauda* deep, tubular-straight. *Crista* present.

**Material.** Otoliths from 30 specimens ranging between 74 to 410 mm TL, 5.7 to 997 g TW, 3.7 to 13.8 mm OL, and 2.3 to 7.15 mm OH.

**Relationships.**

$$TL = 12.002 OL^{1.340} \quad R^2 = 0.98$$

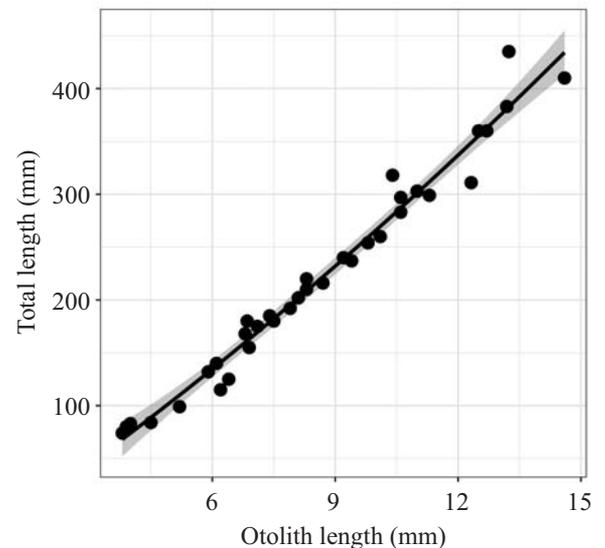
$$TL = 20.992 OH^{1.509} \quad R^2 = 0.98$$

$$TW = 0.026 OL^{4.027} \quad R^2 = 0.98$$

$$TW = 0.142 OH^{4.521} \quad R^2 = 0.97$$

$$TW = 2E-05 TL^{2.994} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.48\text{-max. } 0.69$$



**Family Setarchidae**  
***Setarches guentheri* Johnson 1862**

**Distribution and habitat.** Circumglobal. It occurs along all Brazil. Small-sized (TL < 250 mm) benthopelagic marine species. It is caught in small numbers and discarded on board, by bottom trawlers in the upper continental slope along southern Brazil.

**Exploitation.** Not targeted by any fishery.

**References.** Menezes et al. (2003); Bernardes et al. (2005); Haimovici et al. (2008).

**Description.** *Shape* elliptic to lanceolate. *Distal face* straight. *Proximal face* slightly convex. *Anterior margin* angled. *Posterior margin* round. *Dorsal margin* convex, lobate to dentate. *Ventral margin* convex, lobate to smooth to sinuate. *Rostrum* present, prominent. *Antirostrum* present. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* broader and same length of cauda, shallow, funnel-like to undefined. *Cauda* shallow, elliptic. *Crista* absent.

**Material.** Otoliths from 30 specimens ranging between 51 to 212 mm TL, 2 to 125.8 g TW, 2.48 to 10.65 mm OL, and 1.75 to 6.97 mm OH.

**Relationships.**

$$TL = 2.8434 + 20.159 OL \quad R^2 = 0.96$$

$$TL = 26.482 OH^{1.158} \quad R^2 = 0.98$$

$$TW = 0.081 OL^{3.211} \quad R^2 = 0.98$$

$$TW = 0.204 OH^{3.651} \quad R^2 = 0.98$$

$$TW = 7E-06 TL^{3.150} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.54\text{-max. } 0.72$$



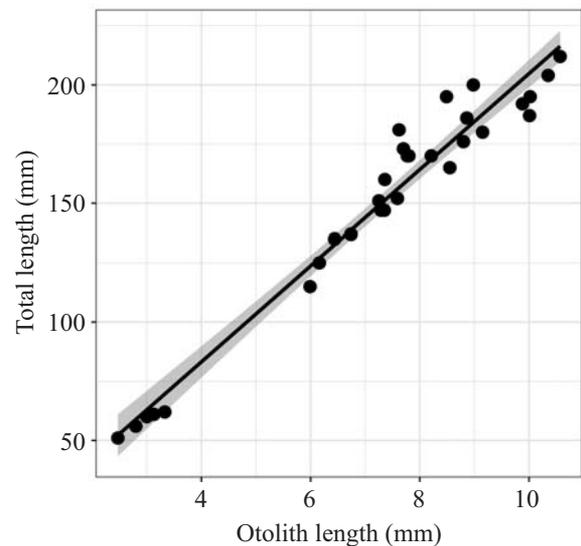
(a) 2.4 mm OL, 51 mm TL



(b) 6.6 mm OL, 135 mm TL



(c) 10.4 mm OL, 212 mm TL



### Family Triglidae

#### *Prionotus nudigula* Ginsburg 1950

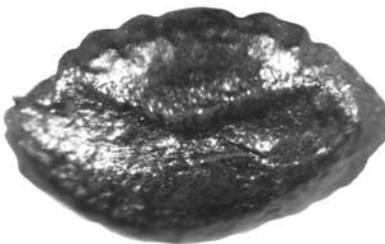
**Distribution and habitat.** Southwestern Atlantic: Rio de Janeiro, Brazil to San Jorge Gulf along southern Argentina. Small-sized (TL < 300 mm) demersal marine species. It is incidentally caught and discarded on board by bottom trawlers fishing on the outer continental shelf and upper slope along southern Brazil.

**Exploitation.** Not targeted by any fishery.

**References.** Haimovici et al. (1996, 2008); Menezes et al. (2003); Cousseau and Perrota (2013).



(a) 1.9 mm OL, 69 mm TL



(b) 3.5 mm OL, 124 mm TL



(c) 7.4 mm OL, 265 mm TL

**Description.** Shape elliptic. Distal face concave. Proximal face convex. Anterior margin round. Posterior margin round. Dorsal margin convex, smooth to sinuate. Ventral margin convex, smooth. Rostrum present, short. Antirostrum present. Sulcus acusticus opened at the anterior region, closed at posterior region. Ostium same width and shorter than cauda, deep, round-oval to tubular. Cauda deep, elliptic. Crista present.

**Material.** Otoliths from 45 specimens ranging between 84 to 227 mm TL, 5.6 to 143 g TW, 2.6 to 6.75 mm OL, and 1.75 to 4 mm OH.

#### Relationships.

$$TL = -0.657 + 35.843 OL \quad R^2 = 0.94$$

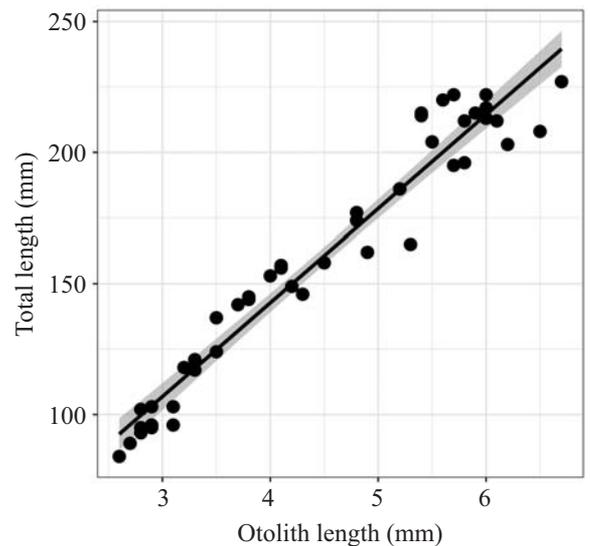
$$TL = 45.828 OH^{1.152} \quad R^2 = 0.94$$

$$TW = 0.255 OL^{3.399} \quad R^2 = 0.97$$

$$TW = 0.722 OH^{3.760} \quad R^2 = 0.96$$

$$TW = 4E-06 TL^{3.204} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.59\text{-max. } 0.78$$



*Prionotus punctatus* (Bloch 1793)

**Distribution and habitat.** Circumglobal. It occurs along all Brazil. Small-sized (TL < 450 mm) demersal marine species. It is incidentally caught by bottom trawls and gillnets in the continental shelf along southern Brazil.

**Exploitation.** Larger specimens regularly landed.

**References.** Haimovici et al. (1996, 2008); Mezezes et al. (2003: 74).



(a) 1.5 mm OL, 36 mm TL



(b) 4 mm OL, 126 mm TL



(c) 6.4 mm OL, 228 mm TL



(d) 10.7 mm OL, 429 mm TL

**Description.** Shape elliptic to oval. Distal face concave. Proximal face convex. Anterior margin round. Posterior margin round. Dorsal margin convex, smooth to dentate to sinuate. Ventral margin convex, smooth to dentate to sinuate. Rostrum present, short. Antirostrum absent. Sulcus acusticus opened or closed at the anterior region, opened or closed at posterior region. Ostium same width and shorter than cauda, deep, round-oval to rectangular. Cauda deep, tubular-strongly curved ventrally. Crista present.

**Material.** Otoliths from 57 specimens ranging between 36 to 318 mm TL, 0.35 to 425 g TW, 1.5 to 9.0 mm OL, and 1.1 to 5.55 mm OH.

**Relationships.**

$$TL = 22.374 OL^{1.246} \quad R^2 = 0.99$$

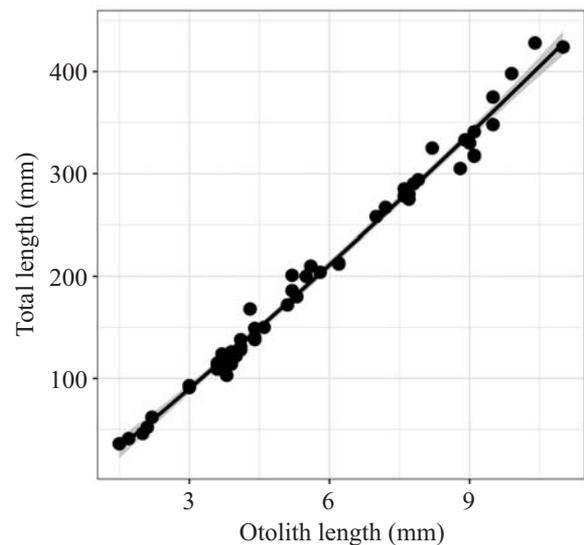
$$TL = 36.808 OH^{1.275} \quad R^2 = 0.99$$

$$TW = 0.090 OL^{3.939} \quad R^2 = 0.99$$

$$TW = 0.438 OH^{4.023} \quad R^2 = 0.98$$

$$TW = 5E-06 TL^{3.156} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.55\text{-max. } 0.73$$



**Order Siluriformes****Family Ariidae*****Genidens barbatus* (Lacepède 1803)**

**Distribution and habitat.** Southwestern Atlantic Ocean from northeastern Brazil the northern Argentina. Large-sized (TL > 800 mm) anadromous demersal species. It occurs in the Patos Lagoon and marine adjacent shelf waters along southern Brazil.

**Exploitation.** A commercially valuable species fished with gillnets in the estuary and trawl nets and hook and line in coastal waters up to 100 m. Its fishery in southern Brazil collapsed in the 1980s. Fishing is forbidden since 2014.

**References.** Menezes et al. (2003); Fischer et al. (2011).

**Description.** *Shape* oval. *Anterior margin* flattened. *Posterior margin* round. *Incisura lineae basalis* absent in small individuals, deep in larger. *Sulculus lapilli* tubular slightly curved in small individuals, strongly curved in larger.

**Material.** Otoliths from 31 specimens ranging between 68 to 700 mm TL, 2.5 to 4,090 g TW, 3.35 to 14.7 mm OL, and 2.65 to 12 mm OH.

**Relationships.**

$$TL = 8.878 OL^{1.668} \quad R^2 = 0.98$$

$$TL = 12.193 OH^{1.624} \quad R^2 = 0.99$$

$$TW = 0.003 OL^{5.346} \quad R^2 = 0.98$$

$$TW = 0.009 OH^{5.201} \quad R^2 = 0.98$$

$$TW = 3E-06 TL^{3.196} \quad R^2 = 0.99$$

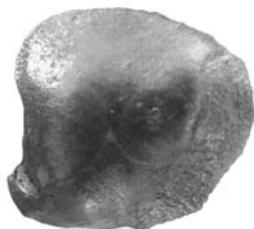
$$OH/OL = \text{min. } 0.77\text{-max. } 1.00$$



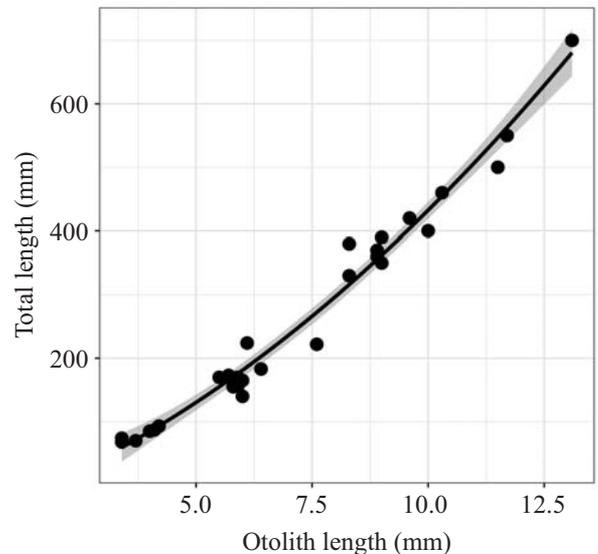
(a) 3.4 mm OL, 68 mm TL



(b) 6.9 mm OL, 222 mm TL



(c) 10.1 mm OL, 418 mm TL



*Genidens genidens* (Cuvier 1829)

**Distribution and habitat.** Southwestern Atlantic Ocean from Guianas to northern Argentina. Small-sized (TL < 450 mm) freshwater and estuarine species. Fished with gillnets in the Patos Lagoon along southern Brazil.

**Exploitation.** Small scale fishers in the Patos Lagoon.

**References.** Menezes et al. (2003); Fischer et al. (2011).



(a) 4.9 mm OL, 118 mm TL



(b) 7.8 mm OL, 231 mm TL

**Description.** *Shape* oval. *Anterior margin* flattened. *Posterior margin* round. *Incisura linea basalis* absent in small individuals, deep in larger. *Sulculus lapilli* tubular slightly curved in small individuals, strongly curved in larger.

**Material.** Otoliths from 33 specimens ranging between 116 to 380 mm TL, 12 to 580 g TW, 4.95 to 11.9 mm OL, and 4.15 to 9.9 mm OH.

**Relationships.**

$$TL = -79.10 + 39.958 OL \quad R^2 = 0.97$$

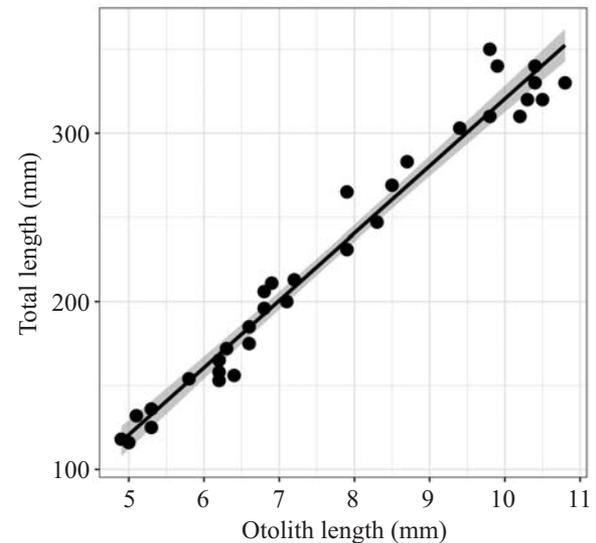
$$TL = 17.960 OH^{1.350} \quad R^2 = 0.96$$

$$TW = 0.013 OL^{4.288} \quad R^2 = 0.98$$

$$TW = 0.031 OH^{4.262} \quad R^2 = 0.96$$

$$TW = 4E-06 TL^{3.149} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.78\text{-max. } 0.88$$



***Genidens planifrons***

(Higuchi, Reis and Araújo 1982)

**Distribution and habitat.** Southwestern Atlantic Ocean. Endemic from the Patos Lagoon hydrographic basin. Large-sized (TL > 600 mm) anadromous demersal species. It is fished with gillnets, trawl and hook and line.

**Exploitation.** Commercially valuable species. Its fishery in southern Brazil collapsed in the 1980s. Fishing is forbidden since 2014. In risk of extinction.

**References.** Menezes et al. (2003); Fischer et al. (2011).

**Description.** Shape oval. Anterior margin flattened. Posterior margin round. *Incisura lineae basalis* absent in small individuals, deep in larger. *Sulculus lapilli* tubular slightly curved in small individuals, strongly curved in larger.

**Material.** Otoliths from 17 specimens ranging between 78 to 630 mm TL, 4.5 to 2,480 g TW, 3.5 to 11.5 mm OL, and 2.9 to 10.8 mm OH.

**Relationships.**

$$TL = 7.432 OL^{1.816} \quad R^2 = 0.99$$

$$TL = 12.316 OH^{1.677} \quad R^2 = 0.99$$

$$TW = 0.003 OL^{5.543} \quad R^2 = 0.99$$

$$TW = 0.014 OH^{5.118} \quad R^2 = 0.99$$

$$TW = 6E-06 TL^{3.066} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.82\text{-max. } 0.96$$



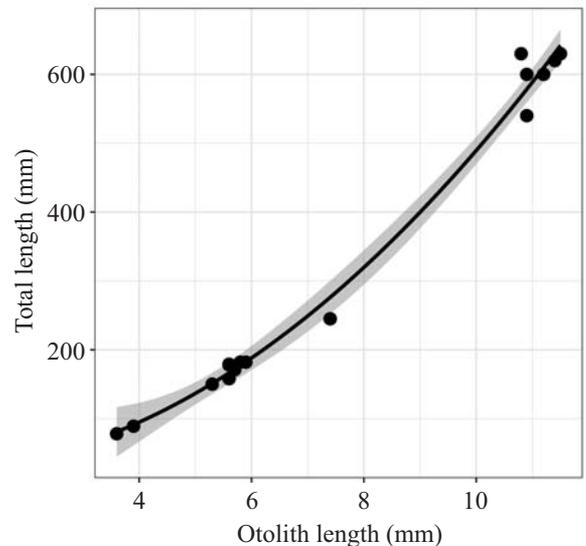
(a) 3.6 mm OL, 78 mm TL



(b) 5.8 mm OL, 182 mm TL



(c) 8.7 mm OL, 379 mm TL

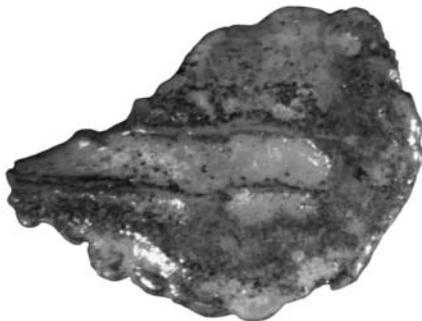


**Order Stomiiformes**  
**Family Sternoptychidae**  
*Maurolicus stehmanni*  
 Parin and Kobylansky 1993

**Distribution and habitat.** Southwest Atlantic (between 23° S and 40° S). Very small (TL < 60 mm) mesopelagic marine species. Abundant along the continental slope of southern Brazil. It is an important forage fish for benthopelagic and pelagic fishes and squids.

**Exploitation.** Not targeted by any fishery.

**References.** Menezes et al. (2003); Bernardes et al. (2006); Almeida and Rossi Wongtschowsk 2007.



(a) 1.7 mm OL, 47 mm TL

**Description.** *Shape* pyriform. *Distal face* straight. *Proximal face* straight. *Anterior margin* angled. *Posterior margin* round. *Dorsal margin* convex, lobate. *Ventral margin* convex, lobate. *Rostrum* present, prominent. *Antirostrum* absent. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* same width and length of cauda, shallow, tubular. *Cauda* shallow, tubular-straight. *Crista* absent.

**Material.** Otoliths from 14 specimens ranging between 39 to 49 mm TL, 0.4 to 0.8 g TW, 1.4 to 1.8 mm OL, and 1.1 to 1.4 mm OH.

**Relationships.**

$$TL = 1.0935 + 26.390 OL \quad R^2 = 0.97$$

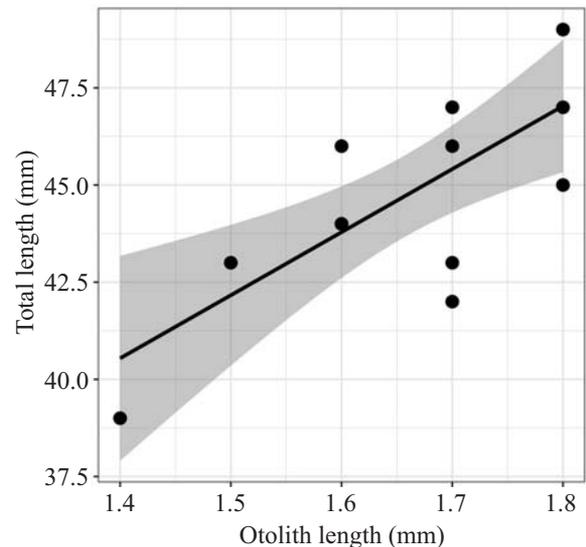
$$TL = 34.173 OH^{1.255} \quad R^2 = 0.99$$

$$TW = 0.358 OL^{0.925} \quad R^2 = 0.99$$

$$TW = 0.465 OH^{0.944} \quad R^2 = 0.99$$

$$TW = 1E-05 TL^{2.851} \quad R^2 = 0.75$$

$$OH/OL = \text{min. } 0.70\text{-max. } 0.84$$



**Order Syngnathiformes**  
**Family Dactylopteridae**  
*Dactylopterus volitans* (Linnaeus 1758)

**Distribution and habitat.** Worldwide. In the western Atlantic Ocean: from Nova Scotia to northern Argentina. Small-sized (TL > 450 mm) benthic marine biotritic and reef-associated species. It is occasionally fished and discarded on board by bottom trawlers on the shelf along southern Brazil.

**Exploitation.** Not targeted by any fishery.

**References.** Bernardes et al. (2003); Menezes et al. (2003).

opened at the anterior region, closed at posterior region. *Ostium* same width and length of cauda, deep, funnel-like to undefined. *Cauda* shallow, round-oval. *Crista* absent.

**Material.** Otoliths from 14 specimens ranging between 67 to 200 mm TL, 3.5 to 69.6 g TW, 0.65 to 2.04 mm OL, and 0.5 to 1.42 mm OH.

**Relationships.**

$$TL = 84.991 OL^{1.146} \quad R^2 = 0.93$$

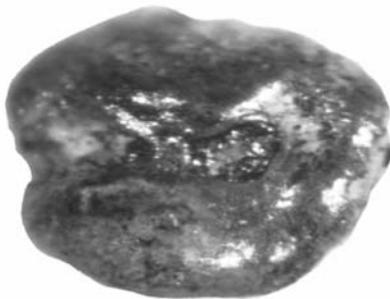
$$TL = 121.14 OH^{1.177} \quad R^2 = 0.93$$

$$TW = 4.981 OL^{0.735} \quad R^2 = 0.24$$

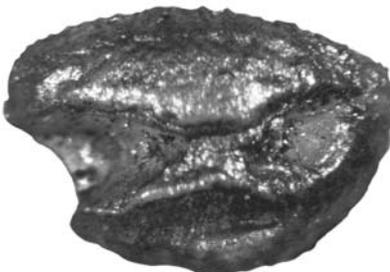
$$TW = 6.668 OH^{0.907} \quad R^2 = 0.43$$

$$TW = 1E-05 TL^{2.962} \quad R^2 = 0.99$$

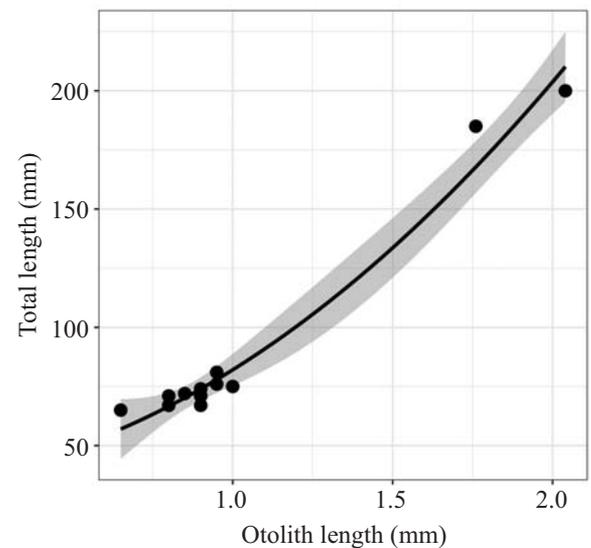
$$OH/OL = \text{min. } 0.67\text{-max. } 0.84$$



(a) 0.8 mm OL, 65 mm TL



(b) 2.1 mm OL, 200 mm TL



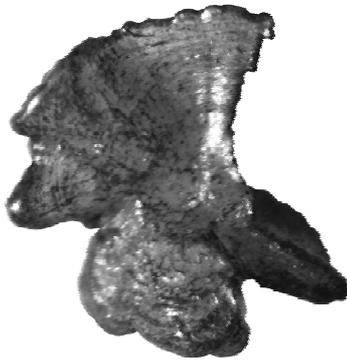
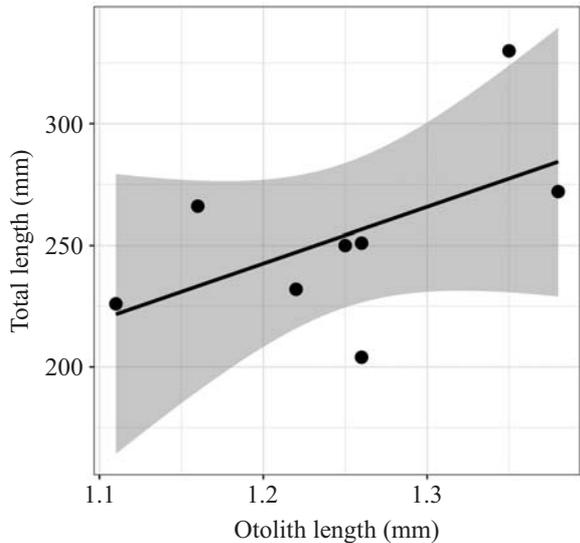
**Description.** *Shape* elliptic to rectangular. *Distal face* concave. *Proximal face* convex. *Anterior margin* double-peaked. *Posterior margin* round. *Dorsal margin* convex, smooth to sinuate. *Ventral margin* convex, smooth to sinuate. *Rostrum* present, short. *Antirostrum* present. *Sulcus acusticus*

**Order Tetraodontiformes**  
**Family Balistidae**  
*Balistes capriscus* Gmelin 1789

**Distribution and habitat.** Western Atlantic Ocean: Nova Scotia to northern Argentina. (46° N-36° S). Mid-sized (TL < 400 mm) benthopelagic marine species on biodetritic and reef substrates. It is fished in small numbers by bottom trawlers in the inner shelf (< 100 m) along southeastern Brazil.

**Exploitation.** Larger specimens regularly landed.

**References.** Menezes et al. (2003); Fischer et al. (2011).



(a) 1.2 mm OL, 250 mm TL

**Description.** *Shape* hour-glass.

**Material.** Otoliths from 8 specimens ranging between 204 to 330 mm TL, 180 to 596.6 g TW, 1.1 to 1.38 mm OL, and 1.72 to 2.3 mm OH.

**Relationships.**

$$TL = -1.325 + 204.70 OL \quad R^2 = 0.89$$

$$TL = 111.44 OH^{1.186} \quad R^2 = 0.99$$

$$TW = 205.50 OL^{1.210} \quad R^2 = 0.99$$

$$TW = 118.55 OH^{1.188} \quad R^2 = 0.99$$

$$TW = 1E-04 TL^{2.627} \quad R^2 = 0.88$$

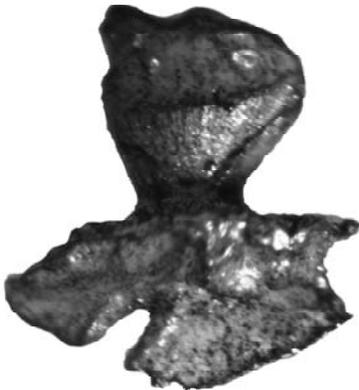
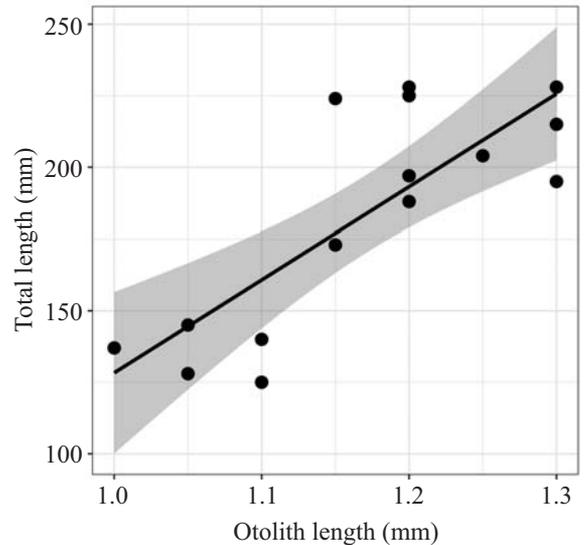
$$OH/OL = \text{min. } 1.36\text{-max. } 1.80$$

**Family Monacanthidae**  
***Stephanolepis setifer* (Bennett 1831)**

**Distribution and habitat.** Western Atlantic Ocean: North Carolina (USA), to southeastern Brazil, cited for the Indo-Pacific. Small (TL < 250 mm) marine, reef-associated species. It is incidentally caught and discarded onboard by the bottom, trawl fisheries in the continental shelf along southern Brazil.

**Exploitation.** Not targeted by any fishery.

**References.** Menezes et al. (2003) as *S. hispidus*; Fisher et al. (2011).



(a) 1.4 mm OL, 255 mm TL

**Description.** *Shape* hour-glass.

**Material.** Otoliths from 15 specimens ranging between 125 to 228 mm TL, 40 to 220.3 g TW, 1.0 to 1.3 mm OL, and 1.0 to 1.25 mm OH.

**Relationships.**

$$TL = -196.2 + 324.50 OL \quad R^2 = 0.61$$

$$TL = 128.45 OH^{2.772} \quad R^2 = 0.84$$

$$TW = 35.845 OL^{7.087} \quad R^2 = 0.71$$

$$TW = 38.272 OH^{8.446} \quad R^2 = 0.82$$

$$TW = 1E-05 TL^{3.073} \quad R^2 = 0.98$$

$$OH/OL = \text{min. } 0.90\text{-max. } 1.00$$

**Order Trachichthyiformes**  
**Family Trachichthyidae**  
*Gephyroberyx darwinii* (Johnson 1866)

**Distribution and habitat.** Atlantic and Indo-Pacific. Mid-sized (TL > 500 mm) benthopelagic marine species. Small specimens occasionally on the upper continental slope along southern Brazil.

**Exploitation.** Not targeted by any fishery.

**References.** Maul (1990); Bernardes et al. (2005); Haimovici et al. (2008).



(a) 11.6 mm OL, 270 mm TL



(b) 21.5 mm OL, 476 mm TL

**Description.** *Shape* pentagonal. *Distal face* slightly concave. *Proximal face* slightly convex. *Anterior margin* angled to flattened. *Posterior margin* angled. *Dorsal margin* convex, dentate. *Ventral margin* angled, smooth to sinuate. *Rostrum* present, prominent. *Antirostrum* present. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* broader and same length of cauda, shallow, funnel-like to undefined. *Cauda* shallow, tubular-slightly curved ventrally. *Crista* absent.

**Material.** Otoliths from 52 specimens ranging between 270 to 473 mm TL, 392 to 2,139 g TW, 12.18 to 20.59 mm OL, and 8.6 to 14.71 mm OH.

**Relationships.**

$$TL = 25.948 + 20.967 OL \quad R^2 = 0.93$$

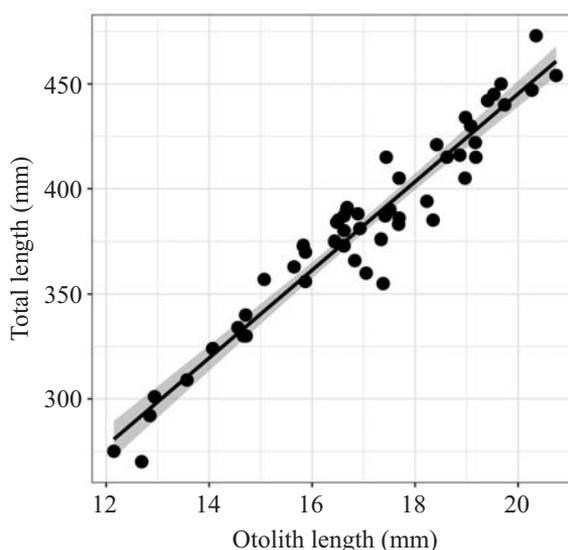
$$TL = 39.801 OH^{0.904} \quad R^2 = 0.90$$

$$TW = 0.576 OL^{2.668} \quad R^2 = 0.88$$

$$TW = 1.622 OH^{2.607} \quad R^2 = 0.87$$

$$TW = 5E-05 TL^{2.857} \quad R^2 = 0.97$$

$$OH/OL = \text{min. } 0.68\text{-max. } 0.78$$



*Hoplostethus occidentalis* Woods 1973

**Distribution and habitat.** Atlantic, Indian and Pacific oceans. In the western Atlantic Ocean from Delaware, USA to southern Brazil. Small-sized (TL < 250 mm) benthopelagic marine species. Is occasionally fished by bottom trawl in the outer shelf and upper continental slope (> 300 m) along southern Brazil.

**Exploitation.** Not targeted by any fishery.

**References.** Menezes et al. (2003); Bernardes et al. (2006); Haimovici et al. (2008).

**Description.** Shape irregular. Distal face straight. Proximal face straight. Anterior margin flattened. Posterior margin angled. Dorsal margin convex, smooth to dentate. Ventral margin convex, smooth to dentate. Rostrum present, prominent. Antirostrum present. Sulcus acusticus opened at the anterior region, closed at posterior region. Ostium broader and same length of cauda, shallow, funnel-like to undefined. Cauda shallow, tubular-straight. Crista absent.

**Material.** Otoliths from 56 specimens ranging between 39 to 162 mm TL, 0.7 to 73 g TW, 2.69 to 9.99 mm OL, and 1.85 to 7.56 mm OH.

**Relationships.**

$$TL = 12.035 OL^{1.120} \quad R^2 = 0.98$$

$$TL = 20.963 OH^{1.034} \quad R^2 = 0.98$$

$$TW = 0.020 OL^{3.488} \quad R^2 = 0.99$$

$$TW = 0.113 OH^{3.227} \quad R^2 = 0.99$$

$$TW = 1E-05 TL^{3.081} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.63\text{-max. } 0.76$$



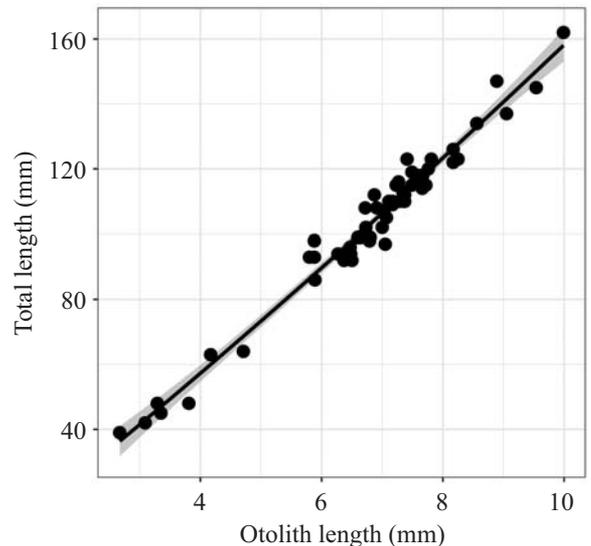
(a) 2.9 mm OL, 39 mm TL



(b) 7.3 mm OL, 112 mm TL



(c) 11.6 mm OL, 188 mm TL



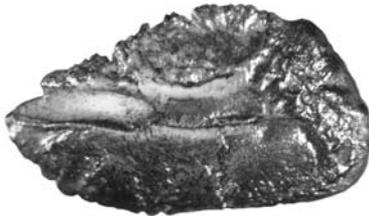
**Order Trachiniformes**  
**Family Percophidae**

***Bembrops heterurus*** (Miranda Ribeiro 1903)

**Distribution and habitat.** Western Atlantic Ocean: Rio de Janeiro to Uruguay (22° S-36° S). Small-sized (TL < 300 mm) demersal marine species. Fished and discarded by bottom trawlers in the outer shelf and upper continental slope (100-600 m) along southern Brazil.

**Exploitation.** Not targeted by any fishery.

**References.** Haimovici et al. (1994, 2008); Meneses et al. (2003).



(a) 3.2 mm OL, 99 mm TL



(b) 4.8 mm OL, 197 mm TL



(c) 6.3 mm OL, 290 mm TL

**Description.** *Shape* cuneiform. *Distal face* straight. *Proximal face* slightly convex. *Anterior*

*margin* angled. *Posterior margin* oblique to flattened. *Dorsal margin* convex, sinuate to dentate. *Ventral margin* flattened to convex, sinuate to smooth. *Rostrum* present, prominent. *Antirostrum* present. *Sulcus acusticus* opened at the anterior region, closed at posterior region. *Ostium* same width and length of cauda, shallow, tubular. *Cauda* shallow, tubular-straight. *Crista* absent.

**Material.** Otoliths from 81 specimens ranging between 113 to 234 mm TL, 5.7 to 91.2 g TW, 3.1 to 5.88 mm OL, and 1.8 to 3.28 mm OH.

**Relationships.**

$$TL = -94.95 + 60.769 OL \quad R^2 = 0.81$$

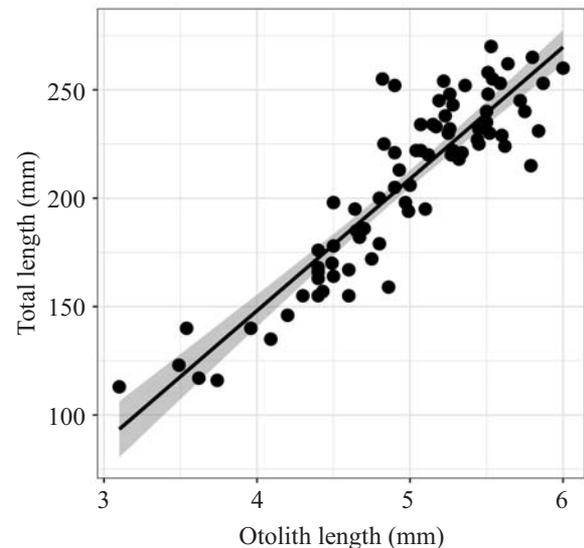
$$TL = 45.580 OH^{1.488} \quad R^2 = 0.90$$

$$TW = 0.021 OL^{4.848} \quad R^2 = 0.92$$

$$TW = 0.450 OH^{4.703} \quad R^2 = 0.92$$

$$TW = 3E-06 TL^{3.113} \quad R^2 = 0.98$$

$$OH/OL = \text{min. } 0.49\text{-max. } 0.61$$

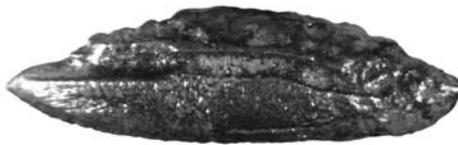


*Percophis brasiliensis* Quoy and Gaimard 1825

**Distribution and habitat.** Southwest Atlantic off southern Brazil to central Argentina. Demersal marine mid-sized (TL > 700 mm) species. It is incidentally caught by bottom trawlers and gillnets along southern Brazil.

**Exploitation.** Larger specimens regularly landed.

**References.** Haimovici et al. (1996); Menezes et al. (2003); Cousseau and Perrota (2013).



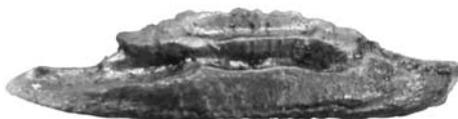
(a) 3.7 mm OL, 151 mm TL



(b) 6.3 mm OL, 274 mm TL



(c) 11.1 mm OL, 498 mm TL



(d) 14.2 mm OL, 642 mm TL

**Description.** Shape fusiform. Distal face straight. Proximal face slightly convex. Anterior margin angled. Posterior margin angled. Dorsal margin convex, sinuate. Ventral margin flattened, smooth to sinuate. Rostrum present, prominent. Antirostrum absent. Sulcus acusticus opened at the anterior region, closed at posterior region. Ostium broader and shorter than cauda, deep, fun-

nel-like to tubular. Cauda shallow, tubular-slightly curved ventrally. Crista present.

**Material.** Otoliths from 31 specimens ranging between 151 to 660 mm TL, 9.5 to 1,220 g TW, 4.05 to 15.2 mm OL, and 1.25 to 3.45 mm OH.

**Relationships.**

$$TL = -20.05 + 46.718 OL \quad R^2 = 0.98$$

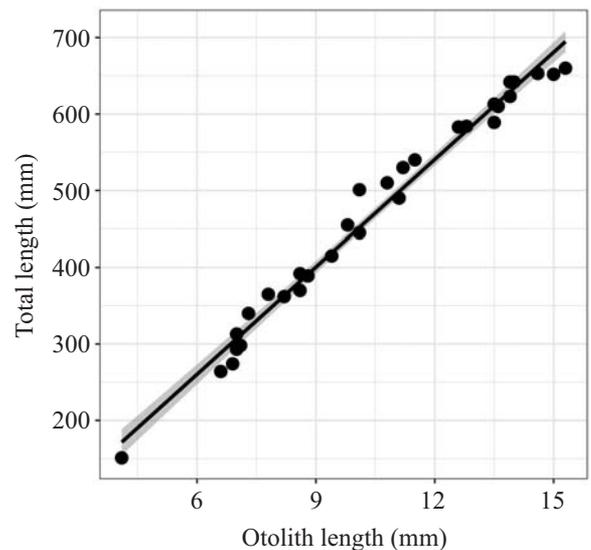
$$TL = 119.77 OH^{1.412} \quad R^2 = 0.97$$

$$TW = 0.093 OL^{3.561} \quad R^2 = 0.96$$

$$TW = 4.746 OH^{4.597} \quad R^2 = 0.97$$

$$TL = 9E-07 TW^{3.247} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.21\text{-max. } 0.31$$



### Family Pinguipedidae

#### *Pinguipes brasilianus* Cuvier 1829

**Distribution and habitat.** Rio de Janeiro, Brazil to Golfo San Jorge (22° S-45° S). Small-sized (TL < 400 mm) demersal marine species. It is incidentally caught in small quantities in hook and line commercial fishing on the upper continental slope along southern Brazil.

**Exploitation.** Larger specimens regularly landed.

**References.** Haimovici et al. (1996); Menezes et al. (2003); Cousseau and Perrota (2013).



(a) 7.3 mm OL, 322 mm TL



(b) 9.4 mm OL, 427 mm TL

**Description.** *Shape* elliptic. *Distal face* concave. *Proximal face* slightly convex. *Anterior margin* angled. *Posterior margin* angled. *Dorsal margin* convex, sinuate. *Ventral margin* convex, sinuate. *Rostrum* present, prominent. *Antirostrum* present. *Sulcus acusticus* opened at the anterior region, closed at posterior margin. *Ostium* broader and shorter than cauda, deep, funnel-like. *Cauda* deep, tubular-strongly curved ventrally. *Crista* absent.

**Material.** Otoliths from 10 specimens ranging between 322 to 442 mm TL, 460 to 1,076 g TW, 7.6 to 9.75 mm OL, and 3.5 to 4.55 mm OH.

### Relationships.

$$TL = -54.53 + 51.369 OL \quad R^2 = 0.80$$

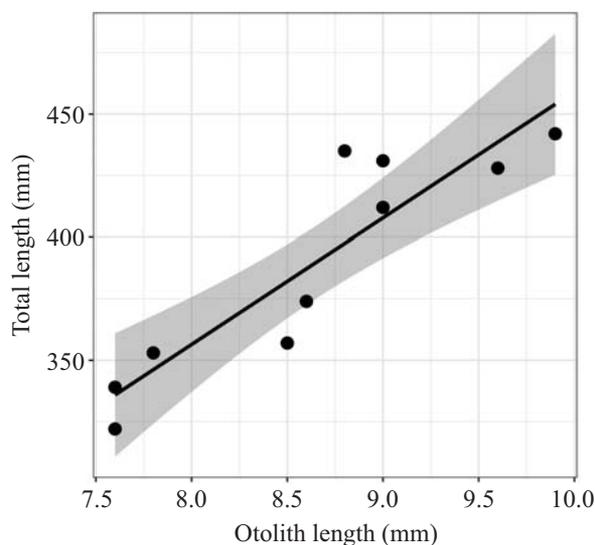
$$TL = 90.415 OH^{1.061} \quad R^2 = 0.82$$

$$TW = 0.408 OL^{3.507} \quad R^2 = 0.89$$

$$TW = 12.97 OH^{2.970} \quad R^2 = 0.81$$

$$TL = 3E-05 TW^{2.850} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.44\text{-max. } 0.51$$



*Pseudopercis numida* Miranda Ribeiro 1903

**Distribution and habitat.** Southwestern Atlantic: Rio de Janeiro to Rio Grande do Sul. Large-sized (TL > 900 mm) demersal marine species. It is present in the outer shelf and upper continental slope along southern Brazil.

**Exploitation.** Commercially fished in small numbers with hook and line on the upper continental slope.

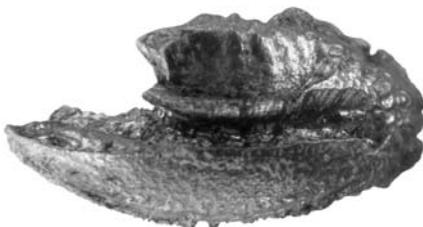
**References.** Menezes et al. (2003); Haimovici et al. (2004); Bernardes et al. (2005).



(a) 133 mm OL, 530 mm TL



(b) 18.3 mm OL, 795 mm TL



(c) 22.5 mm OL, 1,035 mm TL

**Description.** Shape elliptic to lanceolate. Distal face concave. Proximal face slightly convex. Anterior margin double-peaked. Posterior mar-

gin angled to round. Dorsal margin convex, lobate to sinuate. Ventral margin convex, sinuate. Rostrum present, prominent. Antirostrum present. Sulcus acusticus opened at the anterior region, closed at posterior margin. Ostium broader and shorter than cauda, deep, funnel-like. Cauda deep, tubular-slightly curved ventrally. Crista present.

**Material.** Otoliths from 16 specimens ranging between 543 to 950 mm TL, 1,890 to 10,300 g TW, 13.32 to 22.72 mm OL, and 6.63 to 10.81 mm OH.

**Relationships.**

$$TL = 19.682 OL^{1.273} \quad R^2 = 0.95$$

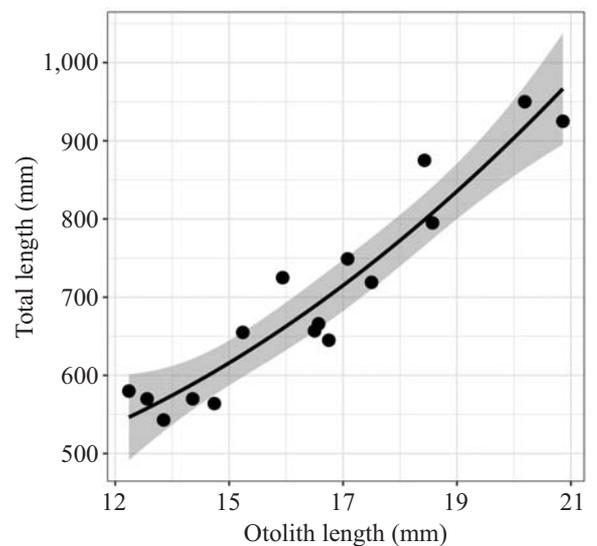
$$TL = 38.508 OH^{1.381} \quad R^2 = 0.91$$

$$TW = 0.122 OL^{3.706} \quad R^2 = 0.93$$

$$TW = 0.646 OH^{4.152} \quad R^2 = 0.91$$

$$TL = 1E-05 TW^{2.978} \quad R^2 = 0.96$$

$$OH/OL = \text{min. } 0.47\text{-max. } 0.54$$



*Pseudopercis semifasciata* (Cuvier 1829)

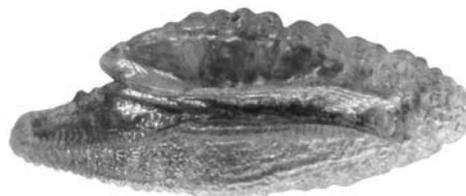
**Distribution and habitat.** Southwest Atlantic: São Paulo, Brazil to Santa Cruz, Argentina (23° S-48° S). Large-sized (TL > 800 mm) demersal marine species. It is present in the outer shelf and upper continental slope along southern Brazil.

**Exploitation.** Commercially fished in small numbers with hook and line on the upper continental slope.

**References.** Menezes et al. (2003); Haimovici et al. (2004); Cousseau and Perrota (2013).



(a) 8.9 mm OL, 275 mm TL



(b) 18.3 mm OL, 482 mm TL

**Description.** *Shape* elliptic to fusiform. *Distal face* concave. *Proximal face* slightly convex. *Anterior margin* angled. *Posterior margin* angled. *Dorsal margin* convex, sinuate. *Ventral margin* convex, sinuate. *Rostrum* present, prominent. *Antirostrum* present. *Sulcus acusticus* opened at the anterior region, closed at posterior margin. *Ostium* broader and shorter than cauda, deep, funnel-like. *Cauda* deep, tubular-slightly curved ventrally. *Crista* present.

**Material.** Otoliths from 18 specimens ranging

between 275 to 1,140 mm TL, 251 to 17,400 g TW, 8.65 to 21.4 mm OL, and 3.45 to 9.45 mm OH.

**Relationships.**

$$TL = 11.115 OL^{1.466} \quad R^2 = 0.98$$

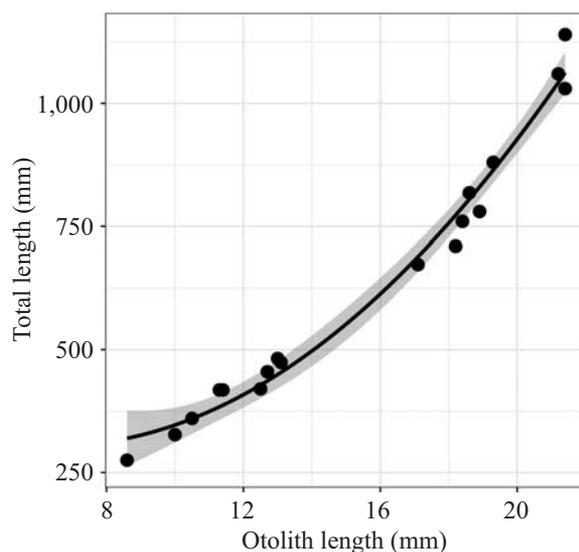
$$TL = 48.995 OH^{1.370} \quad R^2 = 0.98$$

$$TW = 0.013 OL^{4.459} \quad R^2 = 0.98$$

$$TW = 1.277 OH^{4.151} \quad R^2 = 0.97$$

$$TL = 9E-06 TW^{3.033} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.38\text{-max. } 0.49$$



### Family Uranoscopidae

#### *Astroscopus sexpinosus* (Steindachner 1876)

**Distribution and habitat.** Southwestern Atlantic: from Rio de Janeiro to Buenos Aires province, Argentina (22° S-41° S). Mid-sized (TL > 500 mm) demersal marine species. It is present in the continental shelf along southern Brazil.

**Exploitation.** Incidentally caught in small numbers by industrial gillnets and bottom trawlers.

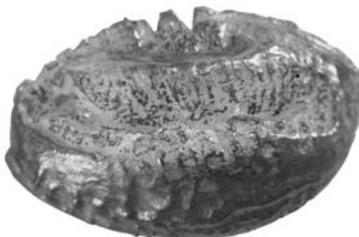
**References.** Haimovici et al. (1996); Menezes et al. (2003).



(a) 8.9 mm OL, 239 mm TL, female



(b) 17 mm OL, 337 mm TL, male



(c) 21.1 mm OL, 397 mm TL, male

**Description.** Shape oblong. Distal face straight. Proximal face convex. Anterior margin round.

Posterior margin angled. Dorsal margin convex, dentate. Ventral margin flattened, dentate to smooth. Rostrum present, short. Antirostrum absent. Sulcus acusticus opened at the anterior region, closed at posterior region. Ostium same width and length of cauda, deep, tubular. Cauda deep, tubular-straight. Crista present.

**Material.** Otoliths from 73 specimens ranging between 218 to 495 mm TL, 184.5 to 2,528 g TW, 9.35 to 22.6 mm OL, and 5.2 to 15 mm OH.

#### Relationships.

$$TL = 88.07 + 15.980 OL \quad R^2 = 0.60$$

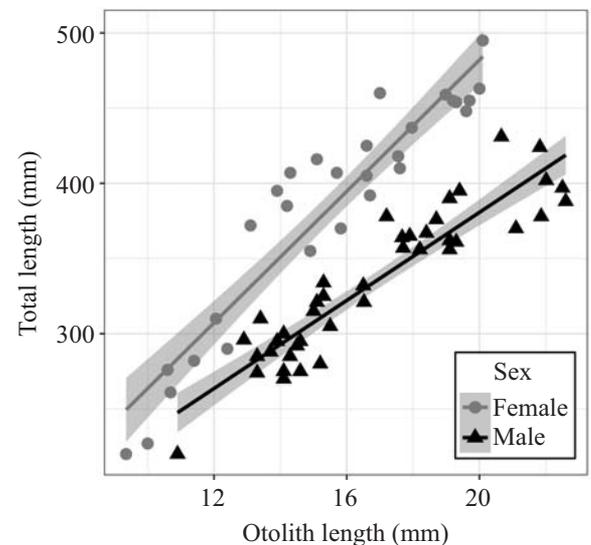
$$TL = 91.118 OH^{0.574} \quad R^2 = 0.57$$

$$TW = 4.507 OL^{1.870} \quad R^2 = 0.54$$

$$TW = 10.222 OH^{1.864} \quad R^2 = 0.50$$

$$TL = 6E-06 TW^{3.195} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.55\text{-max. } 0.76$$



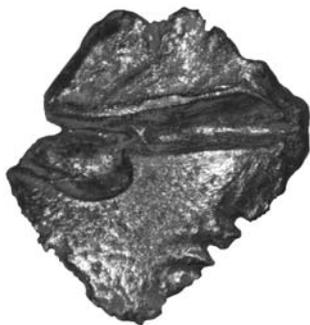
**Note.** We split by sex in relationship plot due evident differences.

**Order Zeiformes**  
**Family Caproidae**  
*Antigonia capros* Lowe 1843

**Distribution and habitat.** Circumtropical. In the western Atlantic Ocean: from New England, USA to Uruguay (44° N-36° S). Small-sized (TL < 300 mm) marine benthopelagic adults and pelagic juveniles. It occurs on biodetritic sediments of the shelf break along southern Brazil.

**Exploitation.** Not targeted by any fishery.

**References.** Bernardes et al. (2005); Menezes et al. (2005); Haimovici et al. (2008).



(a) 7.7 mm OL, 175 mm TL

**Description.** *Shape* pentagonal. *Distal face* concave. *Proximal face* slightly convex. *Anterior margin* angled. *Posterior margin* angled. *Dorsal margin* angled, dentate. *Ventral margin* angled, sinuate to dentate. *Rostrum* present, short. *Antirostrum* present. *Sulcus acusticus* opened at the anterior region, opened at posterior region. *Ostium* broader and shorter than cauda, deep, funnel-like. *Cauda* deep, tubular-straight. *Crista* present.

**Material.** Otoliths from 6 specimens ranging between 170 to 185 mm TL, 143.9 to 206 g TW, 7.64 to 9.19 mm OL, and 8.60 to 9.21 mm OH.

**Relationships.** Insufficient data.

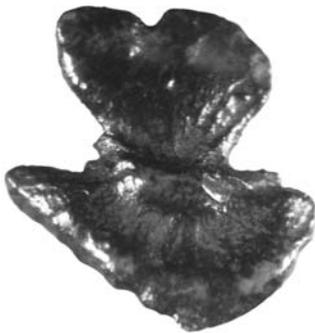
### Family Grammicolepididae

#### *Xenolepidichthys dalgleishi* Gilchrist 1922

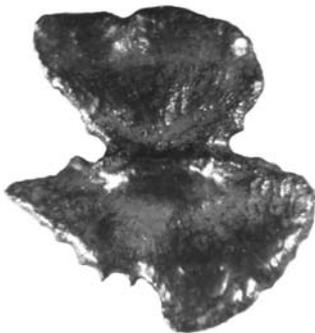
**Distribution and habitat.** Atlantic, Indian and Pacific oceans. Small-sized (TL < 260 mm) bathydemersal marine species. It is occasionally caught and discarded on board by trawlers fishing in the upper continental slope (200-600 m) along southern Brazil.

**Exploitation.** Not targeted by any fishery.

**References.** Menezes et al. (2003); Haimovici et al. (2008).



(a) 2.8 mm OL, 187 mm TL



(b) 2.9 mm OL, 191 mm TL

**Description.** *Shape* hour-glass.

**Material.** Otoliths from 19 specimens ranging between 90 to 187 mm TL, 12 to 123 g TW, 1.71 to 2.99 mm OL, and 1.65 to 3.08 mm OH.

### Relationships.

$$TL = -35.69 + 78.381 OL \quad R^2 = 0.80$$

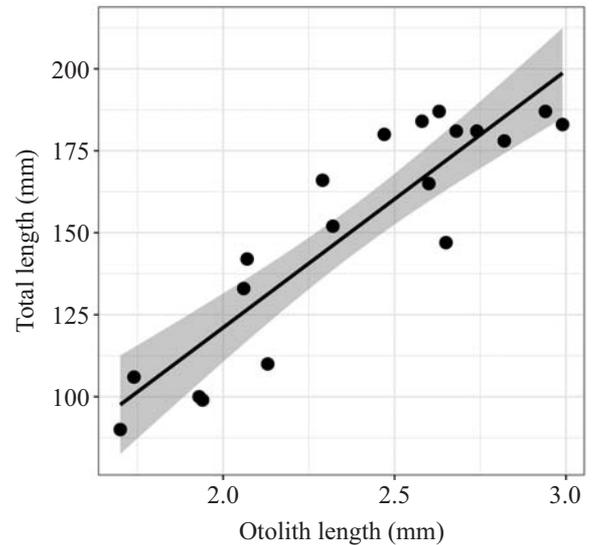
$$TL = 50.365 OH^{1.225} \quad R^2 = 0.92$$

$$TW = 1.369 OL^{4.306} \quad R^2 = 0.84$$

$$TW = 1.784 OH^{3.911} \quad R^2 = 0.92$$

$$TW = 9E-06 TL^{3.135} \quad R^2 = 0.99$$

$$OH/OL = \text{min. } 0.97\text{-max. } 1.18$$



### Family Zeniontidae

#### *Zenion hololepis* (Goode and Bean 1896)

**Distribution and habitat.** Atlantic, northern Pacific and western Indian oceans. Small-sized (TL < 200 mm) bathydemersal marine species. It is occasionally caught and discarded by trawls in the upper continental slope (200-600 m) along southern Brazil.

**Exploitation.** Not targeted by any fishery.

**References.** Menezes et al. (2003); Haimovici et al. (2008).

opening mode not applicable. *Ostium* irregular. *Cauda* irregular. *Crista* absent.

**Material.** Otoliths from 24 specimens ranging between 75 to 145 mm TL, 31 to 51 g TW, 3.19 to 4.8 mm OL, and 2.54 to 3.97 mm OH.

#### Relationships.

$$TL = -23.82 + 34.787 OL \quad R^2 = 0.58$$

$$TL = 29.454 OH^{1.147} \quad R^2 = 0.74$$

$$TW = 5.636 OL^{1.324} \quad R^2 = 0.24$$

$$TW = 7.747 OH^{1.265} \quad R^2 = 0.38$$

$$TW = 8E-04 TL^{2.214} \quad R^2 = 0.71$$

$$OH/OL = \text{min. } 0.73\text{-max. } 0.91$$

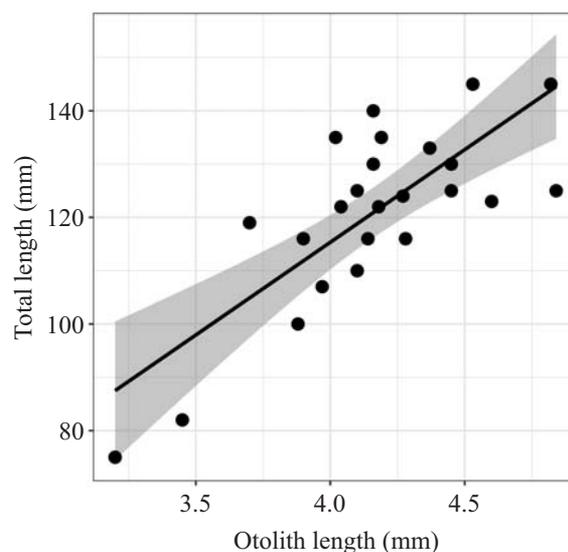


(a) 2.7 mm OL, 71 mm TL



(b) 4.9 mm OL, 145 mm TL

**Description.** *Shape* irregular. *Distal face* straight. *Proximal face* straight. *Anterior margin* flattened. *Posterior margin* round to flattened. *Dorsal margin* convex, smooth to dentate. *Ventral margin* convex, smooth, with protuberance. *Rostrum* absent. *Antirostrum* absent. *Sulcus acusticus*



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## Author contributions

Manuel Haimovici: conceptualization and resources, otoliths collection and measurements, species identification, analysis, writing and editing. Lucas dos S. Rodrigues: final otoliths descriptions and figures production, analysis, writing and editing. Silvia H. B. Lucatto: otoliths collection and description, initial image production, analysis and writing. Mauricio de A. Freire: otoliths collection, measurement and description, species identification, images production and data management. Luciano G. Fisher: otoliths collection, species identification, images production. Luis G. Cardoso: resources, writing and editing.

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