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ORIGINAL RESEARCH

An annotated and illustrated list of Cephalopoda (Mollusca) recorded from Brazilian waters, with an identification key to species

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ABSTRACT. An annotated list of cephalopods from the Brazilian Economic Exclusive Zone is presented. Species are briefly described, mainly based on external characters with information on their habitat and distribution, and images of freshly caught or preserved specimens are given. This list updates the nomenclature and geographical distribution given in previous lists, and it includes some recently described species, as well as unpublished records identified to genera. A key for the identification of families, genera and species, and images of live specimens are included. A total of 93 species are recorded, belonging to the orders Spirulida (1), Sepioidea (6), Myopsida (6), Oegopsida (46), Bathyteuhida (2), Vampyromorpha (1) and Octopoda, suborders Cirrata (4) and Incirrata (27), all in the Subclass Coloidea. Almost half of the species are benthic from the continental shelf or slope, and the remainder are water-column species, mostly from the slope and adjacent oceanic waters. Only 17 species are considered endemic to the southwest Atlantic, including two that are currently known to occur only in Brazil.

Key words: Cephalopods, biogeography, distribution, species richness, southwestern Atlantic Ocean.

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Lista anotada e ilustrada de cefalópodos (Mollusca) registrados en aguas brasileñas con una clave de identificación de especies

RESUMEN. Se presenta una lista anotada de cefalópodos de la Zona Económica Exclusiva de Brasil. Las especies se describen brevemente, basándose principalmente en caracteres externos con información sobre su hábitat y distribución, y se ofrecen imágenes de ejemplares recién capturados o conservados. Esta lista actualiza la nomenclatura y la distribución geográfica indicadas en listas anteriores, e incluye algunas especies descritas recientemente, así como registros inéditos identificados hasta géneros. Se incluye una clave para la identificación de familias, géneros y especies, así como imágenes de ejemplares vivos. Se registra un total de 93 especies, pertenecientes a los órdenes Spirulida (1), Sepioidea (6), Myopsida (6), Oegopsida (46), Bathyteuhida (2), Vampyromorpha (1) y Octopoda, subórdenes Cirrata (4) e Incirrata (27), todos en la Subclase Coloidea. Casi la mitad de las especies son bentónicas de la plataforma continental o del talud, y el resto son especies de la columna de agua, en su mayoría del talud y de aguas oceánicas adyacentes. Solo 15 especies se consideran endémicas del Atlántico Sudoccidental, incluyendo dos cuya ocurrencia se restringe a aguas brasileras.

Palabras clave: Cefalópodos, biogeografía, distribución, riqueza de especies, Océano Atlántico Sudoccidental.

INTRODUCTION

Cephalopods belong to the phylum Mollusca and share their basic body organization. However, they are highly modified and adapted to a nektonic and benthic life, which allowed them to be among the dominant predators in Palaeozoic and Mesozoic seas (Clarke and Trueman 1988). Cephalopods are soft-bodied animals with bilateral symmetry, without or with modified shells, and a funnel or siphon that expels water from the mantle cavity for propulsion. They have a well-developed head with a crown of appendages surrounding the mouth bearing suckers and/or hooks (except in Nautiloidea) and a mouth with a chitinous beak-like jaw and a chitinous tongue-like radula. They have a highly developed central nervous system, especially with large camera-like eyes analogous to those of vertebrates. Most groups have chromatophores and iridocytes and are capable of rapid changes in color patterns (Hanlon and Messenger 1996; Nixon and Young 2003). Extant cephalopods include a few species in the Genus *Nautilus* and over eight hundred species of squid, cuttlefish and octopus, occupying all marine environments (Nesis 1982; Boyle and Rodhouse, 2005). The total number of accepted extant species of cephalopods is around 820 (WoRMS 2024). Cephalopods play an important role in many marine ecosystems (Clarke 1996; Piatkowski et al. 2001), and in many regions are a major target for fisheries (Caddy 1983; Boyle and Rodhouse 2005; Arkhipkin et al. 2015; Sauer et al. 2019).

Worldwide, cephalopods attained 3.9 mt or around 4.6% of total marine fisheries landings in 2022 (FAO 2024). In Brazil, around four thousand metric tons were landed each year during the last two decades, representing less than 1% of the total marine landings in the country. Despite this limited importance as a fishing resource in Brazil, they have an important role in the trophic relations of both demersal and pelagic environments (Santos and Haimovici 2002; Vaske and Costa 2011).

Checklists of cephalopods with illustrations are useful tools to identify species in fisheries, scientific surveys, and studies of trophic relationships. Some checklists are global, including all species such as that of Nesis (1982), or focused on hatchings to juveniles (Sweeney et al. 1992), or on particular groups such as cuttlefish and squid (Okutami 1995), or octopuses (Norman 2003), or include species from a region, such as Guerra (1992) for Spanish waters and O'Shea (1999) for New Zealand. FAO 'Species synopses' focus on commercially valuable species such as those by Roper et al. (1984), Jareb and Roper (2005, 2010) and Jareb et al. (2016).

This checklist deals with cephalopods recorded from Brazilian waters (Figure 1). During the last six decades, five such lists have been published. Those by Rios (1975) and Palacio (1977) were mainly based on museum collections made by 19th Century naturalists such as d'Orbigny (1834-1845, 1845-1855), and by expeditions such as the U.S. Exploring Expedition (Gould 1852), the Challenger Expedition (Hoyle 1885, 1886), the Vettor Pisani Expedition (Jatta 1898, 1899), the Plankton Expedition (Pfeffer 1912), the Terra Nova Expedition (Massy 1916) and the Mercator Expedition (Adam 1937). These collections are held in several museums and have been catalogued by several authors, including Tryon (1879), Robson (1929a, 1929b), Robson (1931) and Pickford (1946, 1955). Other lists are by: Haimovici (1985) for the first edition of 'Seashells of Brazil' by Rios (editor); Haimovici and Perez (1991b) and Haimovici (1997) for southern Brazil; Haimovici et al. (1994) for the second edition of 'Seashells of Brazil' by Rios (editor); Haimovici et al. (2009) for the 'Compendium of Brazilian sea shells' by Rios (editor) and Vaske and Costa (2011). Recently, an illustrated field guide to octopuses from shallow Brazilian waters was published, using an innovative method of species identification based on photographs of animals in their natural habitat (Alvarenga et al. 2024).

Figure 1. Brazilian Exclusive Economic Zone (EEZ). Names of geographical zones and coastal States are included.

This annotated and illustrated list includes 93 species, of which seven are at the genus level only, recorded from Brazilian waters. Species are briefly described, mainly based on external characters, with information on their habitat and distribution. Images of live, freshly caught, or preserved specimens are given. This list updates the nomenclature and geographical distribution given in previous lists, and includes recently described species as well as unpublished records. Some misidentified species records have been corrected. A key for the identification of families, genera and species is included.

MATERIALS AND METHODS

The higher classification of recent cephalopods followed that of Young et al. (2019), in which the Subclass Coleoidea was divided into the Superorder Decapodiformes Leach, 1817, including the orders Spirulida, Sepiolida, Myopsida and Oegopsida, and the Superorder Octopodiformes Berthold and Engese, 1987, including orders Octopoda and Vampyromorpha. The nomenclature at the genus and species level of Decapodiformes followed that proposed by

Jereb and Roper (2005, 2010) and Jereb et al. (2016), unless otherwise specifically stated and commented. The nomenclature of Octopodiformes followed Gónzalez-Gómez et al. (2024) for the taxonomy of the Superfamily Octopodidea d'Orbigny, 1839 was organized according to Strugnell et al. (2014). Brief diagnoses of orders, suborders and families were given, with references to original descriptions or, when available, more detailed subsequent descriptions. For the purposes of this list, descriptions of genera and species were brief and based mainly on the most obvious external morphological characters, such as the shape and consistency of the mantle, the size of arms and tentacles, the number of suckers and hook rows, the shape of fins, skin pattern, coloration in living and preserved specimens. Size was expressed as either dorsal mantle length (ML) or total length (TL). For species with the body fused to the head, the length of the mantle was measured from the posterior end to the midline at eye level. Technical terms for morphological features frequently cited along the text were illustrated in Figure 2. Detailed descriptions of these and other cephalopods features can be consulted in Roper and Jereb (2005, 2010) and Jereb et al. (2016) available online. The bulk of this checklist consisted of species for which adult specimens were available for description. However, some records were from paralarvae and juveniles, which allowed for species identification. In addition, some records come from partially digested specimens and beaks of cephalopods in the stomach contents of marine mammals, fish, seabirds and shallow-water octopods from oceanic Brazilian islands (Santos and Haimovici 2001, 2002; Leite and Haimovici 2006; Leite et al. 2009; Vaske and Costa 2011; Sales et al. 2019).

Although most identifications were made at the species level, in a few cases only the genus could be determined. Some species were described based on characters of specimens from other geographical regions, which are unlikely to have a large distributional range, and the name included the abbreviation 'cf.' Latin for comparable. The abbreviation 'aff.' was used to indicate a resemblance or affinity to a known species, suggesting a close relationship but not necessarily the same species. In the diagnoses of the species, the maximum dorsal mantle length was given in cm when available in the literature. For species with uncertain maximum length, the size was given on a subjective comparison scale as follows: very small, small, medium-sized, medium to large, large, and very large species.

Images of most species were taken from recently caught and some preserved specimens by the authors. These were complemented with drawings or images available online of non- copyright sources such as 'The tree of life web project' (Young et al. 2019), FAO 'Cephalopods of the world catalogue' (Roper and Jereb 2005, 2010 and Jereb et al. 2016), Wikipedia or published in books and journal, for which, authorship was indicated in the captions of figures. Drawings of paralarvae by R. A. Santos were originally published in Haimovici et al. (2002) and Santos and Haimovici (2007). L. G. Fischer L. G. and W. Almeida processed all digital images. The identification key did not include the species of Chiroteuthidae and Histioteuthidae as few specimens were available for description and comparison.

RESULTS

The present list includes 93 species (Table 1). Eight groups of Coleoidea at ordinal and subordinal levels were recorded in Brazilian waters: 1 Spirulida, 6 Sepioidea, 6 Myopsida, 50 Oegopsida, 2 Bathyteuhida, 4 Octopoda Cirrata, 27 Octopoda Incirrata, and 1 Vampyromorpha. The distribution of the 93 species was analyzed by classifying each species in several classes according to four categories: habitat, oceanic realm, latitudinal range and geographic range (Table 2). The number of species per habitat showed a balance of the total species richness as 42 were benthic shelf and slope species, and 51 inhabited the water column, among which 10 were benthopelagic. Of all the 93 species, 42

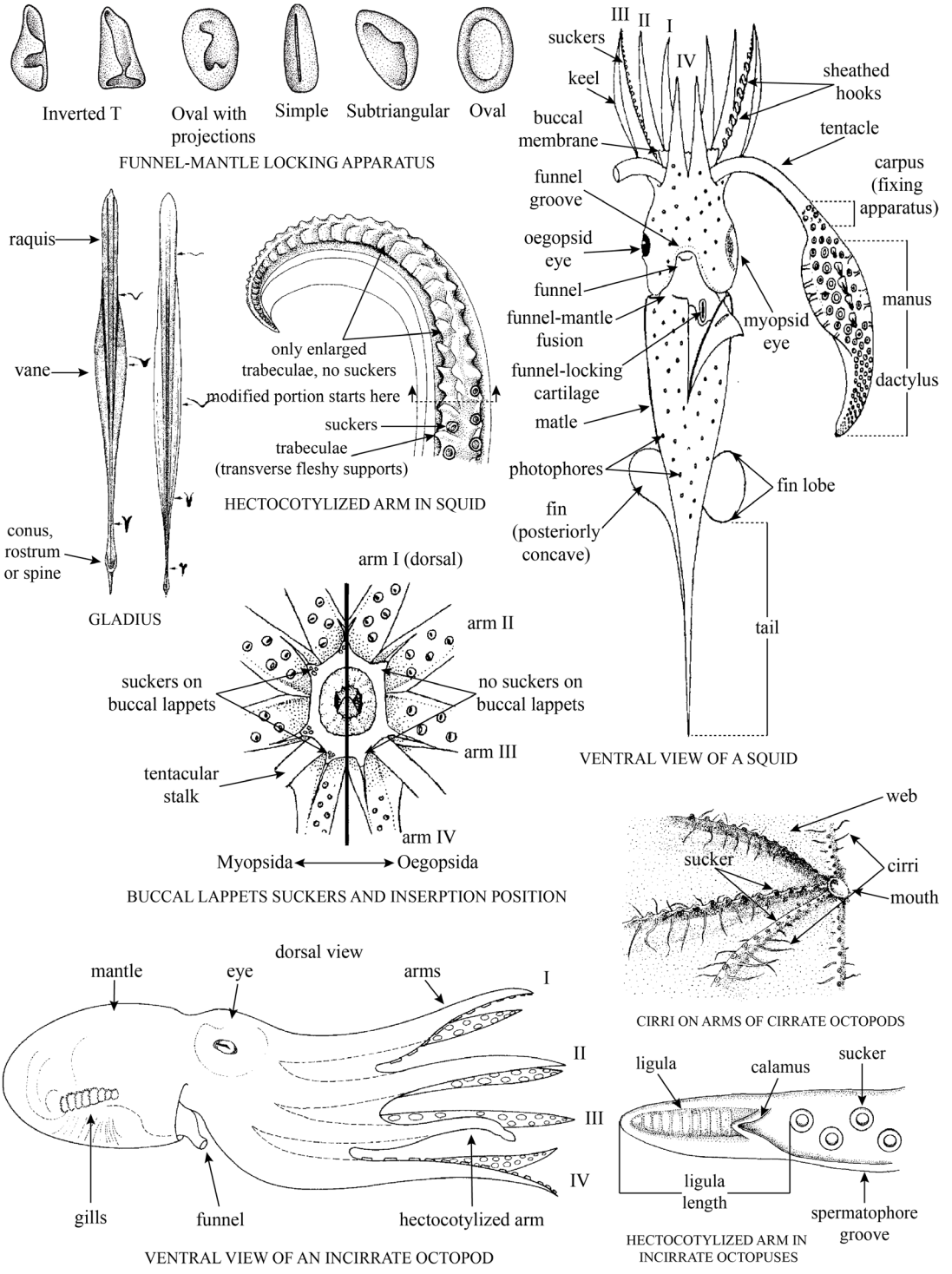


Figure 2. Frequent technical terms on squids and octopuses (adapted from Jereb and Roper 2010, 2016).

Table 1. List of cephalopods recorded from Brazilian waters.

Subclass Coleoidea Bather, 1888
Superorder Decapodiformes Leach, 1817
Order Spirulida Haeckel, 1896
Family Spirulidae Owen, 1836
Spirula spirula (Linnaeus, 1758)
Order Sepiolidea Naef, 1916
Family Sepiolida Keferstein, 1866
Subfamily Heteroteuthinae Appellöf, 1898
Heteroteuthis dagamensis (Robson, 1924)
Nectoteuthis pourtalesi Verrill, 1883
Subfamily Sepiolinae Appellöf, 1898
Rondeletiola minor (Naef, 1912)
Subfamily Rossinae Appellöf, 1898
Austrorossia sp. 1
Austrorossia sp. 2
Semirossia cf. *tenera* (Verrill, 1880)
Order Myopsida Naef, 1916
Family Loliginidae Lesueur, 1821
Doryteuthis pleii (Blainville, 1823)
Doryteuthis sanpaulensis (Brakoniecki, 1984)
Doryteuthis surinamensis (GL Voss, 1974)
Lolliguncula brevis (Blainville, 1823)
Sepioteuthis aff. *sepioidea* (Blainville, 1823)
Pickfordiateuthis pulchella GL Voss, 1953
Order Oegopsida d'Orbigny, 1845
Family Ancistrocheiridae Pfeffer, 1912
Ancistrocheirus lesueurii (d'Orbigny, 1842)
Family Architeuthidae Pfeffer, 1900
Architeuthis dux Steenstrup, 1857
Family Brachioteuthidae Pfeffer, 1908
Brachioteuthis aff. *riisei* (Steenstrup, 1882)
Family Chiroteuthidae Gray, 1849
Chiroteuthis mega (Joubin, 1932)
Chiroteuthis sp. 1
Chiroteuthis sp. 2
Grimalditeuthis bonplandi (Verany, 1839)
Family Cranchiidae Prosch, 1847
Subfamily Cranchiinae Pfeffer, 1912
Cranchia scabra Leach, 1817
Leachia atlantica (Degner, 1925)

Table 1. Continued.

Liocranchia reinhardti (Steenstrup, 1856)
Subfamily Taoniinae Pfeffer, 1912
Egea inermis Joubin, 1933
Helicocranchia pfefferi Massy, 1907
Liguriella podophthalma Issel, 1908
Megalocranchia maxima Pfeffer, 1884
Taonius pavo (Lesueur, 1821)
Family Cycloteuthidae Naef, 1923
Discoteuthis cf. *discus* Young and Roper, 1969
Family Enopoloteuthidae Pfeffer, 1900
Abraliopsis atlantica Nesis, 1982
Abraliopsis morisii (Verany 1839)
Abralia redfieldi GL Voss, 1955
Abralia veranyi (Rüppell, 1844)
Enoploteuthis anapsis Roper, 1964
Enoploteuthis leptura (Leach, 1817)
Family Histioteuthidae Verrill, 1881
Histioteuthis corona (NA Voss and GL Voss, 1962)
Histioteuthis macrohista NA Voss, 1969
Histioteuthis meleagroteuthis (Chun, 1910)
Family Lycoteuthidae Pfeffer, 1908
Subfamily Lycoteuthidae Pfeffer, 1908
Lycoteuthis lorigera (Steenstrup, 1875)
Selenoteuthis scintillans GL Voss, 1959
Family Mastigoteuthidae Verrill, 1881
Magnoteuthis inermis (Rancurel 1972)
Family Neoteuthidae Naef, 1921
Neoteuthis thielei Naef, 1921
Family Octopoteuthidae Berry, 1912
Taningia danae Joubin, 1931
Octopoteuthis cf. *megaptera* (Verrill, 1885)
Family Ommasterphidae Steenstrup, 1857
Subfamily Illicinae Posselt, 1891
Illex argentinus (Castellanos, 1960)
Illex coindetti (Verany, 1839)
Subfamily Ommastrephindae Steenstrup, 1857
Hyaloteuthis pelagica (Bosc, 1802)
Ommastrephes cylindraceus d'Orbigny, 1835
Ornithoteuthis antillarum Adam, 1957
Sthenoteuthis pteropus (Steenstrup, 1855)

Table 1. Continued.

Eucleoteuthis luminosa (Sasaki, 1915)
Subfamily Todarodinae Adam, 1960
Todarodes filippovae Adam, 1975
Family Onychoteuthidae Gray, 1849
Moroteuthopsis ingens (Smith, 1881)
Onykia robsoni (Adam, 1962)
Onychoteuthis banksii (Leach, 1817)
Family Pholidoteuthidae Adam, 1950
Pholidoteuthis adami GL Voss, 1956
Family Pyroteuthidae Pfeffer, 1912
Pyroteuthis margaritifera (Rüppell, 1844)
Pteryogioteuthis giardi Fischer, 1896
Family Thysanoteuthidae Keferstein, 1866
Thysanoteuthis rhombus Troschel, 1857
Order Bathyteuthida Young and Sweeney, 2004
Family Bathyteuthidae Pfeffer, 1900
Bathyteuthis sp.
Family Chtenopterygidae Grimpe, 1922
Chtenopteryx canariensis Salcedo Vargas and Guerrero-Kommritz, 2000
Superorder Octopodiformes Berthold and Engeser, 1987
Order Vampyromorpha Pickford, 1939
Family Vampyroteuthidae Thiele, in Chun, 1920
Vampyroteuthis cf. *infernalis* Chun, 1903
Order Octopoda Leach, 1818
Suborder Cirrata Grimpe, 1916
Family Opistoteuthidae Verrill, 1896
Opisthoteuthis agassizii Verrill, 1883
Family Cirroteuthidae Keferstein, 1866
Cirrothauma magna (Hoyle, 1895)
Cirroteuthis muelleri Eschricht, 1836
Stauroteuthis gilchristi Robson, 1924
Suborder Incirrata Grimpe, 1916
Superfamily Argonautoidea Naef 1912
Family Alloposidae Verrill, 1881
Haliphron atlanticus Steenstrup, 1861
Family Argonautidae Naef, 1912
Argonauta argo Linnaeus, 1758
Argonauta nodosus Lightfoot, 1786
Family Ocythoidae Gray, 1849
Ocythoe tuberculata Rafinesque, 1814

Table 1. Continued.

Family Tremoctopodidae Tryon, 1897
Tremoctopus violaceus Delle Chiaje, 1830
Superfamily Octopodoidea d'Orbigny, 1839
Family Amphitretidae Hoyle, 1886
Subfamily Amphitretinae Hoyle, 1885
Amphitretus pelagicus Hoyle, 1885
Subfamily Bolitaeninae Chun, 1911
Bolitaena pygmaea (Verrill, 1884)
Japetella diaphana Hoyle, 1885
Subfamily Vitreledonillinae Robson, 1932
Vitreledonella richardi Joubin, 1918
Family Eledonidae Grimpe, 1921
Eledone gaucha Haimovici, 1988
Eledone massyae GL Voss, 1964
Family Enteroctopodidae Strugnell, Norman, Vecchione, Guzik and Allcock, 2014
Muusoctopus oregonae (Toll, 1981)
Family Megaleledonidae Taki, 1963
Graneledone yamana Guerrero- Kommritz, 2000
Graneledone sp.
Vosseledone charrua Palacio, 1978
Family Octopodidae d'Orbigny, 1845
Amphioctopus burryi (GL Voss, 1950)
Lepidoctopus joaquini Haimovici and Sales, 2019
Macrotritopus cf. *defilippi* (Verany, 1851)
Octopus americanus Montfort, 1802
Octopus insularis Leite and Haimovici, 2008
Octopus hummelincki Adam, 1936
Paroctopus cthulu Leite, Lima, Lima and Haimovici, 2021
Paroctopus tehuelchus (d'Orbigny, 1834)
Scaeurgus unicirrhus (d'Orbigny, 1840)
Scaergus sp.
Pinnoctopus furvus (Gould, 1952)
Pteroctopus tetracirrhus (Delle Chiaje, 1830)

were known to inhabit oceanic waters and 41 on the continental shelf and slope, and only 10 to inhabit both realms. In terms of latitude, 65 species were known to occur only in tropical and subtropical waters, 18 in southwards temperate waters, and only 4 in subantarctic waters. Among these were the Argentine shortfin squid *Illex argentinus* and 3 benthic deep water dwelling species. Geographically, 40 species were reported from more than one of the three oceanic basins in the Atlantic, Indian and Pacific oceans, seven from the Atlantic Ocean and the Mediterranean Sea, and 30 from different

Table 2. Distribution of the 93 species recorded for Brazilian waters classified according to their known distribution range four ad hoc ecological criteria. SWA: southwestern Atlantic Ocean; Atl: Atlantic Ocean; Atl Med: Atlantic Ocean and Mediterranean Sea; 2 > basin: two or more oceanographic basins.

Habitat	Total	SWA	All Atl	Atl Med	2 > basins
Benthic	42	15	13	4	10
Benthopelagic	10		5	1	4
Water column	41	2	12	1	26
Oceanic realm					
Oceanic		12	42		30
Continental shelf	8	5	14	1	
Shelf and slope	3	2	16	1	
Slope	5	7	21	5	4
Slope and oceanic	1	4	9		6
Latitude range					
Reach subantarctic waters	4	1			3
Reach temperature	18	5	2		11
Tropical to subtropical only	65	9	25	5	26
No data	6	2	3	1	
Total	93	31	15	7	40
Geographical range					
More than one basin	40	10	26	4	
Atlantic and Mediterranean	6	4	2	1	
All Atlantic Ocean	29	14	12	5	
Southwestern Atlantic Ocean	16	14	1		
Total	93	42	41	10	

latitudes in the Atlantic Ocean. Only 17 species were endemic to the southwestern Atlantic Ocean.

DISCUSSION

The first lists of species of Brazilian cephalopods by Rios (1975), Palacio (1977) and Haimovici (1985) included at most 26 species from which several were formerly excluded, such as *Octopus lobensis* (Castellanos and Menni 1969), which was shown to correspond to *Paroctopus tehuelchus* (d'Orbigny, 1834) by Pujals (1984), and *Pareledone charcoti* (Joubin, 1905) and *Pareledone turqueti* (Joubin, 1905) identified from mislabeled specimens as having been collected in Brazilian waters (Scarabino 2003). The following lists by Haimovici et al. (1994) included 42 species; Haimovici et al. (2009) increased to 84 species, and the present

list attained 93 species. This significant increase is explained by the collection of data onboard bottom trawl surveys along southern and southeastern Brazil in the 1980s (Haimovici and Andriguetto 1986, Haimovici and Perez 1991a, 1991b; Perez and Haimovici 1993), reviews of Brazilian museum collections (Haimovici et al. 1989; Perez and Haimovici 1991a), pelagic and bottom-trawl surveys, on-board sampling in commercial fishing vessels or research surveys on the outer shelf and slope of the southern, southeastern, central and northeastern regions of Brazil in the early 2000's (Haimovici et al. 2002, 2007, 2008; Santos and Haimovici 2002, 2007; Perez et al. 2004), and diving along the northeastern and southeastern continental shelf and oceanic islands (Leite and Haimovici 2006; Alvarenga et al. 2024). Additionally to new records, several new species have been described since the 1960s, with detailed morphological descriptions, including *Eledone massyae* (Voss GL 1964), *Doryteuthis surinamensis* (Voss GL 1974), *Vosseledone charrua* (Palacio 1978), *Benthoctopus oregoneae* (Toll 1981), *Eledone gaucha* (Haimovici 1988), and *Lepidoctopus joaquini* (Haimovici and Sales 2019). Advances in the use of molecular biology contributed to the resolution of taxonomic and phylogenetic problems and raise to species taxons previously described based on specimens of other regions such as *Octopus insularis* (Leite et al. 2008), *Octopus americanus* Montfort, 1802 (Avedaño et al. 2020), *Ommastrephes cylindraeus* (Fernández-Álvarez et al. 2020); *Paroctopus cthulu*, Leite et al. (2021), and *Callistoctopus furvus* (Gould, 1852) re-described by Jesus et al. (2021).

The known cephalopod species richness of the Exclusive Economic Zone of Brazil is relatively high due to its large latitudinal range of over 8,000 km with an area of approximately four million square kilometers. The cephalopod fauna of Brazil is mainly composed of tropical and subtropical species (> 70%) but also includes 16% of species with a latitudinal distribution range including temperate regions as well as 4% reaching subantarctic regions, including the Argentine shorfin squid *Illex argentinus*, one of the most abundant cephalopods in the world and an important component of food webs along the continental slope along southern Brazil (Santos and Haimovici 2002). The endemism is rather low, with only 15 (16%) endemic to the southwestern Atlantic, two of which are presently recorded only from Brazilian waters: *Eldone gaucha*, and the recently described pygmy octopus *Paroctopus chthulu*. This last species has not been recorded in the northern Atlantic, suggesting that the Amazonian outflow may act as an effective barrier for shallow-water small benthic octopod species with benthic or semi-benthic hatchlings.

Despite the relatively high species richness of cephalopods along the Brazilian coast, only a few species are sufficiently abundant to be considered a relevant fishery resource, including *Octopus americanus* (Ávila-da-Silva et al. 2014), *Octopus insularis* (Haimovici et al. 2014), *Doryteuthis pleii* (Perez et al. 2002), *Doryteuthis sanpaulensis* (Costa and Haimovici 1990), and *Illex argentinus* (Haimovici et al. 2006). The conservation status of the cephalopod fauna along the Brazilian coastline was analyzed in the first evaluation of cephalopod endangered species by the Ministry of the Environment, published in 2024. No species were considered vulnerable or endangered, 40 species were classified as least concerned (LC) and six as data deficient (DD) ICMBIO (2024). Therefore, there are currently no conservation risks of cephalopods found along the Brazilian coast. However, the limited available knowledge on the life history of the species as well as the potential impacts of human impacts such as environment pollution and fishing is a risk in itself.

Several recent studies have identified undescribed lineages in many oceanic species of the Atlantic Ocean, e.g. Fernández-Álvarez et al. (2023). Therefore, it is expected that molecular studies may clarify their taxonomic status. Future data collections are expected to contribute to the description of new species, mainly bottom-dwelling octopods and sepiolids and genetically distinct species of loliginids from northern Brazil (Salas et al. 2024).

DIAGNOSES

Class Cephalopoda

Subclass Coleoidea Bather, 1888

Includes all living cephalopods except a few species of the Subclass Nautiloidea. Internal calcareous, chitinous or cartilaginous shell enveloped in tissue. One pair of gills. Tube-like funnel. Eight to ten circumoral appendages.

Superorder Decapodiformes Leach, 1817

Four pairs of arms and a pair of tentacles.

Order Spirulida Haeckel, 1896

Calcareous or chitinous shell. Ten circumoral appendages, tentacles retractile in pockets, suckers with chitinous rings; posterior fin lobes free, not connected at midline; eyes covered with a transparent membrane.

Family Spirulidae Owen, 1836

1. ***Spirula spirula*** (Linnaeus, 1758)
(Figure 3.1)

Diagnosis. Short and cylindrical body, surrounding almost completely a chambered calcareous shell coiled in a flat spiral, usually less than 2.5 cm in diameter with up to 40 chambers in adults. Arms short connected by a web, long retractile tentacles. Mantle thick not fused to the head, fins small kidney-shaped and a large photophore between the fins at the posterior tip of the body. Very small species, ML under 4.5 cm

Habitat and distribution. Mesopelagic-pelagic on continental and insular slopes, and adjacent oceanic waters in all oceans. Shells appear on beaches along all the Brazilian coast (Rios, 1975). Specimens caught with trawls at 600 to 1,700 m along central Brazil. Semi-digested specimens were found in the stomach contents of large pelagic fishes caught along northeastern Brazil (Palacio 1977; Perez and Haimovici 1991a; Vaske 2005; Haimovici et al. 2007).

Order Sepioidea Naef, 1916
Suborder Sepiolida Keferstein, 1866

Family Sepiolidae Leach, 1817

Shell chitinous or absent. Eight arms and two tentacles retractile in pockets, suckers with chitinous rings; posterior fin lobes free, not connected at midline; eyes covered with a transparent membrane. Very small to small animals, mantle length under 10 cm, mantle very short, lateral and semicircular fins not connected posteriorly, bob-tailed. Eight short arms with 2 to 4 rows of suckers; eyes covered with corneal membrane; internal gladius slender and thin, or absent.

Subfamily Heteroteuthinae Appellöf, 1898

Anterior ventral edge of the mantle extended covering the funnel from below. The dorsal side of the mantle fused or free from head. Fins large, 60-100% of mantle length. Gladius is absent.

2. ***Heteroteuthis dagamensis*** (Robson, 1924)
(Figure 3.2)

Diagnosis. Globular muscular mantle not fused with head on dorsal side. Ventral projections of the mantle reach the level of arm bases. Fins attached to the posterior half of the mantle, not reaching its anterior edge. Relatively long arms with two rows of suckers, arms II-III connected by deep membranes. Long retractile, whip-like tentacles with short clubs and eight rows of minute suckers. Males with three enlarged suckers in their 3rd arms. A large bilobulated luminous organ on the ventral side of the ink sac. Luminous mucus can be ejected through the funnel by muscular contractions so the animal can 'shoot fire'. Living animals have white fin bases and an iridescent metallic color on the head and mantle. Very small species, ML under 4 cm.

Habitat and distribution. Lower epipelagic-mesopelagic species in the tropical and subtropical Atlantic Ocean (Rotermund and Guerrero-Kommritz 2010). In Brazil it was recorded from Bahia to Rio Grande do Sul (Haimovici and Perez 1991b; Perez and Haimovici, 1993; Haimovici et al. 2007) as *Heteroteuthis dispar* (Rüppel, 1844).

3. ***Nectoteuthis pourtalesi*** Verrill, 1883
(Figure 3.3)

Diagnosis. Globular muscular mantle not fused with head on the dorsal side. The anterior edge of the mantle reaches the level of arm bases. Fins are large, attached to the middle of the mantle and extend beyond the anterior edge of the mantle. Luminous organ on the ventral side of the ink sac. Suckers in the distal part of the arms with long thick stalks, thicker than the suckers themselves. Tentacles with narrow clubs and small suckers. Very small species, a single specimen under 3 cm ML was recorded from central Brazil

Habitat and distribution. Epi-mesopelagic species recorded in the western Atlantic Ocean from Florida to Bahia, in central Brazil (Nesis 1982; Arocha 1991; Okutami 1995; Haimovici et al. 2007).

Subfamily Sepiolinae Appellöf, 1898
Anterior edge of the mantle fused with the head.

4. ***Rondeletiola minor*** (Naef, 1912)
(Figure 3.4 a and b)

Diagnosis. Mantle short, rounded and fused to the head dorsally. Short kidney-like fins, much shorter than the mantle. A membrane does not connect the arms I and II, arms III bend inwards toward the mouth in males, and tentacles with 16 series of suckers in the club. One large conspicuous photophore in the anterior part of the ink sac. Very small species, ML under 2.5 cm, with the ventral anterior part of the mantle not covering the funnel.

Habitat and distribution. Usually benthic inhabiting on the upper slope, reproductive adults may rise to the near surface layer. Formerly known from the Mediterranean Sea and tropical and subtropical eastern Atlantic Ocean (Nesis 1999). A single specimen was collected in southern Brazil (Haimovici et al. 2008).

Subfamily Rossinae Appellöf, 1898
Anterior edge of the mantle not fused with the head dorsally and not extended ventrally. Gladius present. Ink sac present without luminous organs. Left or both dorsal arms hectocotylized; gladius present.

Note. The taxonomic status of specimens of the Subfamily Rossinae collected along Brazil was based on descriptions from the Gulf of Mexico and the northwestern Atlantic. However, following the key for Sepiolidae in Jereb and Roper (2005) our specimens were classified as *Autorossia* mainly based on tentacular clubs not expanded, with transverse rows of minute suckers. These species are currently the subjet of a comparative morphological and molecular study.

5. ***Austrorossia*** sp. 1
(Figure 3.5)

Diagnosis. The mantle is almost as wide as long. Semicircular rounded fins are longer than wide and do not reach the anterior edge of the mantle, reduced chitinous gladius. Ink sac present without luminous organs. Arms with two rows of globose suckers. Both dorsal arms are hectocotylized modified with a glandular crest extending over the entire arm length. Tentacular club not widened nor curved with around ten transversal rows of small rounded suckers. Dorsal mantle greyish in living animals. Small species, ML under 10 cm.

Habitat and distribution. Benthic species in the upper and mid-slope. Recorded from central Brazil (Haimovici et al. 2007, 2009) as *Rossia bullisi* Voss GL, 1956.

6. ***Austrorossia*** sp. 2
(Figure 3.6)

Diagnosis. Mantle is almost as wide as long. Large, rounded fins do not reach the anterior edge of the mantle. Reduced chitinous gladius. Ink sac present without luminous organs. Arms with two rows of elongated barrel shaped-suckers. Both dorsal arms are hectocotylized modified with a glandular crest extending over the entire arm length. Long tentacular club not widened nor curved with around ten transversal rows of small, rounded suckers. Dorsal mantle reddish brown with a non-pigmented strip along the anterior border. Small species, ML under 10 cm.

Habitat and distribution. Benthic species in the upper and mid-slope. Recorded from southern Brazil by Perez et al. (2004) and central Brazil by Haimovici et al. (2007, 2009) as *Rossia tortuagensis* Voss GL (1956).

7. ***Semirossia* cf. *tenera*** (Verrill, 1880)
(Figure 3.7)

Diagnosis. Mantle is almost as wide as long, not fused to the head with large, rounded fins. Reduced chitinous gladius. Eye covered by a membrane. Arms moderately long, with two rows of globose suckers much enlarged in the midsection. The left dorsal arm is hectocotylized. Tentacular clubs expanded with a swimming keel and six to seven rows of small suckers, the dorsal twice as larger than the ventral ones. Pinkish to maroon coloured in life. Small species, observed specimens up to 5 cm ML.

Note. The taxonomy of this species is unresolved; COI sequences of specimens identified in Brazil differ from a sequence of one *Semiossia patagonica* (Smith, 1881) from southern Chile (Kawashima et al. 2013, GenBank NC_016425) and also from one attributed to *Semirossia tenera* from the northwestern Atlantic (Nishiguchi et al. 2004, Gene Bank AY426436).

Habitat and distribution. Benthic species. In Brazil this species was recorded on muddy bottoms of continental shelf and upper slope from the Southern to the northeastern regions (Haimovici and Andriguetto 1986; Haimovici and Perez 1991a; Perez and Haimovici 1991a; Haimovici et al. 2007).

8. ***Doryteuthis pleii*** (Blainville, 1823)
(Figure 4.8)

Diagnosis. Mantle long and slender. Fins rhomboidal with sides straight. Gladius with a wide raquis and narrow vane. Colour dark reddish brown dorsally, especially along the mantle dorsal midline. In adult males, yellow longitudinal lateral stripes and cutaneous ridge along the ventral midline. Small to middle sized species, ML of females to 22 cm and males to 35 cm. For full description see Migliavacca and Simone (2020).

Habitat and distribution. Neritic species distributed along the western Atlantic Ocean between New Jersey and Rio Grande do Sul, exceptionally reaching Mar del Plata, Argentina. In Brazil, fished from Rio de Janeiro to Santa Catarina in coastal artisanal fisheries and by industrial trawlers. Frequent as by-catch in shrimp trawling fisheries (Costa and Haimovici 1990; Haimovici and Perez 1991a; Perez and Haimovici 1991a; Perez et al. 2002; Sales et al. 2017).

9. ***Doryteuthis sanpaulensis*** (Brakoniecki, 1984)
(Figure 4.9)

Diagnosis. Mantle moderately long, cylindrical, with posterior end pointed, rhomboid fins, usually more than half the mantle length. Big eyes. Gladius with narrow rachis and wide vane. Reddish brown, darker dorsally and less pigmented ventrally. Small species ML up to around 20 cm (Brakoniecki 1984; Migliavacca and Simone 2020).

Habitat and distribution. Neritic species from the southwestern Atlantic Ocean fom Espírito Santo, Brazil, to the Argentine Patagonia. Common in

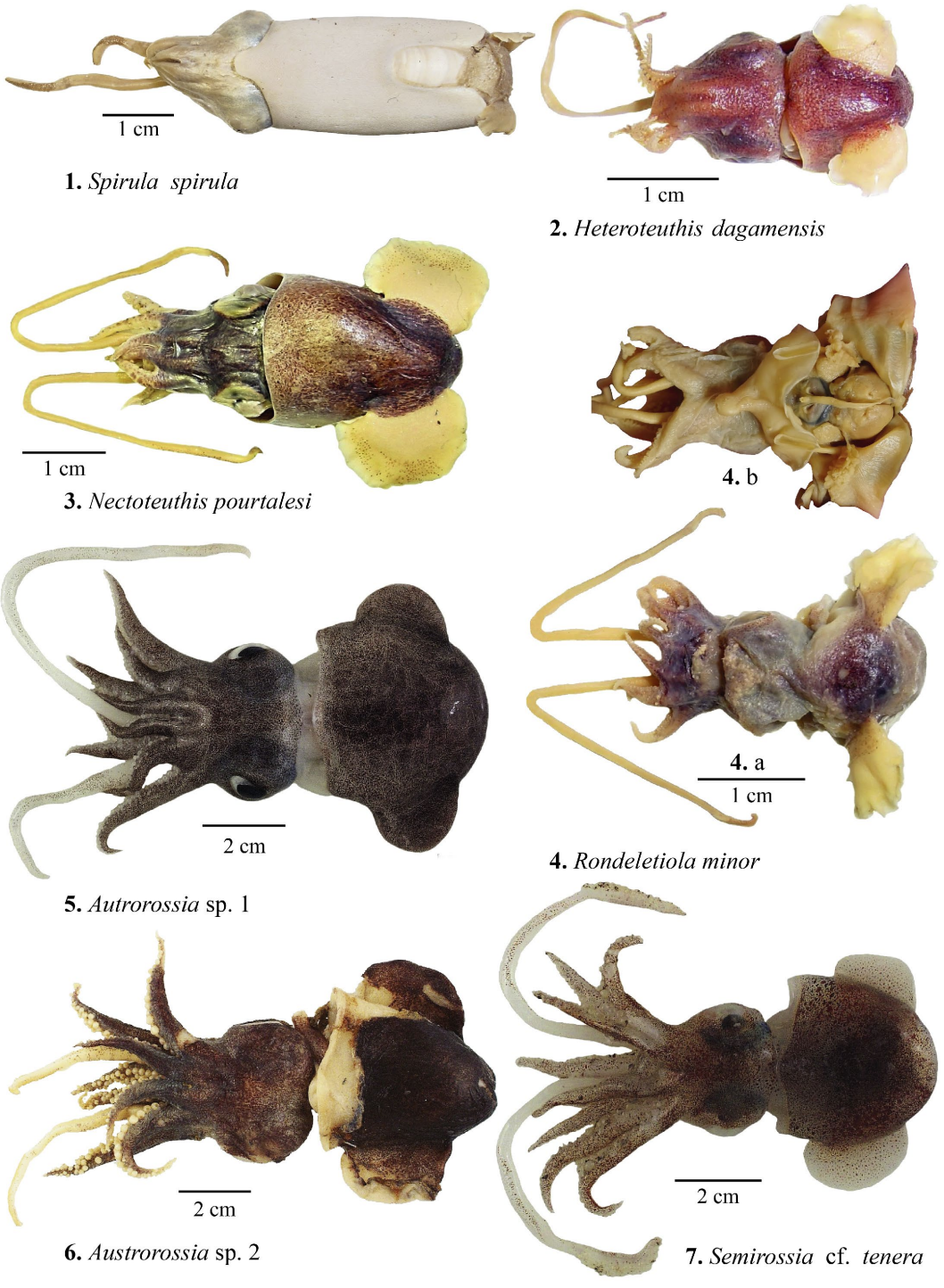


Figure 3. Species of the families Spirulidae and Sepiolidae from Brazil: dorsal views of habitus taken from fresh or preserved adult specimens. 4 a: ventral view. 4 b: dorsal view. 6: ventral view. 1-7 from Haimovici et al. (2007).

coastal waters up to 100 m (Juanicó 1979) as *Loligo brasiliensis* Blainville, 1823 (Haimovici and Andriguetto 1986; Costa and Haimovici 1990; Perez and Haimovici 1991a; Ré 2007; Vidal et al. 2013).

10. ***Doryteuthis surinamensis*** (GL Voss, 1974) (Figure 4.10)

Diagnosis. Mantle moderately broad. Eyes are not large. Fins rhomboidal, about 50-55% of mantle length. More than 15 suckers on all buccal lappets, usually 40-60. Tentacular clubs expanded, with 38 to 40 transverse rows of suckers. Arms are relatively long. Left arm IV of male hectocotylized. Small species, ML up to 20 cm (Voss GL 1974a).

Habitat and distribution. Neritic species in the western Atlantic Ocean from the southern Caribbean Sea to the mouth of the Amazonas River (Palacio 1977; Haimovici et al. 1994; Sales et al. 2013).

11. ***Lolliguncula brevis*** (Blainville, 1823) (Figures 4.11 and 20.94)

Diagnosis. Mantle stout, blunt, rounded posteriorly, wider in midpoint. Fins are broad, wider than long, and ellipsoid in shape. Small oval eyes. Arms short, unequal in size, fourth arm very short, long tentacles. Left arm IV of male hectocotylized. Lightly coloured mantle. Small species, reported ML up to 12 cm for females and 8 cm for males

Note. Nominal *Lolliguncula brevis* includes at least two distinct species, one in the northern hemisphere and the other in the southern hemisphere (Simone 1997; Zaleski et al. 2012; Sales et al. 2014; Costa et al. 2021).

Habitat and distribution. Neritic species restricted to shallow coast and estuarine waters. Tolerates low salinities and temperatures between 15 °C and 32 °C. In Brazil, it occurs in the vicinity of estuaries in Brazil from Amapá to Santa Catarina (Palacio 1977; Perez and Haimovici 1991a).

12. ***Sepioteuthis* aff. *sepioidea*** (Blainville, 1823) (Figures 4.12, 20.95 and 20.96)

Diagnosis. Mantle broad, widest at the anterior opening, blunt posterior end. Fins occupy almost the length, elliptical to sub-rhomboidal, with a width of about 65% of the mantle length. Purplish brown strongly pigmented dorsally. Small species, ML up to around 20 cm.

Habitat and distribution. Tropical shallow water species associated with coral reefs and *Thalassia* grass flats in the western Atlantic Ocean from Bermuda, Florida, W. Indies. In Brazil, recorded from northeastern Brazil to Rio de Janeiro (Voss GL 1974b; Begossi and Duarte 1988; Haimovici et al. 1989; Vaske 2005; Haimovici et al. 2007). Genetic and coloration patterns differ between the specimens from the Caribbean Sea and South America (pers. obs. T Silva Leite).

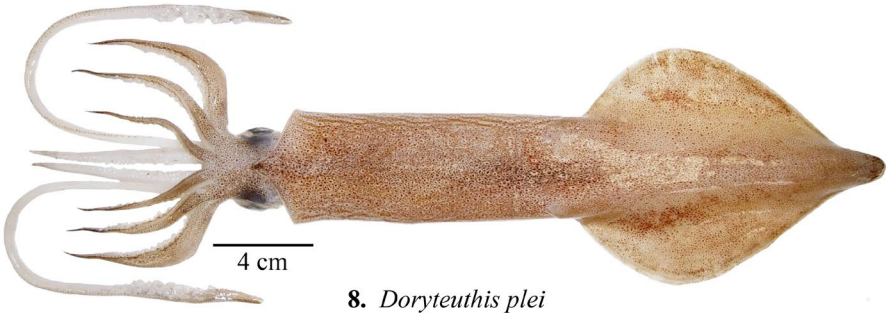
13. ***Pickfordiateuthis pulchella*** GL Voss, 1953 (Figure 4.13)

Diagnosis. Mantle short and cylindrical. Head is almost as wide as the mantle. Prominent eyes. Short and stout arms, two rows of suckers on arms and two rows in the manus of the tentacular clubs. Large bright red, brown and yellow chromatophores on the mantle, head and limbs. The fins are large, longer than wide, kidney-shaped, attached dorsolaterally half of their length, and posterior border convex. Fins colorless. Very small species, ML under 3 cm. Eggs are large and benthic.

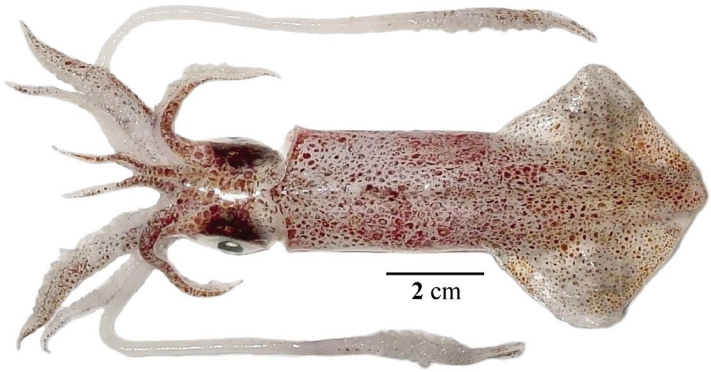
Habitat and distribution. Shallow waters of the western Atlantic in grass flats from Florida to São Paulo. In Brazil, recorded for Rio Grande do Norte, Rio de Janeiro and São Paulo (Haimovici et al. 1989; Perez and Haimovici 1991a).

Suborder Oegopsida Orbigny, 1845

Absence of corneal membrane over the eyes. Species of this suborder inhabit open sea from the

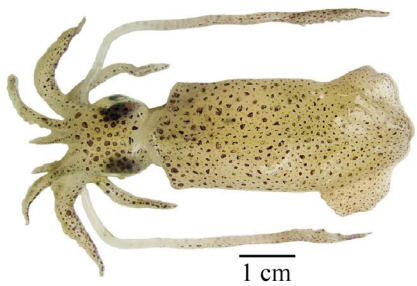


8. *Doryteuthis plei*

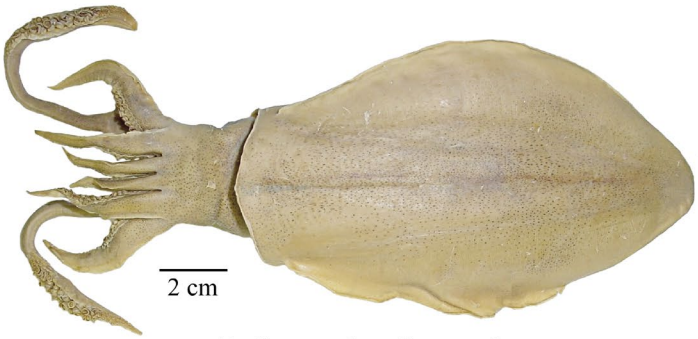


9. *Doryteuthis sanpaulensis*

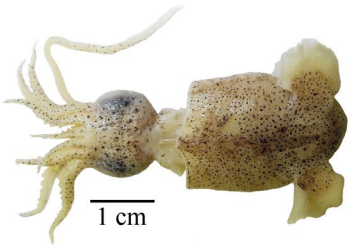
10. *Doryteuthis surinamensis*



11. *Lolliguncula brevis*



12. *Sepioteuthis* aff. *sepioidea*



13. *Pickfordiateuthis pulchella*

Figure 4. Species of the Family Loliginidae from Brazil: dorsal views of habitus taken from fresh or preserved adult specimens. 8-13 from Haimovici et al. (2009).

surface to great depth. Group very diverse in families and exhibits a wide variety of forms.

Family Ancistrocheiridae Pfeffer, 1912

14. ***Ancistrocheirus lesueurii*** (d'Orbigny, 1842)
(Figure 5.14 a and b)

Diagnosis. Mantle conical, long and broad forming a tail, passing over the posterior edge of fins. Fins thick, rhomboidal, long, about 70-80% the mantle length, width about 80% the mantle length. Photophores on the ventral side of the mantle, arranged in transverse rows. Tentacle robust, with 12 photophores along the stalk; clubs unexpanded with a distinct carpal claster; manus with two rows of hooks, the 7th or 8th of the ventral row being larger than the 8th of dorsal row. Arms robust, relatively short with two rows of hooks. Medium-sized species, ML up to around 40 cm.

Note. A review in Young et al. (1998), more than one species of this formerly monospecific genus may occur in the Atlantic Ocean (Fernández-Álvarez et al. 2023).

Habitat and distribution. Cosmopolitan epi-mesopelagic oceanic species in tropical and temperate waters (Nesis 1999). Semi-digested specimens and paralarvae were recorded from northeastern to southern Brazil (Santos and Haimovici 2001; 2002; Haimovici et al. 2002; Perez and Haimovici 2003; Vaske 2005; Ortiz et al. 2024).

Family Architeuthidae Pfeffer, 1900

Note. Several species of *Architeuthis* were described for different regions, however, the genetic analysis of specimens collected in different oceans strongly suggest that all pertain to a single species with a worldwide distribution (Winkelman et al. 2013).

15. ***Architeuthis dux*** (Steenstrup, 1857)
(Figures 5.15 and 20.97)

Diagnosis. Mantle is muscular and narrow, posteriorly acuminate and attenuate into a short tail. Fins are small and semi-round at the posterior end of the mantle. Absence of photophores. Locking cartilage is simple. Gladius has a short and broad rachis and a small terminal cone. Arms very long with two rows of suckers. Tentacles are extremely long, with four rows of suckers. Fixing apparatus runs along the tentacular stalk over almost the entire length. Both arms IV are hectocotylized. Very large squid, ML up to over 200 cm.

Habitat and distribution. Meso-bathypelagic species. Frequently found stranded worldwide. In Brazil, specimens were recorded from off Santa Catarina (Arfelli et al. 1991; Martins and Perez 2009) and unpublished records all along the Brazilian coast. Beaks were identified from the stomach contents of the blue shark *Prionace glauca* (Santos and Haimovici 2002).

Family Brachioteuthidae Pfeffer, 1908

Small nektonic squids with a thin, narrow, weakly muscular elongated mantle, posteriorly pointed. Relatively short terminal rhomboidal or heart-shaped fins. Head small. The Funnel- mantle locking apparatus is a simple straight grove. Arm crown stalk absent. Buccal connectives attach to the ventral borders of the arms IV. Arms with two rows of suckers. Numerous rows of small suckers on the proximal portion of the tentacular clubs. Paralarvae with characteristic long, slender necks.

16. ***Brachioteuthis* aff. *riisei*** (Steenstrup, 1882)
(Figure 5.16 a and b)

Diagnosis. Fin length 35-50% of mantle length, width 45-60% of mantle length. Mantle with scarce chromatophores. Neck of moderate length. Eyes directed forward and laterally. Eyes photophores absent or present. Small species, ML up to 17 cm (Sweeney et al. 1992).

Note. Although some authors consider a single

species to occur worldwide, others suggest several geographic structured species (Young et al. 2019).

Habitat and distribution. Epi-mesopelagic recorded in temperate waters of the southern Atlantic Ocean (Nesis 1982). In Brazil, paralarvae were recorded in southern Brazil (Santos and Haimovici 2007).

Family Chiroteuthidae Gray, 1849

Medium sized squids with a semi-gelatinous body. Mantle conical or sac-like, attenuated into a thin and long tail, only preserved in paralarvae and juvenile. Funnel-mantle locking apparatus specialized. Head long and narrow. Fins rounded, small to medium. The arms IV structures are generally greatly different from those of other arms, and are much broader and longer than the other, covered with several small suckers, often arranged in one row or present only in the basal part. Tentacles are long, several times the mantle length, with a slender stalk, and usually with a widened club with 4-6 rows of suckers. Presence of photophores on eyeball, ink sac, arms IV and on the end of the club. Some forms are without photophores. Secondary fins may be present in the paralarvae and juveniles of some species. Hectocotylus absent. Development is generally with conspicuous metamorphosis (Nesis 1982; Sweeney et al. 1992).

17. ***Chiroteuthis mega*** (Joubin, 1932)
(Figure 5.17)

Diagnosis. Mantle is narrow and cylindrical in the posterior part, passing beyond the posterior edge of the round fin, not fused with the head. Funnel locking cartilage oval with projecting tragus and antitragus. Arm IV is longer and broader than others. Photophores along the arm IV. No photophores on the ink sac. Photophores on the ventral side of eyeballs in three parallel bands. Club very long and narrow along its entire length, in adult specimens as long as mantle length. Arm suckers non-globular, but helmet shaped with 14-24 sharp thin teeth. Small to medium sized squids (Nesis 1982; Sweeney et al. 1992).

Habitat and distribution. Meso-bathypelagic in the tropical and subtropical Atlantic Ocean (Nesis 1982). Specimens recorded as *C. capensis* were caught with trawls at 600 to 1,700 m along central Brazil (Haimovici et al. 2007). *Chiroteuthis capensis* is only known from South Africa and its distribution is not well known.

18. ***Chiroteuthis*** sp. 1
(Figure 5.18)

Diagnosis. Mantle wide and conical extending somewhat farther than the posterior edge of fin, not fused with head. Funnel-mantle locking apparatus oval with projecting knobs. The arms IV are widest, with 30-35 photophores along the suckers. Two photophores on an ink sac. 11-12 photophores on the ventral side of eyeballs in two parallel bands. Clubs widened with protective membranes divided into a proximal with 11 trabeculae and a distal part with about 20 trabeculae. Diameter of suckers in the middle of arm III exceedingly not more than twice the diameter of the suckers of arm IV. Globular suckers, in arms II and III, with 8-12 blunt or rounded teeth. Small to medium-sized squids (Nesis 1982). Adult sizes unknown.

Note. The species have a similarity with *C. spoeli* from the waters of Somalia (Salcedo-Vargas 1996).

Habitat and distribution. Meso-bathypelagic in tropical Atlantic Ocean. Specimens were fished with trawls at 600 to 1,700 m along central Brazil (Haimovici et al. 2007).

19. ***Chiroteuthis*** sp. 2
(Figure 5.19)

Diagnosis. Mantle elongated, sub-cylindrical, large ovoid fin. Head narrow and eyes moderate in size (21% ML). Mantle-locking cartilage with depression indicates the presence of tragus in the funnel cartilage. Funnel cartilage is missing. Arm IV is longest, but not longer than ML. Arm IV is not

wider than other arms. Evidence of photophores along arm IV. Suckers are small (1.5 mm) and similar in all arms, with no evidence of enlarged suckers.

Note. The examined specimen resembles *Chiroteuthis mega* in some characters, but differs in the sucker morphology, arms indices, and fins size and shape. No evidence of eye photophores was found. Tentacles were missing. Adult sizes unknown

Habitat and distribution. Meso-bathypelagic in tropical Atlantic Ocean. A single specimen was fished with trawls at 600 to 1,700 m along central Brazil (Haimovici et al. 2007).

20. ***Grimalditeuthis bonplandi*** (Verany, 1839)
(Figure 5.20)

Diagnosis. Middle-sized squids. Narrow gelatinous conical mantle extending into a long tail. Fins rounded about 50% of mantle length, followed by a secondary fin heart-shaped, on a long tail. The head is narrow, and the funnel is fused with a mantle, but not with the head in the occipital area. Eyes small, smaller than those of chiroteuthids. Arms long and slender with two rows of suckers. Sucker stalks with two or three conical cartilaginous papillae. Suckers with 10-14 pointy teeth. Arms of similar length, and as long as mantle. In adults, one elongated dark photophore on the end of the arms. (Hoving et al. 2013; Young et al. 2019). Small species ML up to 25 cm.

Habitat and distribution. Meso-bathypelagic in the tropical and subtropical Atlantic and northern Pacific oceans (Nesis 1982). Semi-digested animals were identified from stomach content of *Alepisaurus ferox* (Vaske 2005).

Family Cranchiidae Prosch, 1847

Small to giant squids with slender, coriaceous or semi-gelatinous mantle fused with funnel and head in the occipital area. Mantle surface is smooth or covered with cartilaginous tubercles and there is spacious coelom with a considerable quantity of NH4Cl solution. Fins of very different shapes and do not exceed 60% of mantle length. Head short and narrow with big eyes. Arms with 2 rows of suckers. Long tentacles with slightly widened club and 4 rows of suckers, sometimes modified into hooks. Tentacle fixing apparatus developed. Photophores present on eyeballs, sometimes on arm ends and on the liver. This family displays special 'larval' stages characterized by stalked eyes and a short to long arm-crown stalk (Voss NA 1980; Nesis 1982; Voss NA et al. 1992a).

Subfamily Cranchiinae Pfeffer, 1912

Two or four rows of hyaline stripes covered with cartilaginous tubercles with a specific regular sequence present on the anterior edge of the ventral side of the mantle. Numerous photophores around eyeballs as a ring or two arcs. Fins round, not extending into a long tail. One ventral arm hectocotylized.

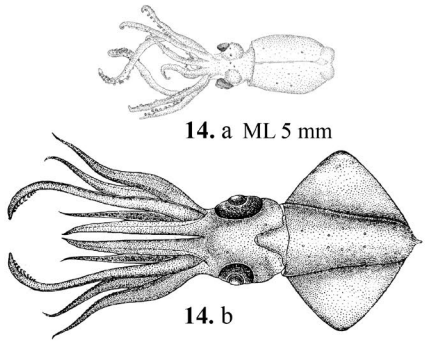
21. ***Cranchia scabra*** Leach, 1817
(Figure 6.21)

Diagnosis. Mantle and dorsal fins surface covered by cartilaginous tubercles, whose tops have 3-5 spines. Mantle barrel-shaped. Fins are small and round. 14 photophores on eyeballs. A large photophore on the end of all arms in adult females. Funnel valve present. Small species, ML up to 15-20 cm (Nesis 1982).

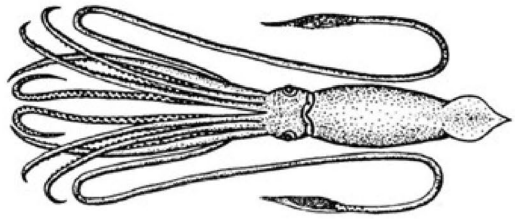
Habitat and distribution. Juveniles epi-mesopelagic, adults meso-bathypelagic (Nesis 1999). Cosmopolitan in tropical to subtropical waters.

22. ***Leachia atlantica*** (Degner, 1925)
(Figure 6.22 a and b)

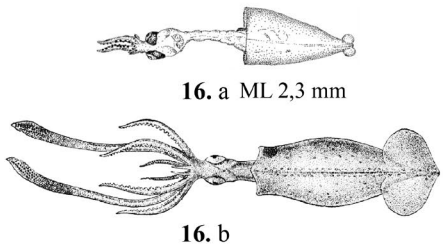
Diagnosis. Ventral surface of mantle with one tubercular cartilaginous stripe from each anterior apex of funnel-mantle fusion shorter than 20%



14. *Ancistrocheirus lesueurii*

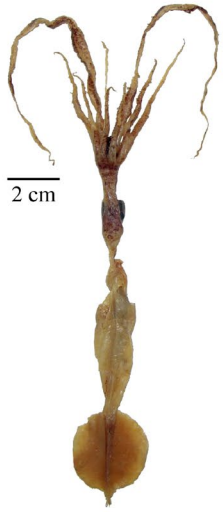


15. *Architeuthis dux*

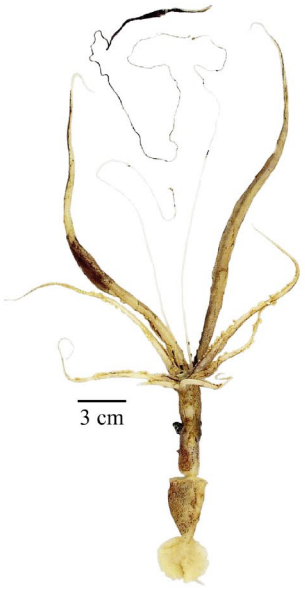


16. *Brachioteuthis* aff. *riisei*

19. *Chiroteuthis* sp. 2



17. *Chiroteuthis mega*



18. *Chiroteuthis* sp. 1

20. *Grimalditeuthis bonplandi*

Figure 5. Species of the families Ancistrocheiridae, Architeuthidae, Branchiteuthidae and Chiroteuthidae from Brazil: habitus of fresh or preserved specimens. 14 a: paralarva. 14 b: adult. 15: adult. 16 a: paralarva. 16 b: adult dorsal view. 19 and 20: dorsal views. 14 a and 16 a from Haimovici et al. (2002). 14 b from Guerra (1992). 15 from Nesis (1982). 16 b by Hudson R, in Wikipedia. 17-19 from Haimovici et al. (2007). 20 by Chun (1910), in Wikipedia.

ML. Fin length 20-30% ML. In juveniles 5-6 photophores on eyeballs and tubercular stripes with 7-8 large, rosette-shape tubercles with intervening small tubercles. Small species, ML up to 15-20 cm (Nesis 1982).

Habitat and distribution. Juveniles epipelagic, adults meso-bathypelagic (Nesis 1999; Voss NA et al. 1992). Tropical and subtropical Atlantic Ocean. Found in plankton samples along the Brazilian coast by Haimovici et al. (2002) and Santos and Haimovici (2007) and in stomach contents of oceanic predators by Vaske (2005) and Vidal et al. (2008).

23. ***Liocranchia reinhardti*** (Steenstrup, 1856)
(Figure. 6.23 a and b)

Diagnosis. Mantle with a pair of hyaline stripes of tubercles with a 'V' inverted shape and tubercles also present along the mantle dorsal median line. 14 photophores on the eyeballs. A large photophore on the end of arms III in mature females. Small species, ML up to 20-25 cm.

Habitat and distribution. Tropical and subtropical cosmopolitan meso-bathypelagic species (Nesis 1982). Young specimens were found in southern and northeastern Brazil (Haimovici et al. 2002, 2007; Vaske 2005; Santos and Haimovici 2007).

Subfamily Taoniinae Pfeffer, 1912

No hyaline stripes with cartilaginous tubercles, only separate tubercles may be found at the mantle fusion sites. One or two (rarely 3) photophores on the ventral side of eyeballs. Fins of different shape, but not round, sometimes mantle extending into a long tail. There is no true hectocotylus.

24. ***Egea inermis*** Joubin, 1933
(Figure 6.24 a and b)

Diagnosis. Mantle attenuated into a long acuminate tail. Fins elongate lanceolated. Arm short with no conspicuous enlarged suckers. Funnel valve present. Tentacular club without hooks. Large photophores on ends of arms in adult females. No photophore on the digestive gland. In juveniles mantle elongate, spindle-shape. Fins small, terminal paddle-shaped with a diamond-shaped lanceola. Head with short, stout arm crown stalk. Eyes oval on short to medium stalks. Tentacles are narrow and long, with 2 rows of carpal suckers, passing to 4 rows. Midium-sized species, ML up to 42 cm (Voss NA 1974c)

Habitat and distribution. Epi-bathypelagic, circumglobal in tropical and equatorial waters (Nesis 1982; Voss NA et al. 1992a). Juveniles were collected along central Brasil (Haimovici et al. 2007) and paralarvae in southern Brazil (Ortiz et al. 2024).

25. ***Helicocranchia pfefferi*** Massy, 1907
(Figure 6.25)

Diagnosis. Mantle gelatinous not attenuated into a long tail, without cartilaginous tubercles. Fins short paddle- or tongue shaped. Funnel very large covering the side of the head and passing the bases of arms IV, without a valve. One large photophore on the ventral side of eyeballs. Small species, ML up to 8 cm.

Habitat and distribution. Epipelagic (juveniles) to mesopelagic in tropical and subtropical waters including (Nesis 1982). Paralarvae were found on slope of northeastern Brazil (Santos and Haimovici 2007).

26. ***Liguriella podophthalma*** Issel, 1908
(Figure 6.26 a and b)

Diagnosis. Mantle does not attenuate into a long tail, 2 small cartilaginous tubercles on anterior mantle- funnel fusion sites. Fins short semi-circular almost forming a circle, with big lanceola. Funnel reaches the bases of arms IV, without a

valve. Arms moderately long with enlarged suckers on the distal part of lateral arms. Tentacular club without hooks. Two photophores on eyeballs. In juveniles mantle stout, spindle-shape. Fins paddle-shaped and become oval with growth with a diamond-shaped lanceola on the dorsal mantle end. Eyes oval on long stalks. Tentacles are moderately long, widening on the distal part. Small species, ML up to 24 cm.

Habitat and distribution. Epipelagic (paralarvae) and mesopelagic (adults) with a circumglobal distribution in subtropical and temperate waters of the southern hemisphere (Nesis 1999). Only juveniles were found in Brazil on the continental slope and oceanic waters from northeastern to southern region (Haimovici et al. 2002, 2007; Santos and Haimovici 2007; Ortiz et al. 2024).

27. ***Megalocranchia maxima*** Pfeffer, 1884
(Figure 6.27 a and b)

Diagnosis. Large squids with mantle attenuate into a long acuminate tail. Fins long lanceolate. Greatly enlarged suckers in distal part of arms III. Funnel valve present. Tentacular club without hooks. Large photophore on the ends of arm III or first three arms in adult females. Two large bilobulated photophores on the liver. Juveniles with small terminal fins, long tentacles, long arm-crown stalks on head, and oval eyes on long stalks. Large species, adult ML up to 80 cm.

Habitat and distribution. Mesopelagic species, circumgloball in equatorial, tropical and subtropical waters (Sweeney et al. 1992). Adult specimens were caught with trawls at 600 to 1,700 m along central Brazil (Haimovici et al. 2007). Beaks found in stomach contents of marine mammals and large oceanic fishes (Santos and Haimovici 2001; Vaske 2005).

28. ***Taonius pavo*** (Lesueur, 1821)
(Figure 7.28 a and b)

Diagnosis. Mantle gelatinous attenuated into a long acuminate tail without cartilaginous tubercles. Fins long with anterior edges attached dorsally. Arms short. Funnel very large without a valve. Tentacular club without hooks. No photophore on arms or liver. Midium-sized species, ML up to 40-45 cm.

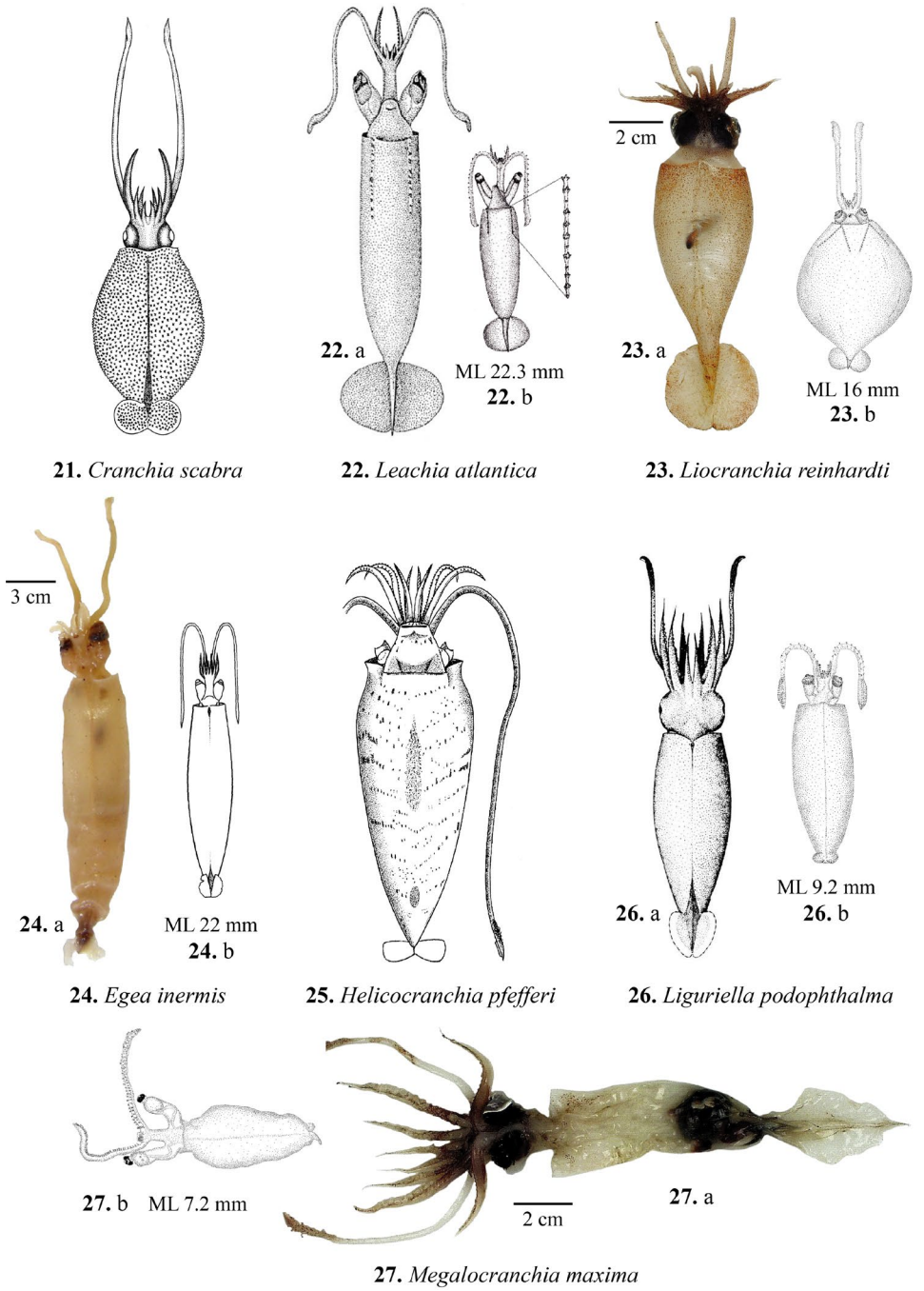
Habitat and distribution. Mesopelagic, widely distributed in the Atlantic Ocean from the northern to the southern convergence zones (Voss NA et al. 1992a; Nesis, 1999). Beaks and a semi-digested specimen attributed to this species were found in the stomach contents of large pelagic fishes along northeastern Brazil (Vaske 2005; Vaske et al. 2009a).

Family Cycloteuthidae Naef, 1923

Medium sized squids with widely conical semi gelatinous mantle, up to 60 cm, and a large rounded fin. Arms with 2 rows of suckers. Long tentacles with compact widened club, and 3- 4 rows of suckers and a fixing apparatus. Funnel cartilage triangular, square or irregularly oval. Photophores present, embedded on the skin, around the eyes and mantle and a single round one inside the mantle in some species. Hectocotylus absent (Young and Roper 1969). Unidentified paralarvae of this family were recorded by Santos and Haimovici (2007).

29. ***Discoteuthis* cf. *discus***
Young and Roper, 1969
(Figure 7.29 a and b)

Diagnosis. Mantle not extended into a tail. Very large fins almost equal or somewhat larger in width than mantle length. Club suckers of marginal rows very small and 4 pairs of suckers in middle rows are greatly enlarged. No photophores on the ink sac. A single photophore on the ventral mantle near the posterior end of the body. Several photophores around the pupil. No photophore near the anterior edge of the mantle or on the head. Adult size unknown.



21. *Cranchia scabra*

22. *Leachia atlantica*

23. *Liocranchia reinhardti*

24. *Egea inermis*

25. *Helicocranchia pfefferi*

26. *Liguriella podophthalma*

27. *Megalocranchia maxima*

Figure 6. Species of the Family Cranchiidae from Brazil: habitus taken from fresh or preserved specimens. 21: juvenile dorsal view. 22 a: adult dorsal view. 22 b: juvenil dorsal view. 23 a: adult dorsal view. 23 b: paralarva dorsal view. 24 a: adult dorsal view. 24 b: paralarva dorsal view. 25: adult dorsal view. 26 a: juvenile dorsal view. 26 b: parlarvae dorsal view. 27 a: adult dorsal view. 27 b: paralarva dorsal view. 21, 22 a and b, and 25 from Nesis (1999). 23 a, 24 a, and 27 a from Haimovici et al. (2007). 23 b, 24 b, 26 a, and 27 b from Haimovici et al (2002).

Note. No photophores were observed in the available specimen and it could be an undescribed species.

Habitat and distribution. Benthopelagic in the tropical and subtropical Atlantic Ocean (Nesis 1982). Large juveniles caught with trawls at 600 to 1,700 m along central Brazil (Haimovici et al. 2007).

Family Enoploteuthidae Pfeffer, 1900

Mantle muscular, small or rarely medium sized. Posterior end of mantle conical, not extended into an acute tail. Mantle-Funnel-mantle locking apparatus simple. Hooks present in all arms. Tentacles club with one or two rows of hooks on the manus. Wide fins. Photophores on the surface of mantle, funnel, head and eyeballs, absent in the mantle cavity and tentacles. A review of the group was carried out by Young et al. (1998).

30. ***Abraliopsis atlantica*** Nesis, 1982
(Figure 7.30)

Diagnosis. Mantle muscular, conical with fins occupying less than 70% of its length. Photophores on the ventral side of the head in 7 longitudinal well-defined rows, median row unpaired. No additional photophores between lateral and 3rd rows of photophores on the ventral side of the head. A wide and clearly defined stripe free from photophores. in the middle of the ventral side of the mantle that narrows to the posterior end of the mantle. About 10 pairs of hooks on arms I-III and large photophores. Ventral arms without suckers and large photophores in the tip. Tentacular club without distinct carpal membrane or keel and two rows of small hooks. Left ventral arm of male with widened ventral protective membrane. Both oviducts developed. Very small squid, ML under 5 cm.

Habitat and distribution. Epi-mesopelagic in the slope and oceanic waters of the tropical and subtropical Atlantic Ocean (Nesis 1982; Young et al. 1998). Specimens caught with mid- water trawls along central Brazil (Haimovici et al. 2007).

31. ***Abraliopsis morisii*** (Verany, 1839)
(Figure 7.31)

Diagnosis. Mantle muscular, conical with large fins occupying 75-80% of the mantle. Photophores on ventral side of head and mantle disposed diffusely and not forming distinct longitudinal rows with a stripe without photophores in middle of ventral side of mantle. About 10 pairs of hooks on arms I-III and large photophores. Ventral arms without suckers and large photophores in the tip. Club with well-developed keel and 4-5 pairs of long hooks and one of suckers Left ventral arm in male not modified. Both oviducts developed. Very small squids, ML under 5 cm.

Habitat and distribution. Epi-mesopelagic in the Tropical and subtropical Atlantic Ocean and Mediterranean Sea (Nesis 1982; Young et al. 1998). Specimens caught in the slope of southern Brazil recorded as *Abraliopsis pfefferi* (Joubin, 1896) (Santos and Haimovici (2007).

32. ***Abralia redfieldi*** GL Voss, 1955
(Figure 7.32)

Diagnosis. Mantle muscular, conical with a small blunt tail. Terminal wide fins, less than half of mantle length. Five eyeballs photophores round, lst, 3rd and 5th larger than 2nd and 4th. Hooks on the tentacular club in one row. Right ventral arm hectocotylized. Very small squids, ML under 4 cm (Nesis 1982; Perez and Haimovici 1993).

Habitat and distribution. Epipelagic, mesopelagic and bathyal Tropical and Subtropical of both eastern and western Atlantic (Nesis 1982). Present in the slope of southern Brazil, sometimes co-occurring with *A. veranyi* (Haimovici and Perez 1991a; Haimovici et al. 2002, 2007; Santos and Haimovici 2007).

33. ***Abralia veranyi*** (Rüppell, 1844)
(Figure 7.33)

Diagnosis. Mantle muscular, conical with a small, pointed tail. Fin length half of mantle length. Five photophores in the ventral part of the eye, 1st (anterior) photophore in adult specimens oval, much larger than 3rd and only smaller than 5th. Three or four rows of tiny suckers on tips of arms I-III. Tentacular club with 1 row of hooks. Left ventral arm hectocotylized. Very small squids, ML under 5 cm (Nesis 1982; Perez and Haimovici 1993).

Habitat and distribution. Bathyal and midwater over slopes, sometimes pelagic in the tropical and subtropical western Atlantic Ocean from New England to Argentina and Mediterranean Sea. Common in southern and central Brazil (Haimovici and Perez 1991a; Vaske 2005; Haimovici et al. 2007; Santos and Haimovici 2007).

34. ***Enoploteuthis anapsis*** Roper, 1964
(Figure 7.34)

Diagnosis. Mantle muscular, conical with short flashy tail. Photophores on the ventral side of the mantle are arranged on straight longitudinal rows, at least in the anterior part. Four wide multiserial ill-defined longitudinal bands of photophores on the ventral side of the mantle. Presence of 8 1/2 longitudinal rows of photophores on ventral side of head, unpaired median row of photophores formed by fusion of rows extending along inner edges of arms IV and terminating at level of anterior margin of eyes, rest of head midline without photophores. Tentacles are robust and very long, one and a half to two times the mantle length, club with many suckers in 4 rows on dactylus. Very small squids.

Habitat and distribution. Epi-mesopelagic in the slope and oceanic waters of the tropical Atlantic Ocean (Nesis 1982). Specimens caught in mid-water trawls and present in stomach contents of pelagic large predators of southern and northeastern Brazil (Vaske. 2005; Haimovici et al. 2007, Santos and Haimovici 2007).

35. ***Enoploteuthis leptura*** (Leach, 1817)
(Figure 7.35)

Diagnosis. Mantle muscular, conical with relatively long flashy tail. Eight longitudinal rows of photophores on the ventral side of head; 2nd and 3rd lateral rows not joining on arm IV bases. Midline of the head without photophores. Seven longitudinal rows of photophores on the ventral side of the mantle, the three median extending to the tail. Six rows of photophores on the funnel. Tentacles are slender with a short club with few suckers in 2 rows on dactylus. Three rows of chromatophores on arms IV. Small squids up to ca 10 cm.

Habitat and distribution. Epi-mesopelagic in the slope and oceanic waters in the tropical Atlantic Ocean (Nesis 1982). Specimens caught in oceanic waters of northeastern Brazil and found in stomach contents of large pelagic fishes (Vaske 205; Haimovici et al. 2007).

Family Histioteuthidae Verrill, 1881

Small to large sized ammoniacal squids, usually with short and conical gelatinous- cartilaginous mantle and large head. Small, rounded fins, joined posteriorly. Asymmetrical eyes with the left usually larger than the right one. Arms long with two rows of suckers. Long tentacles with 4-8 rows of irregularly sized suckers. Inner arms umbrellas are generally well developed. Mantle-funnel-mantle locking apparatus simple. Entire ventral surface of mantle, head and arms with numerous composite photophores. There are few photophores on the body dorsal side and no photophores on the fins and tentacles. There is a ring of photophores in a specific order around each eyelid. Both dorsal arms are hectocotilyzed. Full descriptions and review in Voss NA (1969) and Voss NA et al. (1992, 1998).

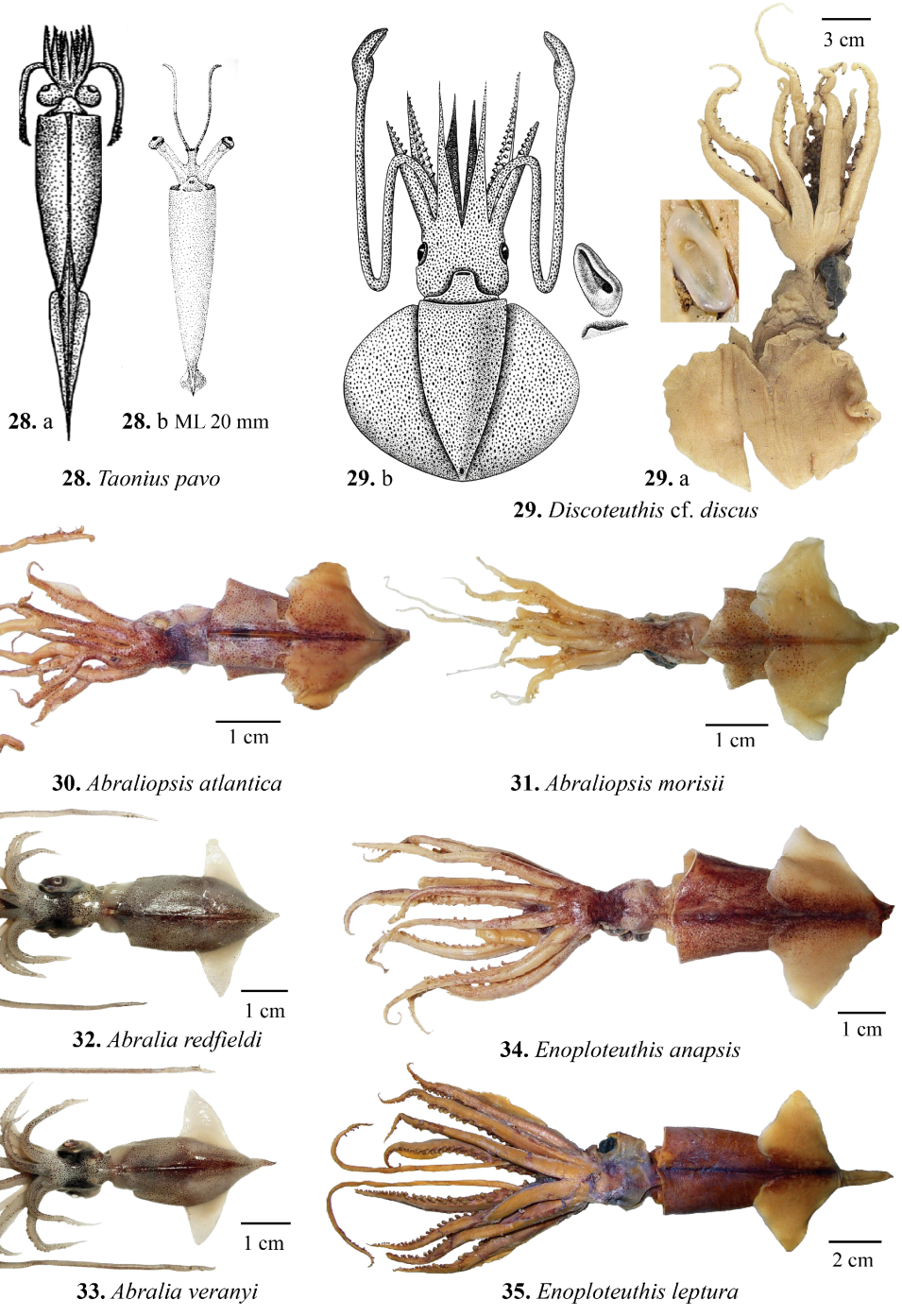


Figure 7. Squids of the families Cranchiidae, Cycloteuthidae and Enoploteuthidae from Brazil: habitus taken from fresh or preserved specimens. 28 a: adult dorsal view. 28 b: juvenil dorsal view. 29 a: damaged specimen with funnel locking cartilage. 29 b: adult ventral view and funnel locking cartilage. 30-35: adults dorsal views. 28 a from Nesis (1982). 28 b from Guerra (1992). 29 a and 30-35 from Haimovici et al. (2007). 29 b from Nesis (1999).

36. ***Histioteuthis corona***
(NA Voss and GL Voss, 1962)
(Figure 8.36 a and b)

Diagnosis. Mantle short and conic with only large photophores distributed on it. Left eye is greatly larger than the right one with 17 photophores around the right eyelid. Arm length around 150% of mantle length. Three rows of photophores in basal parts of arms IV. Depth of inner umbrella less than 15% of length of longest arm; male genitalia normal. Medium sized species ML up to ca 17cm Voss NA et al. 1998.

Habitat and distribution. Mesopelagic and bathypelagic in the tropical and subtropical Atlantic and Indian oceans (Voss NA 1969; Nesis 1982). Found in stomach contents of marine mammals, tunas and sharks as by-catch in bottom-trawl fisheries on the continental slope of southern and central Brazil (Perez et al. 2004; Haimovici et al. 2007; Haimovici et al. 2008).

37. ***Histioteuthis macrohista*** NA Voss, 1969
(Figure. 8.37)

Diagnosis. Very large inner web. Compound photophores number 16 (rarely 15) around the right eye. Two large, round, broadly-separated, dark photophores on the left posterior margin of the ventral surface of head. Single, elongate, simple photophore at end of each arm I-III. Two or three large, round photophores on the left posteroventral margin of head. Compound photophores of large, uniform size on the anterior half of the ventral mantle. Arms IV with 3 longitudinal series on the arm base and without a separated group of compound photophores at arm tips. Tubercles absent. Small squid ML up to 8 cm (Voss NA 1969, 1998).

Habitat and distribution. Primarily occupies the region near the southern subtropical convergence from the eastern Pacific to Atlantic Ocean (Voss NA et al. 1998). In southern Brazil recorded by Perez et al. (1994).

38. ***Histioteuthis meleagroteuthis*** (Chun, 1910)
(Figure 8.38 a and b)

Diagnosis. Mantle conical with photophores densely distributed (around 30 transverse rows of photophores). Left eye is greatly larger than the right one; 19-21 photophores around the right eyelid. Longitudinal rows of cartilaginous tubercles on the anterior mantle dorsal side and in basal parts of arms I-III. Presence of 8-9 longitudinal rows of photophores in the basal part of arms IV. Small squid, females mature at 11.8 cm. A full description in Voss NA et al. (1998a).

Habitat and distribution. Tropical and subtropical cosmopolitan species (Nesis 1982). In Brazil, a single specimen was trawled in the continental shelf of Santa Catarina (Santos and Haimovici 2007).

Note. Perez et al (2013) includes in a list of components of a deep water shirmp fishery two unidentified histiteuthids but do not provide any descriptive information that allows include them in the list.

Family Lycoteuthidae Pfeffer, 1908

Small muscular squids tropical and subtropical mesopelagic occupying depths during the day and migrating into near-surface waters at night. Characterized by a lack of hooks and by photophores present on the viscera, eyeballs and tentacles.

Subfamily Lycoteuthinae Pfeffer, 1908

Five luminous organs on the ventral side of each eyeball arranged in one row. Tentacular stalk with 2 and mantle cavity with 8-10 luminous organs. Male genital organs paired. Hectocotylus absent (Voss GL and Stephen 1992).

39. ***Lycoteuthis lorigera*** (Steenstrup, 1875)
(Figure 8.39 a and b)

Diagnosis. No long tail in males. Five luminous organs on the ventral side of eyeballs, arranged in one row. Tentacular stalk with 2 and mantle cavity with 8-10 luminous organs. Hectocotylus absent. Small squids, ML in males up to 18 cm, females smaller. Currently *Lycoteuthis diadema* (Chum, 1900) is considered a synonym.

Habitat and distribution. Subtropical waters worldwide. Mesopelagic over the slopes and seamounts (Nesis 1982). Recorded from central to southern Brazil (Haimovici and Perez 1991b); Santos and Haimovici 2007; Haimovici et al. 2007).

40. ***Selenoteuthis scintillans*** GL Voss, 1959
(Figure 8.40)

Diagnosis. One large globular photophore on the posterior end of the body. Single globular photophore on tip of arms II and III only in mature males. Arm tips not attenuated. Very small squid, ML up to 4.5 cm.

Habitat and distribution. Mesopelagic ascending to epipelagic at night. Tropical and subtropical in the Atlantic Ocean, Gulf of Mexico and Caribbean Sea (Nesis 1982). Specimens found on the slope of central Brazil (Haimovici et al. 2007) and paralarvae around oceanic islands of northeastern Brazil (Haimovici et al. 2002).

Family Mastigoteuthidae Verrill, 1881

Medium sized squids with cartilaginous-gelatinous body. Anterior part of mantle cylindrical, posterior conical. Fin long, round, rhomboidal or heart-shaped, generally with length not less than 50% of mantle length. Arms IV are, as a rule, longer and wider than other arms. Arms suckers in 2 rows. Long tentacles with a thin stalk not widened, covered with very numerous small suckers in many rows, up to 15 rows in *Magnoteuthis*. Slightly wider in the mid part in some genera (*Mastigopsis* and *Idioteuthis*). Club without keel and fixing apparatus. Mantle locking apparatus specialized, with well-developed tragus but a very low antitragus. Hectocotylus absent. Some species with photophores in the eye sinus and on the eyeball.

41. ***Magnoteuthis inermis*** (Rancurel, 1972)
(Figure 9.41 a and b)

Diagnosis. No stellate warts on skin. Fin round, not reaching the anterior edge of the mantle. Fin length about 67% of mantle length and fin width exceeds or equals fin length and comprises 70-80% of the mantle length. Funnel cartilage flask-shaped. Tentacular club with suckers along its entire perimeter. Arms sucker ring smooth. Photophores absent. Midle-sized species up to 23 cm in Haimovici et al. 2007

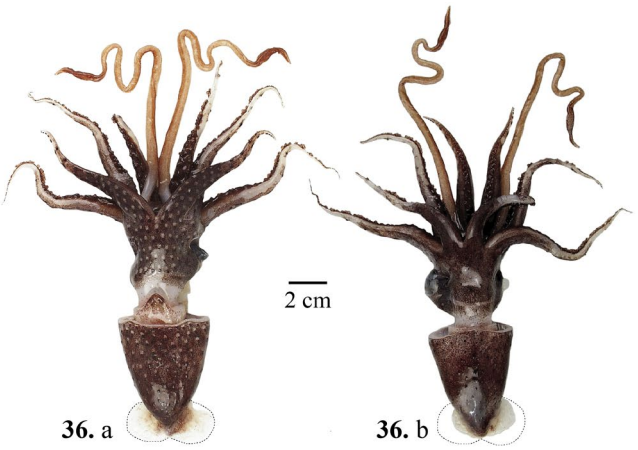
Habitat and distribution. Bathypelagic species ascending at night to the mesopelagic zone in the tropical and northern subtropical Atlantic and Indian oceans and Tasman Sea (Nesis 1982). Specimens were collected in oceanic water of central Brazil (Haimovici et al. 2007) and reported in stomach contents of oceanic predators (2024 pers. comm. T Vaske). Paralarvae of this family were found in northeastern Brazil (Haimovici et al. 2002).

Family Neoteuthidae Naef, 1921

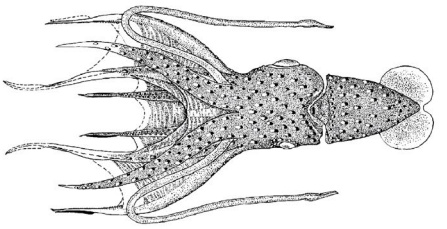
Medium and small sized squids with conical mantle and large head. Funnel-mantle locking apparatus simple. Arms with two rows of suckers. Tentacular fixing apparatus present. No photophores. Long fins with an incision on posterior edge.

42. ***Neoteuthis thielei*** Naef, 1921
(Figure 9.42)

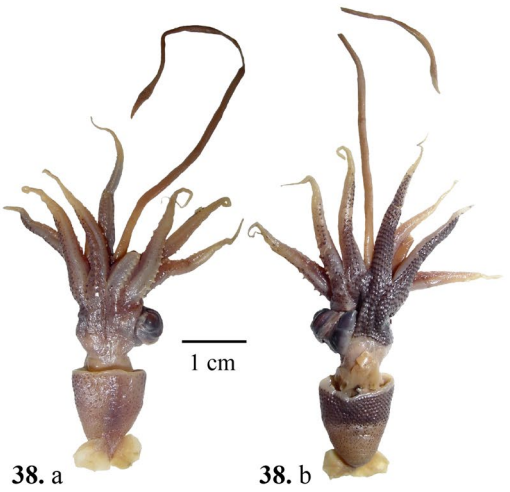
Diagnosis. Fins length more than 50% of mantle length, with width much smaller than its length, gradually widening to posterior end and extending beyond mantle length. Tentacles are long and strong with widened carpal part occupying 67-80%



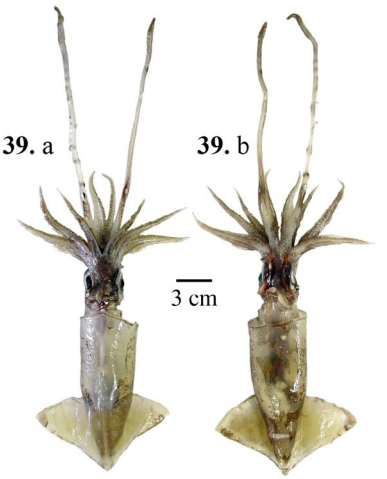
36. *Histioteuthis corona*



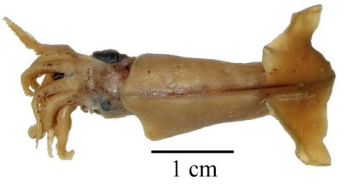
37. *Histioteuthis macrohista*



38. *Histioteuthis meleagroteuthis*



39. *Lycoteuthis lorigera*



40. *Selenoteuthis scintillans*

Figure 8. Species of the families Histioteuthidae and Lycoteuthidae from Brazil: habitus taken from fresh or preserved specimens. 36 a: dorsal view. 36 b: ventral view. 37: adult dorsal view. 38 a: dorsal view. 38 b: ventral view. 39 a: dorsal view. 39 b: ventral view. 40: dorsal view. 36 a and b, and 40 from Haimovici et al. (2007). 37 from Voss NA (1969).

of its length. No arm hooks. Small squid, ML up to 17 cm (Nesis 1982).

Habitat and distribution. Meso-bathypelagic species in the Tropical and Subtropical Atlantic Ocean (Nesis 1982). Specimens caught with trawls at 600 to 1,700 m along central Brazil (Haimovici et al. 2007).

Family Octopoteuthidae Berry, 1912

Medium and large squids. Body gelatinous. Mantle conical, more or less acuminate posteriorly. Fins very large, rhomboidal, extending along almost the entire mantle, fused with the dorsal side of the mantle. Head broad, arms short and thick. Two rows of short hooks on the arms. Sucker, when present, only on tips of arms. Tentacles present

only in paralarvae or juveniles. Mantle locking apparatus simple. Luminous organs are present on arm tips, sometimes tissues of head, arms and mantle, and inside the mantle cavity. Hectocotylus absent (Nesis 1982). A recent review for this family was produced by Kelly (2019).

43. ***Taningia danae*** Joubin, 1931
(Figure 9.43 a and b)

Diagnosis. Large composite photophores located on the tip of arms II. No photophores on other arm tips, on sides of anus, or at posterior end of mantle. Single large round photophore on ink sac. Rudiments of tentacles stalk present in adults. Large squids, ML up to 170 cm in Nesis (1987).

Habitat and distribution. Mesopelagic to bathyal. Tropical and subtropical cosmopolitan species (Nesis 1982, 1999). Specimens and beaks recorded from stomach contents of large pelagic predators in southern and northeastern Brazil (Santos and Haimovici 2002; Vaske 2005; Leite et al. 2009).

44. ***Octopoteuthis* cf. *megaptera*** (Verrill, 1885)
(Figure 9.44 a and b)

Diagnosis. Fin not reaching the posterior end of the mantle. Fin length about 75% of mantle length. Tail long, acuminate, flattened from above. Tips of all arms with one elongated photophore. No photophore on the ink sac. Tentacles totally reduced in adults. Medium sized squids ML up to 20 cm in Kely 2019.

Habitat and distribution. Mesopelagic to bathyal ascending at night to the epipelagic zone. Tropical and subtropical cosmopolitan species (Nesis 1982). Specimens caught with trawls on the slope of central Brazil (Haimovici et al. 2007). Paralarvae of the genus were found in northeastern (Haimovici et al. 2002) and adults in stomach contents from predators from southern and northeastern Brazil (Santos and Haimovici 2001, 2002).

Family Ommastrephidae Steenstrup, 1857

Muscular squids with elongate mantle, tapering posteriorly, fins large and terminal; Funnel-mantle locking apparatus T inverted-shaped. Two rows of suckers on arms and 4 to 8 rows on tentacular clubs, hooks never present.

Subfamily Illicinae Posselt, 1891

Funnel groove without foveola or side pockets. Light organs absent. Males with arms longer than females. Eight rows of suckers in the dactylus of the tentacular club.

45. ***Illex argentinus*** (Castellanos, 1960)
(Figure 10.45)

Diagnosis. Mantle long, widest in midpoint. Short and broad fins. Arms relatively long. Males with left arm IV hectocotylized along more than half of its length. ML up to over 40 cm.

Habitat and distribution. Southern Brazil to southern Argentina. Sustains the principal squid fishery in western south Atlantic. In southern Brazil, occurs from Rio de Janeiro to Rio Grande do Sul, being the main cephalopod in the food chains of the upper slope and occasionally fished in large quantities (Haimovici and Perez 1990; Haimovici et al. 1998; Santos and Haimovici 2002).

46. ***Illex coindetti*** (Verany, 1839)
(Figure 10.46)

Diagnosis. Mantle long, widest in the anterior part. Head as wide as the mantle. Short and broad fins, rounded anteriorly. Arms relatively long. Males with left arm IV hectocotylized less than 33% of its length. ML up to over 30 cm.

Habitat and distribution. Neritic and slope species in the eastern Atlantic Mediterranean Sea, Gulf of Mexico, Caribbean Sea and southwest Atlantic Ocean down to central Brazil (Sánchez et al. 1998; Haimovici 2007).

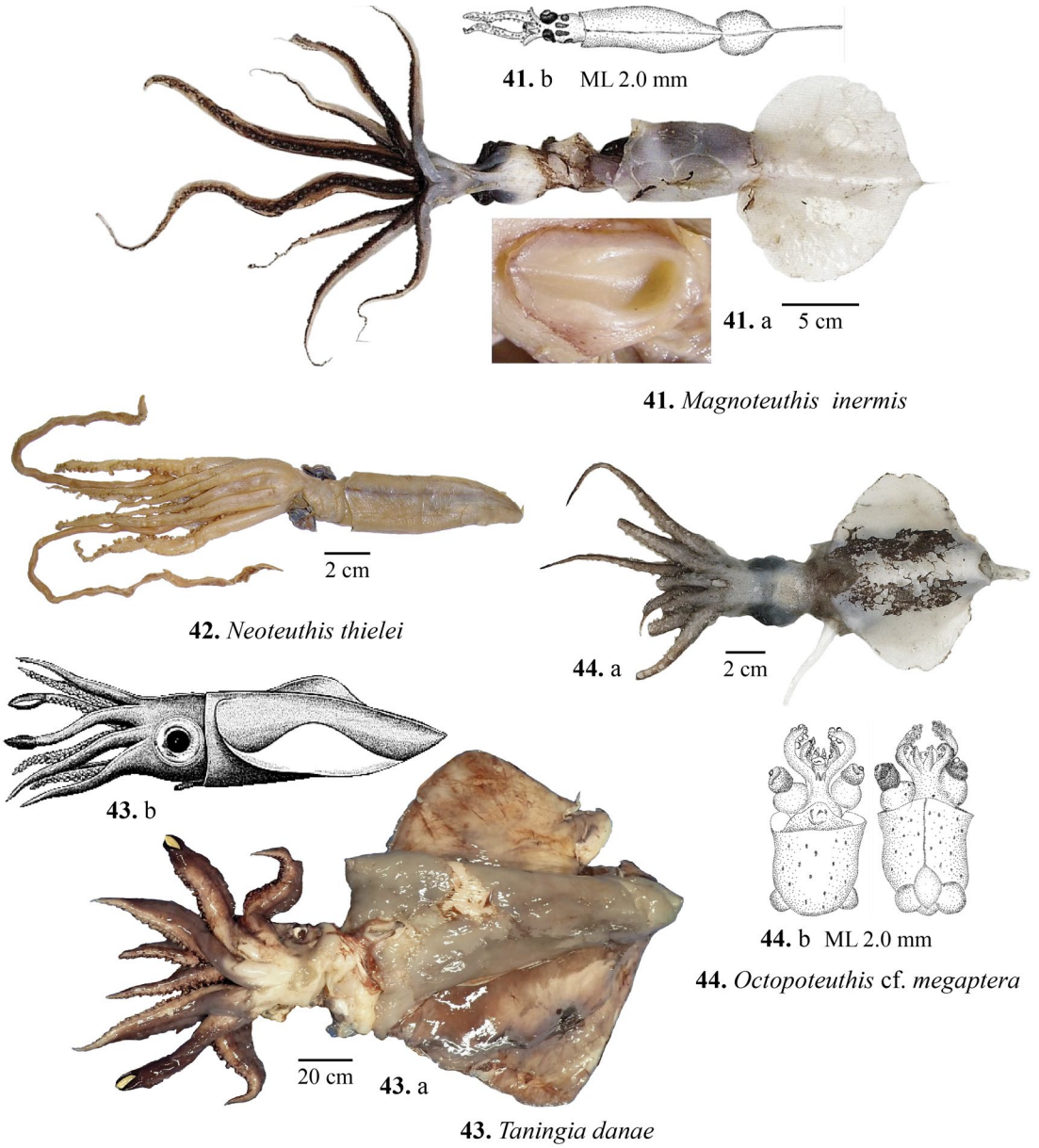


Figure 9. Species of the families Mastigoteuthidae, Neoteuthidae and Octopoteuthidae from Brazil: habitus taken from fresh or preserved specimens. 41 a: paralava dorsal view. 41 b: adult dorsal view. 42: adult dorsal view. 43 a: adult dorsal view. 43 b: adult lateral view. 44 a: adult dorsal view. 44 b: paralarva dorsal and ventral views. 41 a, 42, and 44 a from Haimovici et al. (2007). 41 b and 44 b from Haimovici et al. (2002). 43 a edited from non copyright images in the web. 43 b from Wikipedia.

Subfamily Ommastrephinae Steenstrup, 1857

Presence of foveola with side pockets in the funnel groove and presence of photophores deeply buried in tissue of mantle, head or arms.

47. ***Hyaloteuthis pelagica*** (Bosc, 1802)
(Figure 10.47)

Diagnosis. Mantle muscular, cylindrical. Ventral

surface of the mantle is covered with 19 photophores in a distinct pattern, primarily in pairs. Fins short and rhomboidal. Mantle and funnel cartridges not fused. Small squid, ML up to 9 cm.

Habitat and distribution. Oceanic epipelagic and uppermost mesopelagic species, in the tropical and subtropical Atlantic and Pacific (Warneke-Cremer 1986; Nesis 1999). Records from paralarvae in northeastern Brazil (Haimovici et al. 2002) and stomach contents (Santos and Haimovici 2001; Vaske 2005).

48. ***Ommastrephes cylindraceus*** (d'Orbigny, 1835) (Figure 10.48)

Diagnosis. Known as flying squid. Mantle robust with a long golden stripe along the ventral midline. Muscular and wide fins. Short arms with large keels. Light organs under the skin of the ventral mantle and head surface. ML up to over 50 cm. This species is part of the *Ommastrephes bartramii* complex inhabiting all oceans (Fernández-Álvarez et al. 2020).

Habitat and distribution. Oceanic species from tropical to temperate waters in the southern Atlantic and southern Indian oceans. Records from southern to northeastern Brazil (Haimovici and Perez 1991a, 1991b; Vaske 2005; Haimovici et al. 2007).

49. ***Ornithoteuthis antillarum*** Adam, 1957 (Figure 10.49)

Diagnosis. Conical mantle narrowing to a pointed tail. Wide fins with convex anterior and concave posterior edges. Funnel groove with foveola with 7 to 12 folds. Light organs on the ink sac and rectum. Purplish maroon, darkest on the dorsal surface. ML up to 30 cm.

Habitat and distribution. Oceanic species in the tropical and subtropical eastern and western Atlantic Ocean (Warneke-Cremer 1986; Nesis 1999). Recorded from northeastern to southern Brazil (Santos and Haimovici 2002, 2007; Vaske 2005; Haimovici et al. 2007; Leite et al. 2009).

50. ***Sthenoteuthis pteropus*** (Steenstrup, 1855) (Figure 11.50)

Diagnosis. Mantle muscular, robust, not pointed posteriorly. Large muscular wide fins. A large oval orange patch on the antero-dorsal part of the mantle consists of numerous densely packed light organs. Scattered light organs in the ventral surface of the mantle, head and arms. Attains 60-65 cm (Nesis 1982).

Habitat and distribution. Epipelagic oceanic species in tropical and warm temperate waters in both hemispheres of the Atlantic Ocean, Gulf of Mexico and Caribbean Sea. In Brazil, more common in the tropical regions (Warneke-Cremer 1986; Haimovici et al. 2002, 2007; Leite et al. 2009).

51. ***Eucleoteuthis luminosa*** (Sasaki, 1915) (Figure 11.51)

Diagnosis. Mantle muscular, conical, tapering to moderately sharp tail. Mantle and funnel fused at locking cartilages. Pair of long stripes of luminous tissue along the ventral side of the mantle. Two oval luminous spots near the anterior margin of the mantle in front of each stripe, a large photophoric patch at base of each arm IV. Fins sagittate, length and width about 50% of mantle length. ML up to 22 cm (Nesis 1982).

Habitat and distribution. Epipelagic oceanic species. Subtropical worldwide and temperate north Pacific Ocean. Records from central Brazil (Warneke-Cremer 1986; Haimovici et al. 2007).

Subfamily Todarodinae Adam, 1960

Mantle cylindrical. No photophores. Funnel groove with foveola, without side pockets.

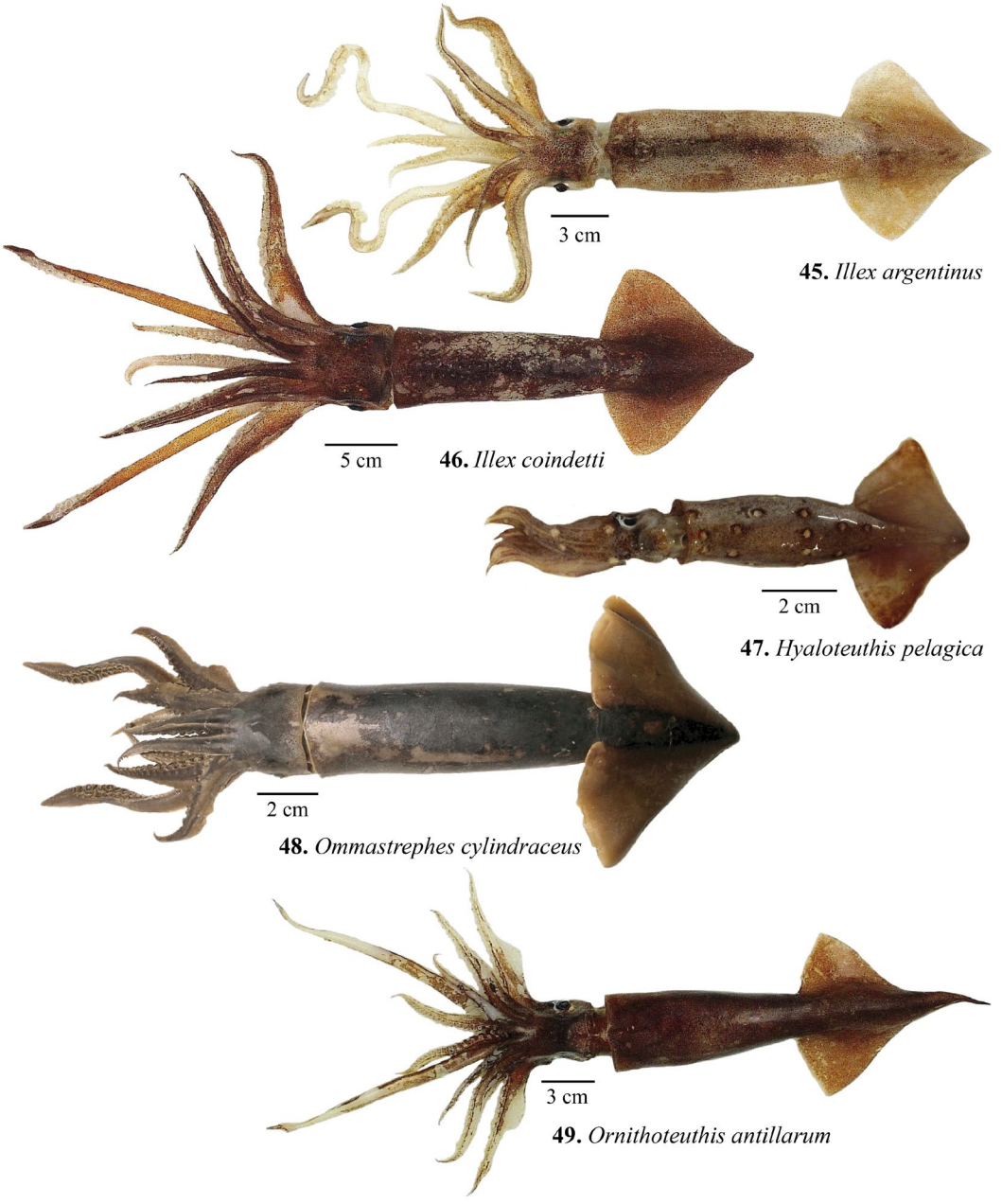


Figure 10. Species of the Family Ommastrephidae from Brazil: dorsal views of habitus taken from fresh or preserved adult specimens. 45, 46, and 49 from Haimovici et al. (2007). 47 edited from non copyright image in the web.

52. ***Todarodes filippovae*** Adam, 1975
(Figure 11.52)

Diagnosis. Mantle muscular, long, tapers to a pointed tail. Fins sagittate, length and width about 50% of mantle length. Tentacles very large and robust. Clubs occupy nearly the entire length of tentacles and 4 rows of suckers on the dactylus, 2 very small.

Arms relatively short. Maximum mantle length ML over 50 cm. Synonymy: *T. angolensis* (Nesis 1982).

Habitat and distribution. Slope and oceanic demersal species in subantarctic and temperate waters of the southern hemisphere (Nesis 1982). Records from southern Brazil (Perez and Haimovici 1991a; Santos and Haimovici 2007).

Family Onychoteuthidae Gray, 1849

Body muscular with pointed tail. Funnel-locking apparatus simple. Fin in the posterior part of the mantle. Tentacular club and 2 rows of hooks and 2 marginal rows of suckers or suckers absent in adults. Two rows of suckers on arms. No hectocotylus. Fixing apparatus of tentacles very developed. presence of three primary occipital folds on the head, arms with two rows of suckers, tentacle clubs with two rows of hooks on the manus, and buccal connective formula DDVV (Bolstad et al. 2010, 2018).

53. ***Moroteuthopsis ingens*** (Smith, 1881)
(Figure 11.53)

Diagnosis. Mantle robust broad thick, muscular covered with fleshy warts. Fins rhomboidal, large and broad, about 50% of mantle length, not attenuated into the tail. Tentacular clubs unexpanded with 28 to 29 hooks and a keel, first pair of arms shorter and third pair longer and with a keel. Color brown. ML up to 100 cm.

Habitat and distribution. Oceanic epipelagic circum-antarctic species (Nesis 1982). Collected from commercial fishing and research cruises off southern and central Brazil reported as *Moroteuthis ingens* (Haimovici 1997; Haimovici et al. 2007).

54. ***Onykia robsoni*** (Adam, 1962)
(Figure 12.54)

Diagnosis. Body very muscular and robust. Tentacles with hooks. Skin rugose covered with irregular flattened tubercles. Fin long heart-shaped with a greatly attenuated tail. Fin length about 67% and width 50% of mantle length. Without nuchal folds. Mantle length up to 75 cm.

Habitat and distribution. Circunglobally in southern subtropical and temperate areas (Nesis 1982). Specimens caught over the slope with trawls at 600 to 1,700 m along central Brazil (Haimovici et al. 2007) and in southern and southeastern Brazil from commercial fishing (Perez et al. 2004) and from beaks found in stomach contents of marine mammals (Santos and Haimovici 2001) reported as *Moroteuthis robsoni*.

55. ***Onychoteuthis banksii*** (Leach, 1817)
(Figure 12.55)

Diagnosis. Mantle muscular and robust. Elongate flap-like folds around the dorso-lateral surface of the neck. Patch-like photophore on the ventral surface of both eyes. Two bulbous light organs on the ventral midline of the intestinal tract. Fins rhomboidal, about 50 to 60% of mantle length with posteriorly attenuated tail. Tentacular clubs with 19 to 23 large hooks in two rows. ML up to 30 cm.

Habitat and distribution. Mainly epipelagic oceanic species, worldwide in warm and temperate waters (Roper et al. 1984). In Brazil, recorded from paralarvae and stomach contents from southern to southeastern coast (Haimovici 1997; Haimovici et al. 2002, 2007).

Family Pholidoteuthidae Adam, 1950

Large squids with mantle covered by dermal cushions or papillae resembling scales. Rhomboidal fins. Two rows of suckers on arms, tentacles moderately long with slightly expanded clubs with suckers in 4 rows. With penis, no hectocotylized arm.

56. ***Pholidoteuthis adami*** Voss, 1956
(Figure 12.56)

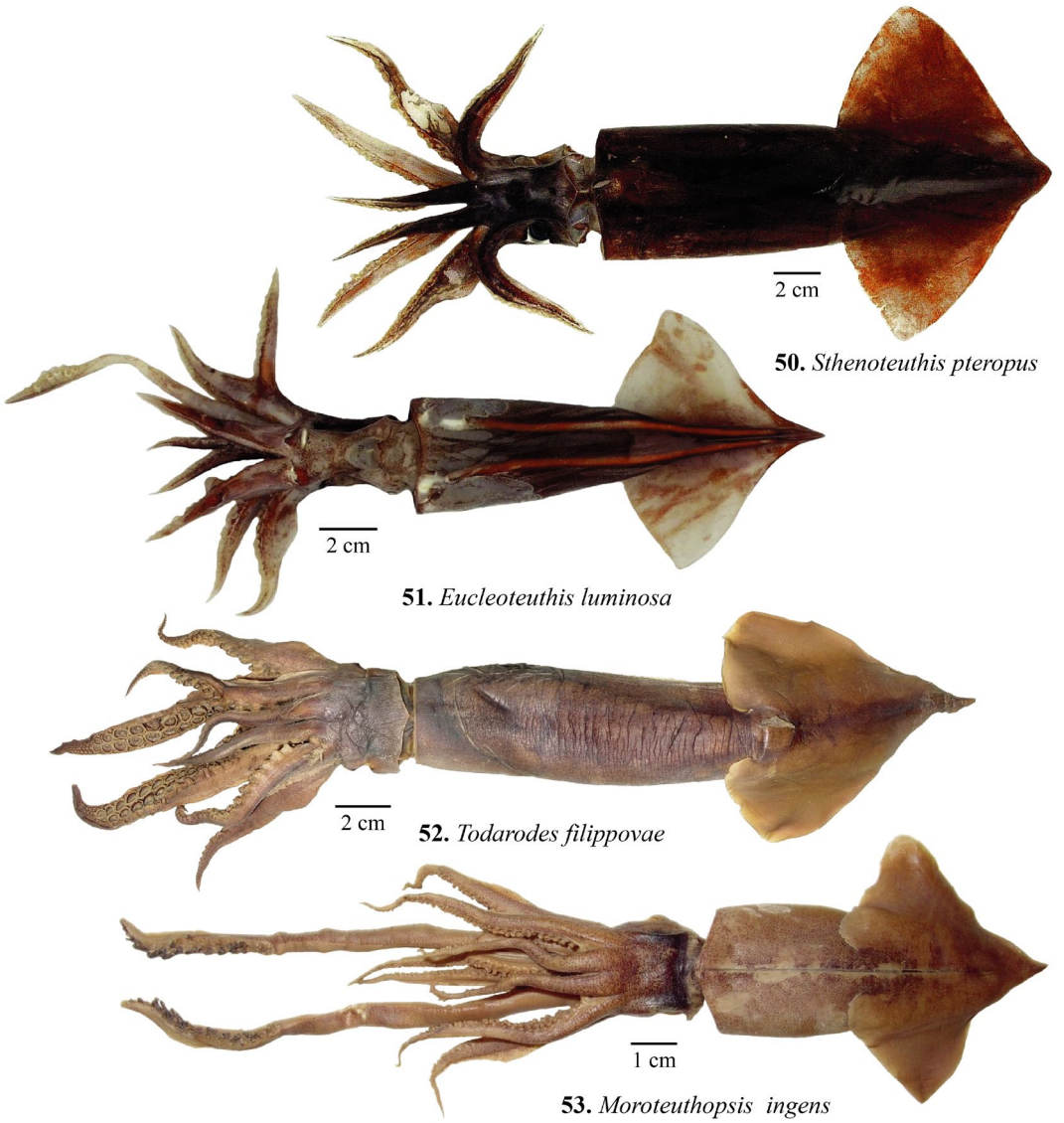


Figure 11. Species of the families Ommastrephidae and Onychoteuthidae from Brazil: dorsal views of habitus taken from fresh or preserved adult specimens. 50-53 from Haimovici et al. (2007).

Diagnosis. Scales arranged in irregular rows, not serrate and closely contacting. Fins extended into a tail, with length 70-75%, width 60-70% of mantle length. ML over 90 cm and 10 kg (Haimovici et al. 2007).

Habitat and distribution. Bathipelagic in the tropical and subtropical Atlantic Ocean in depths of 500-2,000 m (Nesis 1982). Specimens caught with trawls at 600 to 1,700 m from northern to southern Brazil (Perez et al. 2004; Haimovici et al. 2007).

Family Pyroteuthidae Pfeffer, 1912

Small muscular squids. Mantle conical. Subterminal rounded, kidney-shaped fins. Tail not flashy, gladius ending in solid cone. Photophores present

on viscera, eyeballs and tentacles and are absent from mantle, fins, arms and head. Hooks present on at least arms I to III. Nidamental glands present, with unpaired oviducts (Young et al. 1998).

57. ***Pyroteuthis margaritifera*** (Rüppell, 1844)
(Figure 12.57)

Diagnosis. Mantle conical with visceral photophores seen through ventral mantle. Head larger than mantle opening with globular eye which carries 12 subocular photophores and 10 visceral photophores. More than 13 hooks per arm. Hooks on all arms in two series. Tentacular manus with one row of hooks and three series of suckers. Right arm IV hectocotilyzed. Very small species, ML up to 3.5 cm (Okutami 1995).

Habitat and distribution. Epi and mesopelagic species in the tropical-subtropical Atlantic, Indic and West Pacific oceans and Mediterranean Sea (Young et al. 1998; Nesis 1999). Recorded from central and southern Brazil (Santos and Haimovici 2007; Haimovici et al. 2008).

58. ***Pteryogioteuthis giardi*** Fischer, 1896
(Figure 12.58)

Diagnosis. Mantle conical, ending in a solid cone of gladius. Visceral photophores seen through the ventral mantle. Head large. Less than 8 hooks per arm, at the most, 2 hooks on the arm IV. Presence of 14-15 photophores on the eyeball (ten large and 4-5 small). Tentacular club with 4 series of suckers on the manus and without hooks. Oviduct present on the right side only. Left arm IV hectocotylized with brown and orange glandular areas larger than the non- pigmented tip with two hook-like teeth between them. ML under 3 cm (Nesis 1982; Okutami 1995).

Habitat and distribution. Epi and mesopelagic species in the tropical-subtropical Atlantic, Indian and West Pacific oceans and Mediterranean Sea (Young et al. 1998; Nesis 1999). In Brazil recorded from the stomach contents of predators and as juveniles in plankton samples, from northeastern to southern regions (Santos and Haimovici 2002, 2007).

Family Thysanoteuthidae Keferstein, 1866

59. ***Thysanoteuthis rhombus*** Troschel, 1857
(Figure 13.59)

Diagnosis. Large nektonic squid with a strong muscular mantle and long broad rhomboidal fins extending along the entire mantle length. Arms short, with two rows of suckers and well developed wide protective membranes expanded on long cirri-like trabeculae; especially well developed on arms III. Tentacles with 4 rows of suckers. Funnel locking apparatus T-shaped. Absence of photophores (except one supposedly at the ink sac). Pelagic egg mass looks like a long cylinder of transparent gelatinous mucus. Mantle length up to 100 cm.

Habitat and distribution. Epipelagic oceanic species. Tropical and subtropical waters, probably restricted to the Atlantic Ocean (Deville et al. 2023). Paralarvae and adults recorded from southern to northeastern Brazil (Haimovici et al. 1989, 2002; Santos and Haimovici 2002, 2007).

Order Bathyteuthida
Vecchione, Young and Sweeney, 2004

Suckers in the buccal membrane present. Arms suckers in four or more series at some point on arms I-III. In the tentacles, club suckers in more than 7 irregular series, without carpal locking-apparatus and not divided into manus and dactylus.

Family Bathyteuthidae Pfeffer, 1900

Short and broad mantle. Short fins, subterminal kidney-shaped. Wide head with projected eyes. Funnel-mantle locking apparatus: a simple straight grove. One photophore on the base of arms I-III, mainly distinguished in young specimens. First to third arms with 2-4 rows of numerous and small suckers, often irregularly positioned and arms IV

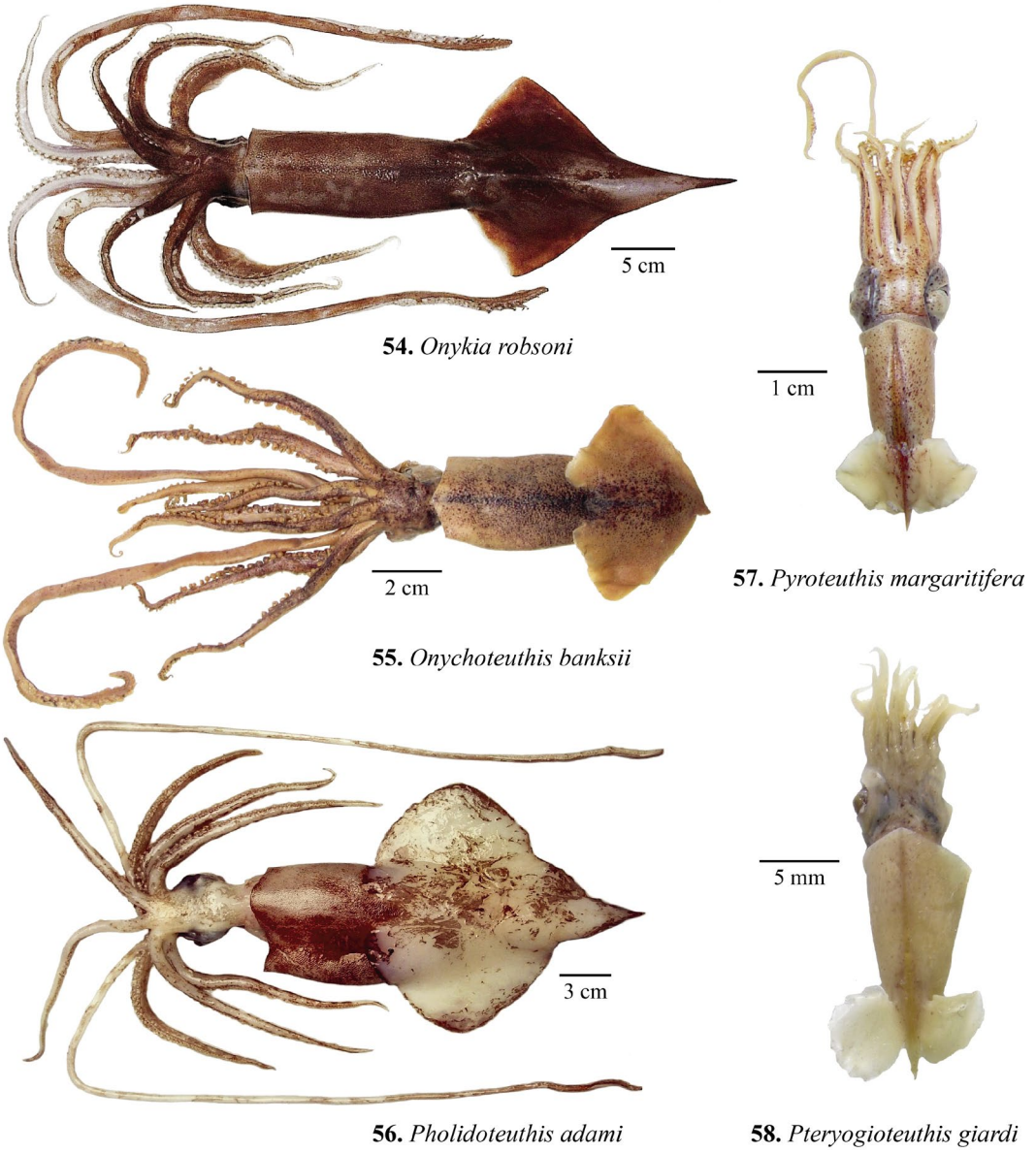


Figure 12. Species of the families Onychoteuthidae, Pholodoteuthidae and Pyroteuthidae from Brazil: dorsal views of habitus taken from fresh or preserved adult specimens. 54-58 from Haimovici et al. (2007).

and 2 rows. Long and slender tentacles, no distinct club with 8-10 rows of small suckers. ML up to 7.5 cm.

60. ***Bathyteuthis*** sp.
(Figure 13.60)

Diagnosis. Long arms attenuated with thin tips. Fins round and large 1/3 of the ML Arms with 2 rows of suckers in proximal part and 4 rows from medial to distal part. Armature over 50% of the ML. Arm IV with 2 rows of suckers most of the arm. Arms I-III with more than 200 small suckers.

Protective membrane of arms poorly developed. Tentacle broken in the examined specimen.

Note. Large-size armature is the most conspicuous character that separates it from other species, as *Bathyteuthis abyssicola* Hoyle, 1885 (Nesis 1982) from the Atlantic Ocean *and Bathyteuthis berryi* Roper, 1968, described from the northwestern Pacific Ocean.

Habitat and distribution. Meso and bathypelagic. A single specimen was caught with trawls at 600 to 1,700 m along central Brazil (Haimovici et al. 2007).

Family Chtenopterygidae Grimpe, 1922

Mantle width 40-60% of mantle length, with fringe-like fins extending along all or most of the mantle length, with a series of soft rays joined by a thin membrane. Wide head but not wider than the mantle. Locking apparatus simple. Hectocotylus is absent. Short arms with two rows of suckers, in the arms I-III increasing to 4 to 6 or more in distal part. Arm IV greatly enlarged at the base.

61. ***Chtenopteryx canariensis***
Salcedo-Vargas and Guerrero-Kommritz, 2000
(Figure 13.61 a-c).

Diagnosis. Arms with two rows of suckers in the proximal part that increase to more than four rows in the distal part. Ink sac. Absence of ventral visceral photophore. Recorded specimens up to 9 cm ML. Described by Salcedo-Vargas and Guerrero-Kommritz (2000) from the Canary Islands.

Habitat and distribution. Formerly northeastern and northwestern Atlantic Ocean (Escánez et al. 2018). Paralarvae collected off southern and northeastern Brazil (Haimovici et al. 2002; Santos and Haimovici 2007) and a juvenile in the slope of the southern region (Haimovici et al. 2008), formerly reported as *C. sicula*.

Superorder Octopodiformes
Berthold and Engese 1987
Order Vampyromorpha Pickford, 1939
Family Vampyroteuthidae Thiele, in Chun, 1920

62. ***Vampyroteuthis* cf. *infernalis*** Chun, 1903
(Figure 14.62 a and b)

Diagnosis. Mantle and head fused, shell chitinous, thin, broad, 10 circumoral appendages, 2nd pair sensory filaments only. Arms with one row of suckers and two of papilla-like cirri. Wide web. Long and narrow paddle-like fins. Large eyes. Numerous small photophores covering mostly the ventral side of the head, mantle and arms; a large photophore in the base of each fin. All black pigmentation. Maximum mantle length 13 cm and total length 37 cm.

Habitat and distribution. Two species are described in this genus, and more undescribed species are suggested to occur in the Atlantic Ocean (Qiu et al. 2024). Inhabits the low oxygen mesopelagic layer in tropical and subtropical waters, adults found at depth between 700 and 1,500 m, juveniles in slightly shallower waters on the slope (Nesis 1982; Guerra 1992). Found in stomach contents in southern Brazil (Santos and Haimovici 2002) caught with trawls in the central region (Haimovici et al. 2007) and in stomach contents of sharks fished along the northeastern seamounts chain (Vaske et al. 2009b).

Order Octopoda Leach, 1818

Eight circumoral arms, no tentacles. Shell vestigial or absent. Subterminal or absent fins. Funnel valve absent. Suckers without chitinous rings and broad stalks, set directly on the arms.

Suborder Cirrata Grimpe, 1916

Eight arms with uniserial suckers alternate with papilla-like pairs of cirri. One pair of widely separated paddle-like fins. Shell is cartilage-like with a U, V or saddle shape. Mantle opening reduced. Hectocotilization absent. Radula present or absent, no ink sac (Collins and Villanueva 2006).

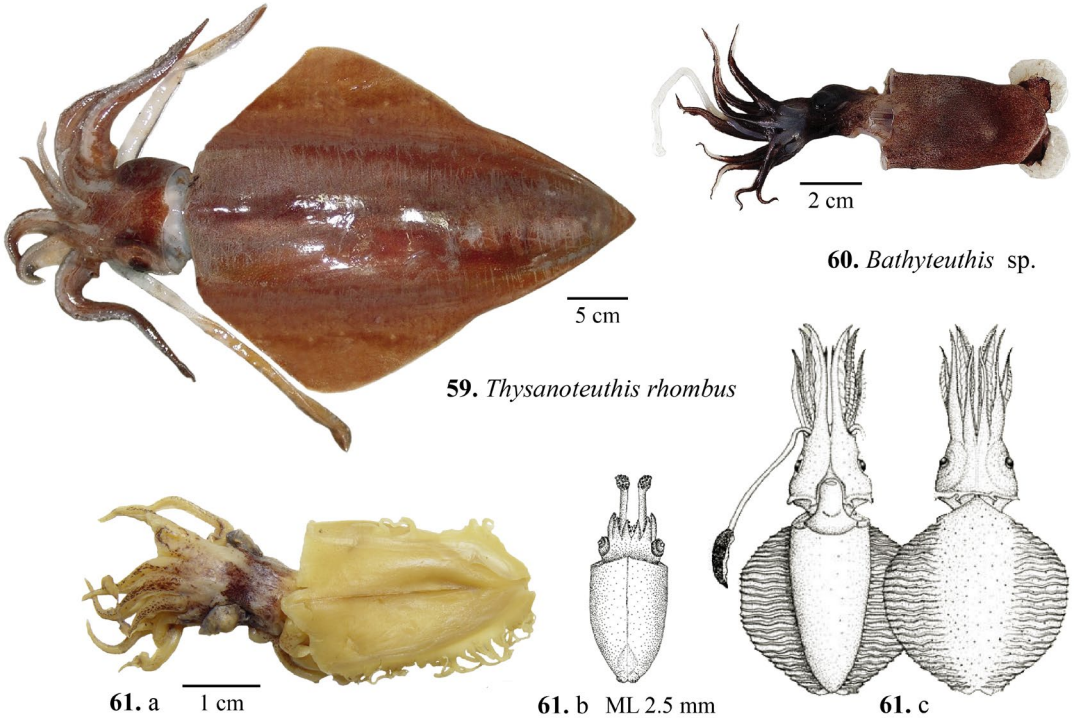


Figure 13. Species of the families Thyasanoteuthidae, Bathyteuthidae and Chtenopterygidae from Brazil: habitus taken from fresh or preserved specimens. 59 and 60: adults dorsal views. 61 a: adult dorsal view of damaged specimen. 61 b: paralarva dorsal view. 61 c: adult ventral and dorsal views. 59 from Haimovici et al. (2009). 60 and 61 a from Haimovici et al. (2007). 61 b from Haimovici et al. (2002). 61 c from Salcedo-Vargas and Guerrero-Kommritz (2000).

Family Opistoteuthidae Verrill, 1896

Body semi-gelatinous and flattened along the dorsoventral axis. A well-developed primary web that may reach almost the tip of the arms. Secondary web absent. Shell U-shaped. Short lateral pad-like fins. Eyes well developed. Short cirri.

63. ***Opisthoteuthis agassizii*** Verrill, 1883
(Figure 14.63 a-c)

Diagnosis. The umbrella of the primary web reaches 2/3 of the arm's length. In males, two fields of enlarged bulbous suckers, the proximal field typically with suckers 6th to 10th enlarged, and the distal field beginning in the 30th at the border of the umbrella and with the 33rd to 36th the largest. Short and thick lateral pad-like fins. Reddish to chocolate-colored. Males reach 48 cm TL and 6 kg and females 35 cm TL and 1.7 kg. Redescribed by Villanueva et al. (2002).

Habitat and distribution. Near bottom meso-bathypelagic species on the slope between 125 and 2,250 m. Distributed in the Caribbean Sea, Gulf of Mexico and western Atlantic from Bahamas to central Brazil (Haimovici et. al. 2007).

Note. A genetic sequence of a second unidentified *Opisthoteuthis* species was recorded from northeastern Brazil (pers. obs. T Silva Leite and M Haimovici).

Family Cirroteuthidae Keferstein, 1866

Body gelatinous elongated with prominent

head not compressed dorso-ventrally. Eyes range from very large to small; some taxa have degenerate, barely-functional eyes. Fins large, wide, longer than head width. Two sets of webs present: primary webs between each arm, and secondary webs as inflatable pouches along arm bases. Primary web reaching almost the tip of the arms. Paleal opening small. Funnel thin and long. Arms with one row of sessile suckers and two rows of long cirri. Shell saddle or butterfly-shaped. Radula absent. Entirely pelagic (Collins and Villanueva 2006).

64. ***Cirrothauma magna*** (Hoyle, 1895)
(Figure 14.64 a-c)

Diagnosis. Eyes large, well developed with lens and iris. Equal sized arms 3 to 4 times the mantle length. Butterfly shaped shell with the wings less than half the shell length and triangular shape from a lateral view.

Habitat and distribution. Atlantic Near bottom meso-bathypelagic species. Described for the deep sea in the Indian and Atlantic oceans between 1,300 m and 3,350 m (Guerra et al. 1998). In Brazil recorded for the slope of the central region by Haimovici et al. (2007).

65. ***Cirroteuthis muelleri*** Eschricht, 1838
(Figure 15.65 a and b)

Diagnosis. Head as large as the mantle. Eyes large, well developed with lens and iris. Single intermediate web. Saddle-shaped shell with large wings.

Habitat and distribution. Near bottom meso-bathypelagic species. The species is reported from the northeastern Atlantic and Pacific oceans in Voss NA and Pearcy (1990). In Brazil, it occurred in deep trawl along the slope of central region of Brazil (Haimovici et al. 2007).

Family Stauroteuthidae Grimpe, 1916

Body gelatinous, with pronounced anterior-posterior elongation. Arms long with extremely long cirri on midsection. Moderately long fins and U-shaped shell. Mantle opening forms a complete tube around the funnel. Web sectors between arms in two distinct layers (known as primary and secondary webs), capable of being inflated (ballooning behaviour) (Collins and Henriques 2000).

66. ***Stauroteuthis gilchristi*** Robson, 1924
(Figure 15.66 a and b)

Diagnosis. Equal sized arms 3 to 4 times the mantle length. U-shaped shell with wings forming a wider angle than the one of co-generic *S. syrtensis* Verrill, 1879.

Habitat and distribution. Near bottom meso-bathypelagic species. Southern Atlantic Ocean (Collins and Henriques 2000). In Brazil, the specimens were collected at 400 m depth on the slope of the Saint Peter and Paul archipelago (pers. obs. T Silva Leite and M Haimovici).

Suborder Incirrata Grimpe, 1916

Eight arms without cirri. Fins absent. Shell vestige, a pair of curved rods (or absent).

Superfamily Argonautoidea Naef, 1912

67. ***Haliphron atlanticus*** Steenstrup, 1861
(Figure 15.67 a-c)

Diagnosis. Single species family. Large size pelagic gelatinous octopods with a short mantle and wide head with very large eyes. Arms relatively short with a very deep web. Suckers small in one row within the web, two rows outside the web and again one row in the tip of the arms. Third right arm hectocotylized developed in a sac in front of the right eye. Funnel embedded in the head tissue and opens in front of the eyes. Mantle length to 40 cm, total length to 200 cm. *Allposus mollis* Verrill, 1880 is a synonym.

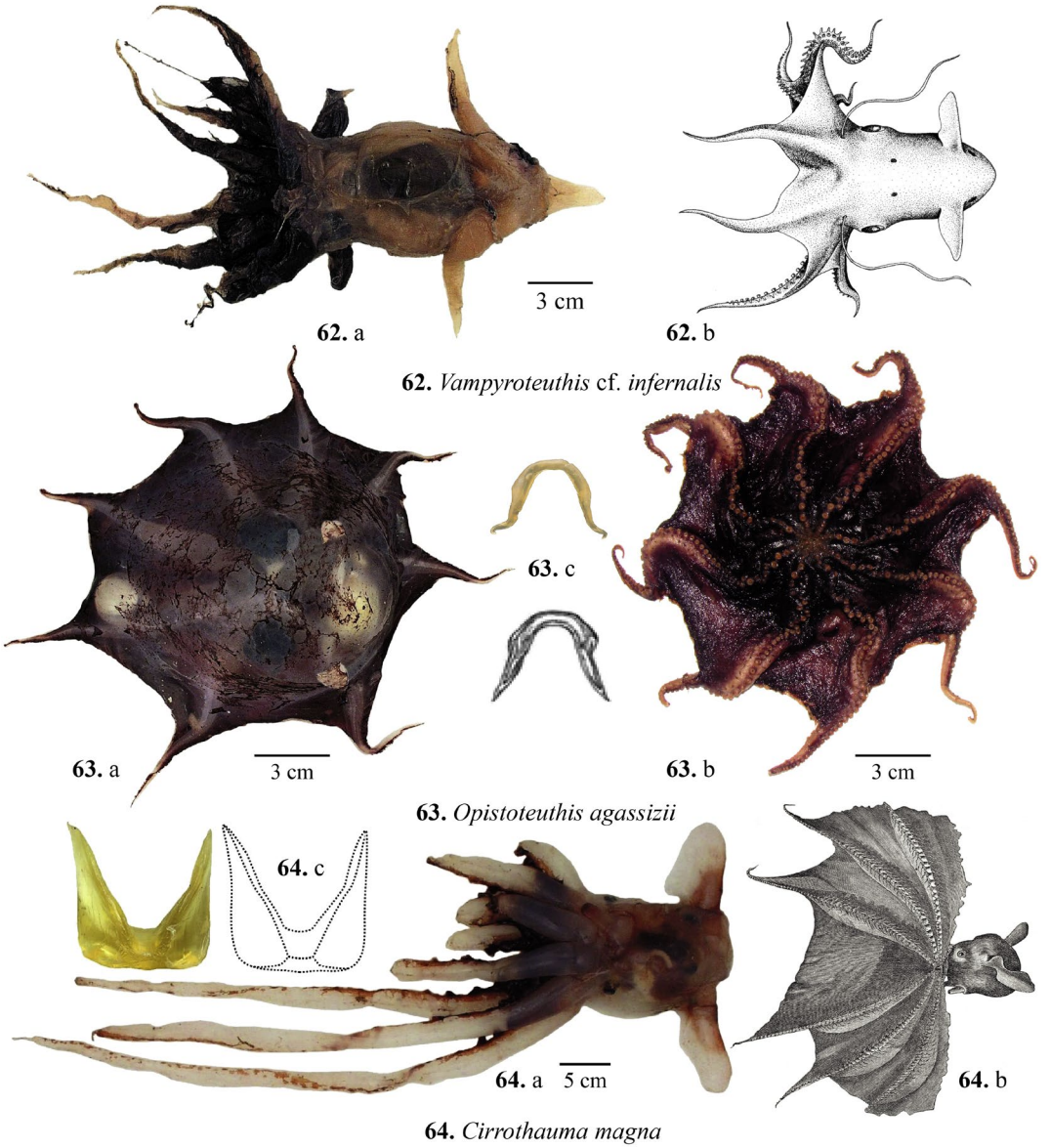


Figure 14. Species of the families Vampyroteuthidae, Opistoteuthidae and Cirrotheutidae from Brazil: habitus taken from fresh or preserved specimens. 62 a: dorsal view of damaged specimen. 62 b: adult dorsal view. 63 a: adult dorsal view. 63 b: adult ventral view. 63 c: shell. 64 a: dorsal view damaged specimen. 64 b: adult dorsal view. 64 c: shell. 62 a, 63 a, 64 a and c from Haimovici et al. (2007). 62 b from Cooke et al. (1895). 64 b from Wikipedia.

Habitat and distribution. Adults meso- to bathypelagic and juvenile pelagic to bathypelagic. Cosmopolitan, mainly above slopes and submarine rises. (Nesis 1982). In Brazil, recorded on the slope of the central region and from stomach contents of oceanic predators from northeastern region (Vaske 2009b), bottom trawl surveys (Haimovici et al. 2007), and a large dead specimen from the tropical oceanic island of Fernando de Noronha Archipelago (Lima et al. 2017).

Family Argonautidae Naef, 1912

Pelagic octopuses with marked sexual dimorphism, firm consistency and biserial suckers on arms. Females with dorsal first pair of arms with a broad membranous flap that secretes and holds a thin shell to which the eggs are attached. Dwarf males. Third left arm hectocotylized with very long filamentous tip, coiled in a sac below the eye. The hectocotylus self-amputees after copula and remains with the female. Keys for shells and adult females morphometrics in Nesis (1982) and Finn (2016).

68. ***Argonauta argo*** Linnaeus, 1758
(Figure 16.68 a-c)

Diagnosis. Fourth arm is much longer (1.5 to 2 times) than the arm III and 10-20% longer than the arm II. Shell compressed diameter up to 30 cm, narrow keel width up to 6% of the shell diameter. Ribs smooth, more than 50 in large shells, each rib terminating on the keel in an acute tubercle. Early part of the shell is dark brown and the rest white. Sides of shell with projections or 'ears'. Diameter of the shell up to 25-30 cm in adults.

Habitat and distribution. Epielagic, worldwide in warm seas (Nesis 1982; Finn 2016). In Brazil, shells collected off São Paulo and off Rio de Janeiro by fishing boats (Perez and Haimovici 1991a; Perez et al. 2004).

69. ***Argonauta nodosus*** Lightfoot, 1786
(Figures 16.69 a-d and 21.98)

Diagnosis. Arm I shorter than II and not longer than III. Shell inflated, up to 25-30 cm diameter in adults, broad keel width about 15% of the total diameter. Up to 30-40 ribs representing chains of separate tubercles or nodules (3 to 5 per 20 mm). Distinguished from *A. argo* by the wider keel.

Habitat and distribution. Epipelagic, worldwide in warm waters (Nesis 1982; Finn, 2016). Along Rio Grande do Sul and Uruguay found mostly during summer and extreme oceanographic events (Haimovici and Andriguetto 1986; Perez and Haimovici 1991a; Scarabino 2003; Demicheli et al. 2006).

Family Ocythoidae Gray, 1849

70. ***Ocythoe tuberculata*** Rafinesque, 1814
(Figure 16.70 a and b)

Diagnosis. Firm body. Web greatly reduced. Ventral side of mantle in adult females with reticular sculpture of crossing skin ridges and tubercles at crossing points. One pair of water pores on the ventral side of the head. Funnel very short. No web and arm fringe. Arms long, I and IV much longer than II and III arms. Suckers small, in two rows. Adult males with the arm III hectocotylized. Eggs developing in oviducts of female, hatched larvae extruded. Males were observed inside the body of doliolids and salps. Mantle length is up to 30 cm in females and up to 3 cm in males (Roper and Sweeney 1976).

Habitat and distribution. Epipelagic tropical-subtropical, cosmopolitan (Nesis 1982). Found in stomach contents of sharks and tunas caught along southern and northeastern Brazil (Perez and Haimovici 1991a; Santos and Haimovici 2002; Vaske 2005).

Family Tremoctopodidae Tryon 1987

Firm body. Two pairs of cephalic water pores. Females larger than males. Suckers small, in two rows. Arms of the first two pairs are connected by a web continuing into a fringe on both sides of arm I and dorsal side of II. No fringe on arms III and IV, web between them is poorly developed. Arms I and II are much longer than III and IV ones. Funnel of medium size. Males are very small with the third right arm hectocotylized.

71. ***Tremoctopus violaceus*** Delle Chiaje, 1830
(Figures 16.71 and 21.99)

Diagnosis. Large pelagic octopus. Mantle muscular

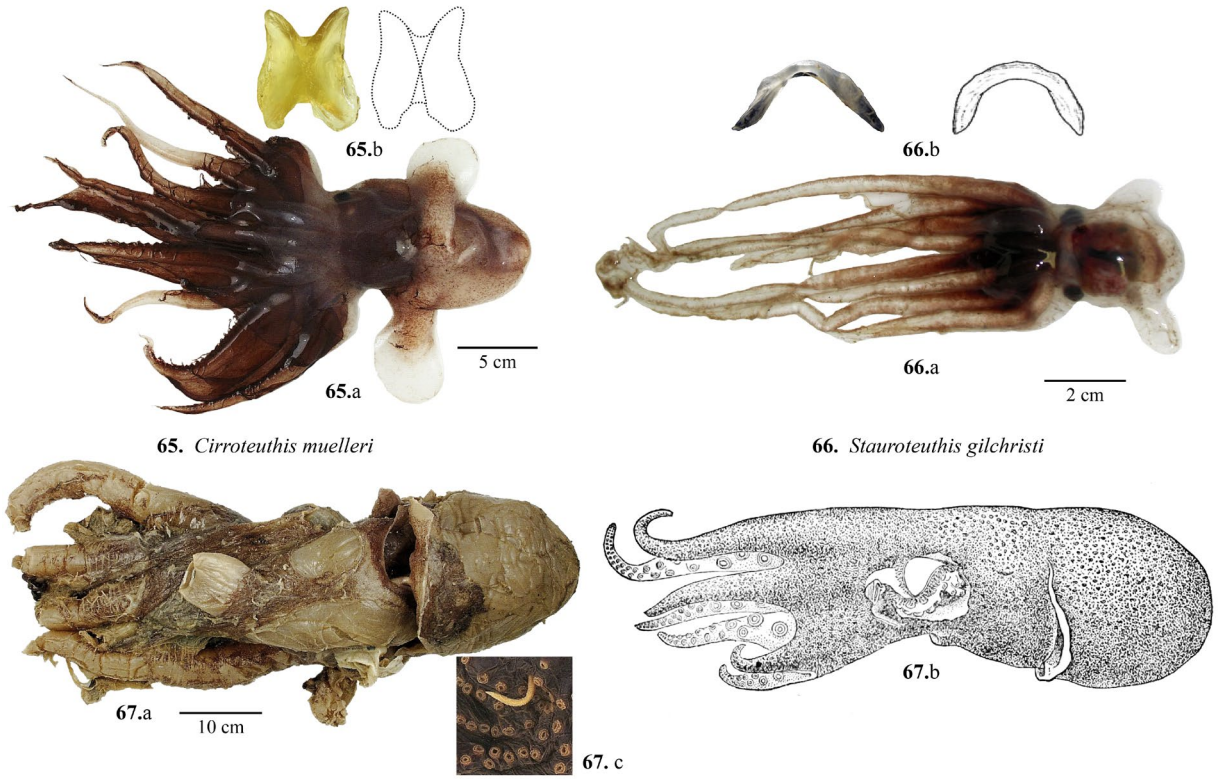


Figure 15. Species of the families Cirrotheutidae, Stauroteuthidae and Alloposidae: habitus taken from fresh or preserved specimens. 65 a: adult dorsal view. 65 b: shell. 66 a: adult dorsal view. 66 b: shell, adult dorsal view. 6 7a: adult dorsal view of damaged specimen. 67 b: adult lateral view. 67 c: shell. 65 a and b, 67 a and c from Haimovici et al. (2007). 67 b from Wikipedia.

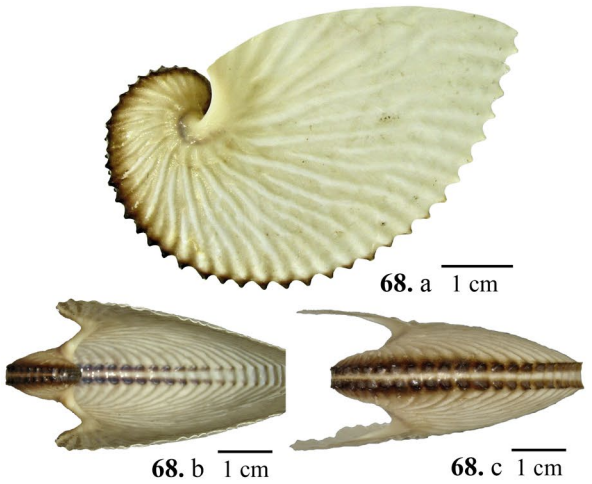
and wide. Head narrower than mantle and bears laterally-directed eyes. One pair of water pores on the dorsal surface of the head, between the eyes and another pair ventrally, adjacent to the funnel. First arms are the longest. The web is well developed. Suckers are small, in two rows. Funnel of medium size. Males are very small. Third right arm is hectocotylized. Thirteen to sixteen filaments in the demibranches of females gills and nine to ten in males. Adult females are dark blue-purple dorsally and light golden ventrally. Males and juveniles are bright with small dark points. Eggs small carried by females on the basal part of 1st arm. Maximum ML of females 50 cm. A full description in Thomas (1977).

Habitat and distribution. Oceanic epipelagic species. Tropical and subtropical waters of the Atlantic Ocean in both hemispheres (Nesis 1982). Paralarvae to adults found off northeastern to southern Brazil, frequently found in large pelagic predator's stomach contents (Haimovici et al. 1989, 2002; Santos and Haimovici 2002, 2007; Vaske and Lessa 2005).

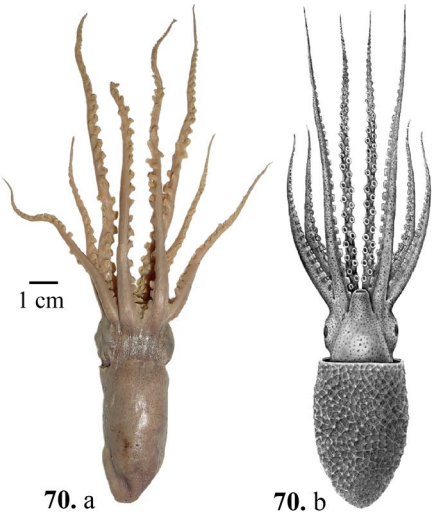
Superfamily Octopodoidea d'Orbigny, 1839
Family Amphitretidae Hoyle, 1886
Subfamily Amphitretinae Hoyle, 1885

72. ***Amphitretus pelagicus*** Hoyle, 1885
(Figure 17.72)

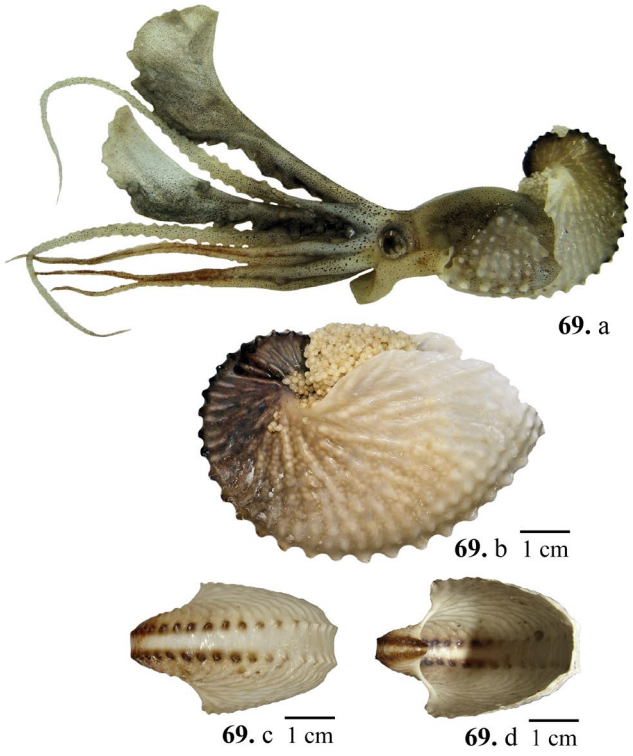
Diagnosis. Body semitransparent, involved in a



68. *Argonauta argo*



70. *Ocythoe tuberculata*



69. *Argonauta nodosus*

71. *Tremoctopus violaceus*

Figure 16. Species of the families Argonautidae, Ocythoidae and Tremoctopodidae from Brazil: habitus taken from fresh or preserved specimens. 68 a: egg case lateral view. 68 b: egg case dorsal view. 68 c: egg case ventral view. 69 a: adult lateral view. 69 b: egg case lateral view. 69 c: egg case dorsal view. 69 d: egg case ventral view. 70 a: adult dorsal view. 70 b: adult ventral view. 71: adult dorsal view. 68 a-c, 69 a-d, 70 a and 71 from Haimovici et al. (2009). 70 b from Jereb et al. (2016).

layer of gelatinous tissue. Mantle fused with a very long funnel. Mantle opening is reduced to two small lateral lists. Eyes elongate, tubular directed upward. Stomach anterior to digestive organ (liver). Arms long with one row of suckers. Third arm hectocotylized. Small species, ML up to 90 mm ML (Nesis, 1982).

Habitat and distribution. Meso-bathypelagic species, tropical and subtropical in all oceans. Several subspecies described (Nesis 1982). In Brazil recorded on the slope of the central region and oceanic islands (Haimovici et al. 2007).

Subfamily Bolitaeninae Chun, 1915

Deep sea octopuses, body gelatinous, pigmented. Arms short, III is the longest. Umbrella of modest size, suckers in one row. Mantle aperture wide. Ink sac present. A luminous organ under the integument around the mouth in adult females (Nesis 1982).

73. ***Bolitaena pygmaea*** (Verrill, 1884)
(Figure 17.73 a and b)

Diagnosis. Eyes small, in adults less than 6% ML. Optic nerves long and optic ganglia near the eyes. Suckers small, distance between neighboring suckers larger than sucker diameter. Arm III left hectocotylized, with enlarged suckers after the midline part of arm III. Maximum depth of umbrella 33-50% of longest arm. Red tones dominate coloration. Very small, ML up to 2 cm.

Habitat and distribution. Bathypelagic species, cosmopolitan tropical-subtropical (Nesis 1982). In Brazil, adults recorded in the slope of the central region (Haimovici et al. 2007) and paralarvae in southern Brazil (Ortiz et al. 2024).

74. ***Japetella diaphana*** Hoyle, 1885
(Figure 17.74 a and b)

Diagnosis. Small species. Eyes large, located on sides of head. Optic nerves short and optic ganglia near the circumoral brain. Suckers large, distance between neighboring suckers shorter than sucker diameter. Maximum depth of umbrella 25-33% of longest arm. Brown tones dominate coloration. No hectocotylus, only some enlarged suckers in the middle part of the arm III. Eggs small, connected by stalks. Very small species ML up to 4 cm.

Habitat and distribution. Bathypelagic species, tropical-subtropical cosmopolitan (Nesis 1982). In Brazil, one specimen recorded from Rio Grande do Sul (Haimovici and Perez 1991a, Perez and Haimovici (1993). Otherwise, their conspicuous beaks were frequently recorded in the stomach contents of oceanic predators (Santos and Haimovici 2002; Vaske 2005).

Subfamily Vitroeledonellinae Robson, 1932

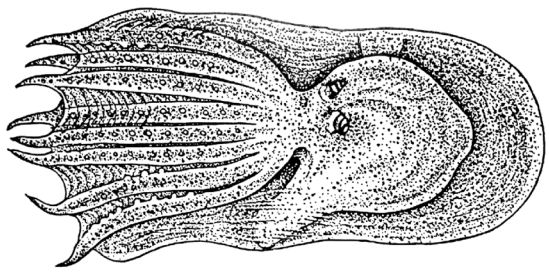
75. ***Vitreledonella richardi*** Joubin, 1918
(Figure 17.75)

Diagnosis. Gelatinous, transparent and almost colorless body. Suckers in a single series, with suckers abruptly enlarged beyond the web and widely separated from one another. Rectangular-shaped eyes in frontal view. Left arm III hectocotylized; spherical vesicle present near tip; other arms, in males, with suckers abruptly enlarged beyond web. Small species.

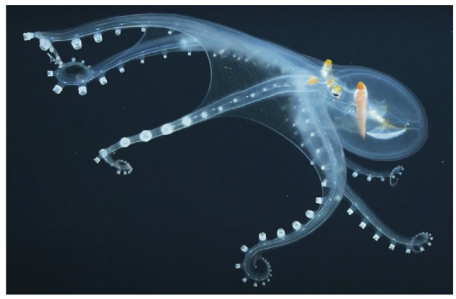
Habitat and distribution. Meso to bathypelagic species. Cosmopolitan distribution in tropical and subtropical waters (Nesis 1999). In northern Brazil, collected from stomach contents of tunas (Vaske 2005).

Family Eledonidae Grimpe, 1921

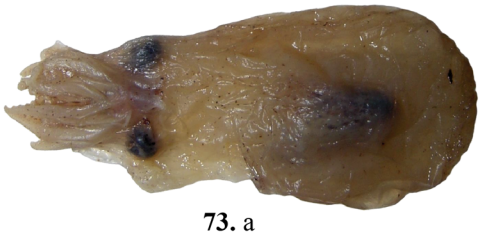
76. ***Eledone gaucha*** Haimovici, 1988
(Figure 18.76)



72. *Amphitretus pelagicus*

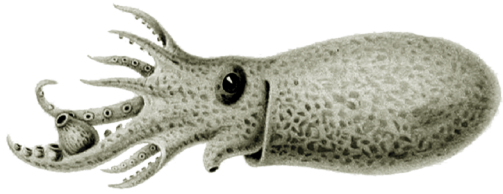


75. *Vitreledonella richardi*



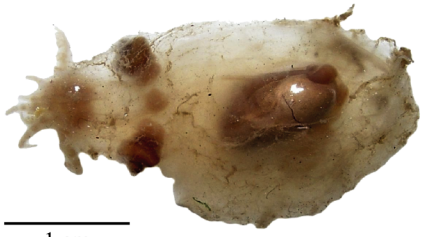
73. a

1 cm



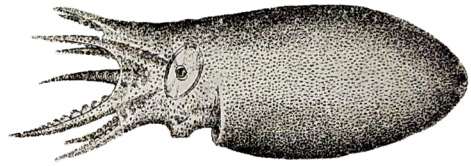
73. b

73. *Bolitaena pygmaea*



1 cm

74. a



74. b

74. *Japetella diaphana*

Figure 17. Species of the Family Amphitretidae from Brazil: habitus taken from fresh or preserved adult specimens. 72: adult lateral view. 73 a: dorsal view of damaged specimen. 73 b: adult lateral view. 74 a: dorsal view of damaged specimen. 74 b: adult lateral view. 75: lateral view of live specimen *in situ*. 72 from Nesis (1982). 73 a and 74 a from Haimovici et al. (2007). 73 b and 74 b by E. Rübsaamen non copyright image in the web. 75 from Wikipedia.

Diagnosis. Mantle oval, narrow head and constricted neck, wide mantle aperture. Smooth skin brownish grey dorsally and ventrally. Thin long arms decreasing in size from pair I to IV. In males, third right arm hectocotilized and shorter of the opposite one (41-65%). Ligula small with no differentiation of the calimus. Seven to ten gill lamellae in the outer demibranch. Spermatophores 15 to 20 mm long and less than 1 mm in diameter, eggs larger diameter up to 7 mm. Small species, ML is usually under 5 cm. A full description in Haimovici (1988).

Habitat and distribution. Benthic species, on the outer shelf and upper slope from Rio de Janeiro to Rio Grande do Sul (Haimovici and Perez 1991a, 1995; Perez et al. 1997).

77. ***Eledone massyae*** Voss, 1964
(Figure 18.77)

Diagnosis. Mantle oval, broad, lateral periphery surrounded by a cutaneous fold or ridge. Wide mantle aperture, no neck constriction. Stout arms

with moderately deep web. In males, third right arm hectocotilized and shorter than the opposite one (59-82%). Ligula small with no differentiation of the calimus. Spermatophores up to 25 mm long and diameter more than 1 mm. and eggs, larger diameter 7 to 10 mm. Eight to ten gill lamellae in the outer demibranch. Mantle gray dorsally and whitish ventrally. Small to mid-sized octopus, ML up to 10 cm. A full description in Voss GL (1964).

Habitat and distribution. Benthic species. From central Brazil to Chubut, in Argentina (Voss GL, 1964; Perez and Haimovici 1991b; Ré 1998, 2007; Guerrero-Kommritz, 2006). In Brazil it is a common species on the outer shelf of Rio Grande do Sul to Rio de Janeiro (Haimovici and Andriguetto, 1986; Perez and Haimovici 1991a; Costa and Haimovici 1990; Perez and Haimovici 1995).

Note. Guerrero-Kommritz (2006) reported small female (ML 2 cm) with long arms with uniserial suckers that he identified as aff. *Eledone*, from the upper slope (800 m) off Rio de Janeiro.

Family Enteroctopodidae
Strugnell, Norman, Vecchione, Guzik and Allcock, 2014

Note. The systematics of this newly proposed family based on molecular phylogenetics (Strugnell et al. 2014); includes former Octopodidae with biserial suckers and hectocotylus with non-laminate ligula and well-developed calamus that frequently lack ink sac.

78. ***Muusoctopus oregonae*** (Toll, 1981)
(Figure 18.78)

Diagnosis. Mantle smooth devoid of sculpture. Arms 2.5 to 4 times the ML. Biserial suckers on the arms. Males with hectocotylus on the third right arm 25-33% shorter than opposite one; ligula slender, conical, groove or channel of modest size Ligula 5-7% of hectocotylized arm length. Posterior salivary glands reduced. Crop present. Ink sac absent. Stout, medium sized octopus. A full description in Toll (1981).

Habitat and distribution. Benthic middle-sized species from the continental slope, described for the southern Caribbean Sea (Toll 1981) and one specimen of 14.5 cm ML collected along central Brazil (Haimovici et al. 2007).

Family Megaleledonidae Taki, 1961

One row of suckers on the arms. Dorsal mantle, head and part of the arms covered with papillae or warts. Very small gills. VV funnel organ. Small hectocotylus but clearly differentiated into ligula and calimus. Large eggs.

Note. Guerrero-Kommritz (2006) recorded two small females of this family he identified as aff. *Paraeledone turquetti* collected in the continental slope from the limit between Uruguay and Brazil. This species was recorded for Uruguayan waters by Castellanos, 1970. It is possible this species to be present in Brazilian waters as it occurs in Uruguay (Scarabino 2003). However, its occurrence must be confirmed with further data collections.

Genus Graneledone Voss, 1988

Ink sac absent. Dorsal mantle, head and part of the arms skin beset with raised conical or composite papillae hardened with cartilaginous inclusions (wart-like tubercles). Very small gills. VV funnel organ. Small hectocotylus but clearly differentiated into ligula and calamus. This genus is benthic mostly in bathyal and abyssal of all oceans (Voss GL and Pearcy 1990; Guerra et al. 2000).

79. ***Graneledone yamana***
Guerrero-Kommritz, 2000
(Figure 18.79)

Diagnosis. Short arms around 2 times ML with uniserial suckers, 35-80 on females and 26-70 on males, with two well developed ‘horns’ above the

eyes. Small gills with 5-7 lamellae on the outer demibranch. The third right arm is hectocotylized, the ligula up to 14% of the arm length with a long and well differentiated. Small species ML up to 4.4 cm in (Guerrero-Kommritz (2000).

Habitat and distribution. Endemic in the southwestern Atlantic Ocean at depth from 90 and 1,000 m off the coasts of southern Brazil, Uruguay, and Argentina (Guerrero-Kommnitz 2000, 2006).

80. ***Graneledone*** sp.
(Figure 18.80 a and b)

Diagnosis. Uniserial suckers. Dorsal mantle, head and part of the arms with composite papillae with up to 10 spines and 6 lamellae in the gills. The specimen has long stout arms, four times the ML, wide head and a short global mantle that resemble *Grandeledone antarctica* in its body proportions and differ from the other species of the genus reported from the Atlantic Ocean that have far shorter arms: *G. verrucosa* (Verril, 1881) redescribed by Allcok et al. (2003), *G. macrotyla* (GL Voss, 1976) and *G. yamana* (Guerrero-Kommritz 2000).

Habitat and distribution. Only one specimen of 10 cm ML in poor condition was collected with a trawl net on the lower continental slope along the central region of Brazil (Haimovici et al. 2007).

Genus Vosseledone Palacio, 1978

81. ***Vosseledone charrua*** Palacio, 1978
(Figure 18.81)

Diagnosis. Globular and wide mantle covered with well-spaced papillose warts. Ink sac is large and superficially imbedded. No neck constriction, eyes prominent with 2 papillose cirri over them. Six to seven gill lamellae in the outer demibranch. Short strong arms with large suckers. Radula reduced to 3 elements (a single row of highly modified teeth with vane-like lateral wings plus marginal plates). Right third arm hectocotylized with a large well-defined ligula and deeply grooved calimus. Large eggs and spermatophores. Color reddish. Small to middle- sized octopod, up to 10 cm ML. A full description in Palacio (1978).

Habitat and distribution. Benthic species endemic from the southwestern Atlantic, common on consolidated substrates of relict corals on the upper slope on the continental slope from central Brazil to Uruguay (Palacio 1978; Haimovici and Perez 1991a; Haimovici et al. 2007).

Family Octopodidae Orbigny, 1839

Firm body. Water pores absent. Males with third right or left arm hectocotylized with spoon- like non-filamentous tip. Web normal, reduced or absent. Two rows of suckers on arms. Ink sac is present and functional.

82. ***Amphioctopus burryi*** (GL Voss, 1950)
(Figures 19.82 and 21.100)

Diagnosis. Small round papillae cover the dorsal mantle surface, while ventral surface and oral web are smooth. No ocellus on the mantle. Purplish brown, dark band extending over the inner dorsal surface of each arm. In males, right third arm hectocotylized, ~ 85% the length of opposite arm. Ligula index 4 to 5; 9 to 11 gill lamellae. Small species, in Brazil ML up to 5.5 cm.

Habitat and distribution. Associated to bottoms of sand, mud, broken coral and shells from 18 to 200 m on the lower continental shelf in tropical and subtropical waters of the western and southeastern Atlantic Ocean and Caribbean (Jereb et al. 2014). Records in Brazil from Amapá to Bahia states (Palacio 1977; Haimovici et al. 1994; Sales et al. 2019).

83. ***Lepidoctopus joaquini***
Haimovici and Sales, 2019
(Figure 19.83 a and b)

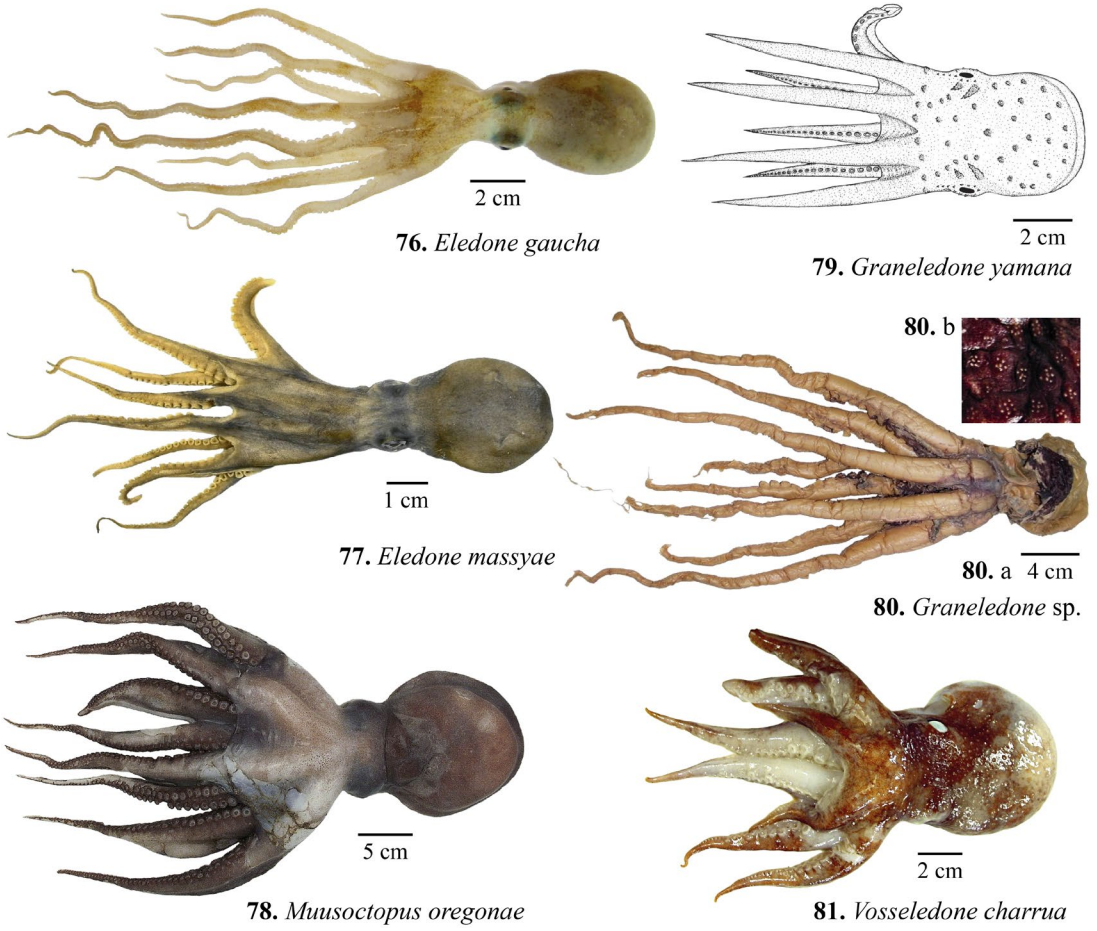


Figure 18. Species of the families Eledonidae, Enteroctopodidae and Megaleledonidae from Brazil: habitus dorsal views of adult specimens. 80 b: detail of skin warts. 76 and 77 from Haimovici et al. (2009). 79 from Guerrero-Kommritz (2000). 80 a and b from Haimovici et al. (2007).

Diagnosis. Mantle, head and base of arms are covered by large rounded papillae-like dermal cushions more densely packed and larger on the dorsal mantle and smaller on the head and web; some papillae on the dorsal mantle bear cirri branched in multiple tips; arms long, I and II around 4.5 times ML, III and IV under 4.0 times ML; web typically half of ML; third left arm of males hectocotylized, ~ 3/4 of the opposite third arm with a short conical calamus and slender ligula with a deep longitudinal groove ending in blunt tip. Females with numerous small oocytes ca 2 mm in the ovaries. Small-sized benthic octopod, up to 5 cm. ML under A full description in Sales et al. (2019).

Habitat and distribution. Recently described species from the Amazonian reef system (Sales et al. 2019) and deep reefs off Curaçao in the southern Caribbean Sea (Pratt et al. 2020).

84. ***Macrotritopus* cf. *defilippi*** (Verany, 1851) (Figures 19.84, 22.101, and 22.102)

Diagnosis. Mantle small when compared to the total length, very long arms, asymmetrical in length,

first 4 to 5 suckers in a single row, the remainder biserial. Very small ligula. Very smooth mantle surface, pale colored with dark pigmentation lines arranged in irregular mesh, becoming denser in the region of the neck and eyes. Small octopods, in Brazil, up to 9 cm ML.

Habitat and distribution. Benthic species inhabit sandy or muddy bottoms in coastal waters of Mediterranean Sea, East and West Atlantic and Indian oceans (Jereb et al. 2016). In Brazil, specimens were recorded from northern and northeast Brazil, including Fernando de Noronha oceanic islands up to Santa Catarina states (Palacio 1977; Salas et al. 2019).

Note. Paralarvae of this genus were collected along northeastern and southern Brazil (Haimovici et al. 2002; Santos and Haimovici 2007). The holotype of this species is from the Mediterranean Sea and the taxonomy of this genus in Brazil is under revision (Leite et al. 2024).

85. ***Octopus americanus*** Montfort, 1802
(Figures 19.85, 22.104, and 22.105)

Diagnosis. Ovoid wide mantle, narrow head with prominent eyes. Rugose skin. Moderately long and stout arms, typically over 3 times ML. The first pair is shorter, second and third are wider. Variable colors. Seven to 11 gill lamellae. Only mature males bear enlarged suckers in the II and III arms. Ligula small and inconspicuous. Small pelagic eggs (2 to 3 mm, longer diameter). Large species, in Brazil may reach up to 20 cm ML and over 3 kg in weight.

Note. Until recently considered part of the *Octopus vulgaris* species complex. Re-described by Avendaño et al. (2020).

Habitat and distribution. Neritic benthic species in subtropical to temperate waters (up to 200 m depth) from North Atlantic up to Uruguay. In Brazil, recorded as *Octopus vulgaris* (Palacio 1977; Haimovici and Andriguetto 1986; Costa and Haimovici 1990; Perez and Haimovici 1991a; Warnke et al. 2004). Fished in southeastern and southern Brazil with pot longlines and as by-catch by shrimp bottom trawlers (Ávila da Silva et al. 2014; Sauer et al. 2019).

86. ***Octopus insularis*** Leite and Haimovici, 2008
(Figures 19.86 and 23.106)

Diagnosis. Rugose reddish-brown skin in preserved specimens. Relatively short, stout arms, typically under 3 times ML. Eight to eleven gill lamellae on the outer demibranch. Small ligula. Produce numerous eggs and pelagic hatchlings. Medium to large size octopus, in northern Brazil may attains 2 kg and over 16 cm ML. A full description in Leite et al. (2008).

Habitat and distribution. Benthic in shallow coastal and reefs in tropical and warm temperate waters from the Caribbean Sea to southern Brazil and South Atlantic islands In Brazil present in reefs of northeastern Brazil and its oceanic islands (Leite and Haimovici 2006, as *Octopus* sp.; Leite et al. 2009). Fished with pot longlines, traps and hand picking and diving along the northeastern region (Haimovici et al. 2014; Sauer et al. 2021).

87. ***Octopus hummelincki*** Adam, 1936
(Figures 19.87 and 22.103)

Diagnosis. Ocellus with dark blue iridescent rings under each eye on the beginning of the second arm. Protruding eyes surrounded by ocular cirri. Small ligula, gill lamellae 5 to 9, small eggs. Color reddish brown in recently caught animals. *O. filosus* Howell, 1867 is considered a synonym. Small species, in Brazil up to 7 cm ML. A full description in Burguess (1966).

Habitat and distribution. Florida Keys, W. Indies, North to South Brazil. Usually associated with calcareous bottoms, coral reefs and patches of Sargas-

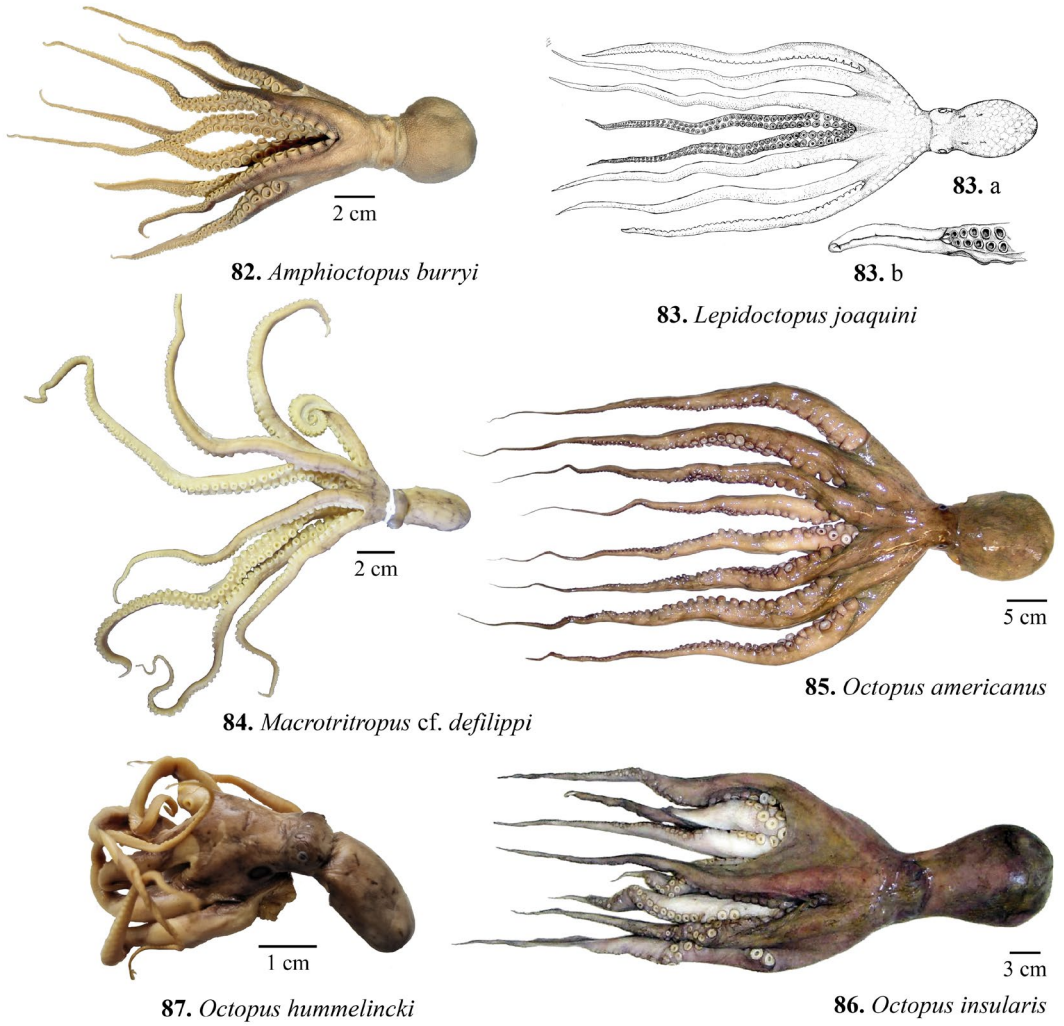


Figure 19. Species of the Family Octopodidae from Brazil: habitus taken from dorsal views of fresh, preserved adult specimens. 83 b: hectocotylus. 82 from Haimovici et al. (2009). 83 a and b from Sales et al. 2019.

sum and Dictyola weeds. Recorded from Maranhão to Rio Grande do Norte and the oceanic islands of northeastern Brazil up to Santa Catarina state (Palacio 1977; Perez and Haimovici 1991a; Leite and Haimovici 2006).

88. ***Paroctopus cthulu***
Leite, Lima, Lima and Haimovici, 2021
(Figures 20.88, 23.110 and 23.111)

Diagnosis. Mantle globular, smooth without ocellae or papillae. Arms very short and subequal. Male with enlarged suckers near the base of arms II and III. Hectocotylized arm shorter. Female lays eggs from 4 up to 10 mm eggs in shells or marine debris. Very small species, with adults up to 4 cm ML and weight around 15 g. A full description in Leite et al (2021).

Habitat and distribution. Benthic shallow water species, recorded from shallow coastal waters of south and southeastern Brazil, where all specimens

were found sheltered in marine debris. Specimens collected off Espírito Santo, Rio de Janeiro up to Santa Catarina (Palacio 1977; Perez and Haimovici 1991a, as *Octopus joubini*; Leite et al 2021).

89. ***Paroctopus tehuelchus*** (d'Orbigny, 1834)
(Figures 20.89 and 23.109)

Diagnosis. Mantle globular with constricted neck. Mantle opening is wide. Arms moderately long and thick, frequently with enlarged suckers. Smooth skin with granulations around the eyes. Small ligula, 5-7 gills filaments on outer demibranch. Large elongated eggs of 15 to 17 mm longer in diameter. Color reddish brown. Small to medium-sized species, in southern Brazil ML up to 8 cm.

Note. Octopus lobensis described by Castellanos and Menni, 1969) was shown to be the same species as *P. tehuelchus* (Pujals, 1994). Recent molecular analysis supports the inclusion of this species in the Genus *Paroctopus* (Leite et al. 2021).

Habitat and distribution. Muddy and rocky coastal bottoms in the southwestern Atltantic Ocean from central Brazil to San Jorge Gulf in Argentina (Palacio 1977; Haimovici and Andriguetto 1986; Costa and Haimovici 1990; Ré 1998).

90. ***Scaeurgus unicirrhus*** (d'Orbigny, 1840)
(Figure 20.90)

Diagnosis. One multifid supraocular cirrus. Mantle is covered with rounded papillae and surrounded by a peripheral ridge. Normal arms with around 170 to 200 suckers and hectocotilized arm with less than 100 suckers. Spoon-shaped big ligula. Eleven to fourteen lamellae on the outer demibranch of gills. Small to medium sized, in Brazil up to 9 cm ML. Ink sac and anal flaps present. A full description in Norman and Hochberg (2005).

Habitat and distribution. Benthic species living from 100 to 800 m on sandy or coralline bottoms. Worldwide distribution in tropical and warm temperate waters (Sánchez and Perez, 1988). Recorded from northern to southern Brazil (Voss GL 1964; Palacio 1977; Perez and Haimovici 1991a; Haimovici et al. 2008; Sales et al. 2019).

91. ***Scaeurgus*** sp.
(Figure 20.91 a and b)

Diagnosis. Body covered with few rounded papillae, concentrated in the top of the dorsal mantle. Normal arms with up to 90 suckers. No distinct enlarged sucker in sub-adult males. Webs shallow. Mantle ovoid, with no keel or ridge encircled it. The left third arm hectocotilized, slightly shorter than the opposite arm (~ 70-80%). In a sub-adult specimen, the copulatory organs are small (4.5% of hectcotilized arm), ligula and calamus of similar length. Gills with seven to nine lamellae in the outer demibranchs. Ink sac and anal flaps presents.

Habitat and distribution. This species is being described from two small sized specimens collected at 375-377 m depth from upper slope off Rio Grande do Norte State (pers. obs. T Silva Leite and M Haimovici).

92. ***Pinnoctopus furvus*** (Gould, 1852)
(Figures 20.92 a and b, 23.107, and 23.108)

Diagnosis. Long arms, and the first pair longer. Mantle surface with papillae also subequal rapidly tapering to sharp tip. Funnel small, 9-11 filaments in demibranch. Hectocotylus small with a short broad ligula and a wide, slightly folded calimus. Large species, ML up to 18 cm. Generic name revised in Gónzalez-Gómez et al. (2024).

Note. Formerly reported as *Octopus macropus* (Perez and Haimovici 1991a; Haimovici et al. 1994, 2009). Redescribed by Jesus et al. (2021) as *Callisoctopus furvus.*

Habitat and distribution. Shallow water tropical

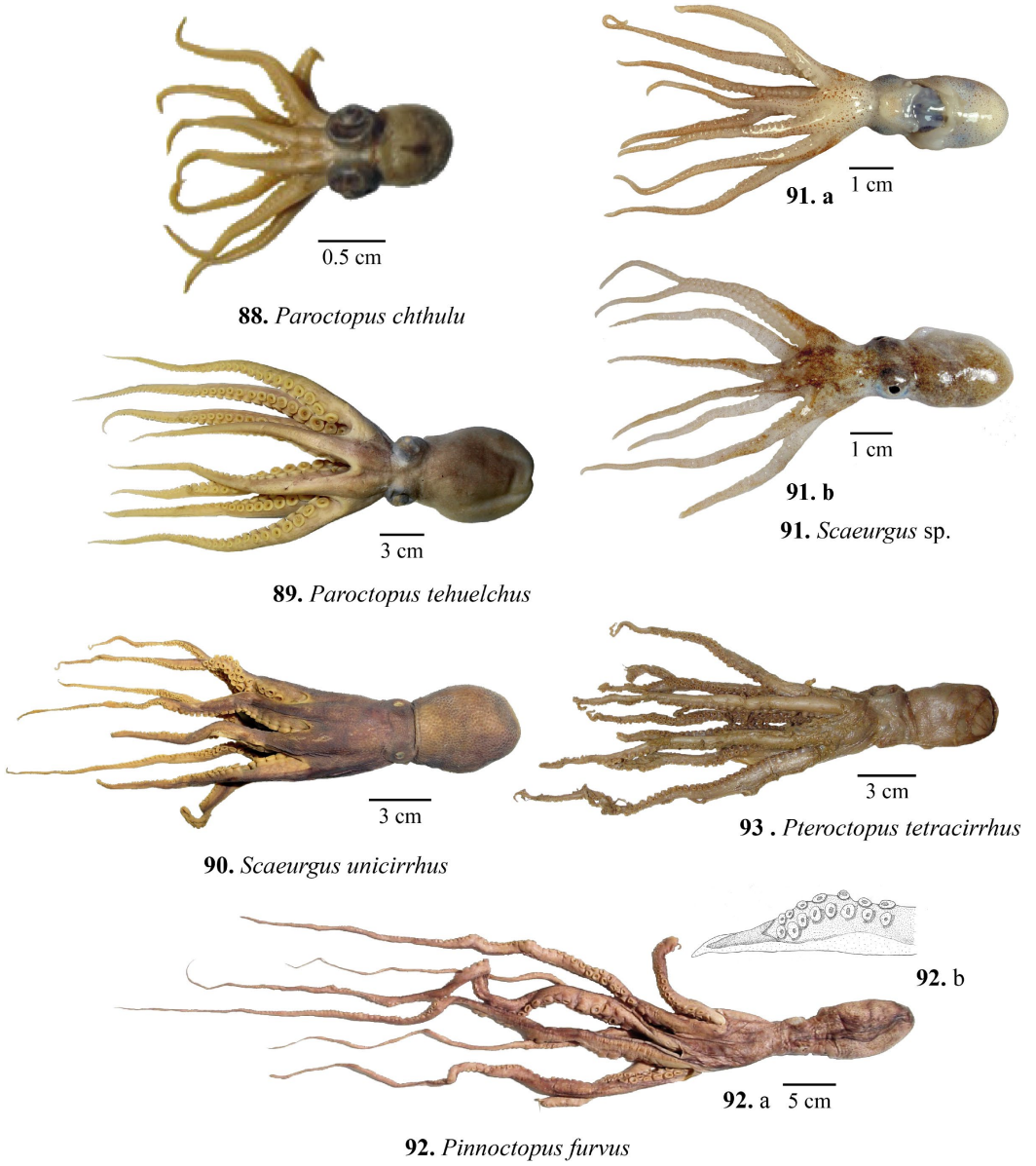


Figure 20. Species of the Family Octopodidae from Brazil: habitus taken from dorsal views of fresh or preserved adult specimens. 91 a: ventral view. 92 b: hectocotylus. 88 from Leite et al. (2021). 89 and 90 from Haimovici et al. (2009). 93 from Haimovici et al. (2007).

species occurring near the coast and in coral reefs in the Caribbean Sea and western Atlantic from Bermuda to northeastern Brazil including the oceanic islands (Palacio 1977; Leite and Haimovici 2006; Gónzalez-Gómez et al. 2024).

93. ***Pteroctopus tetracirrhus*** Delle Chiaje, 1830 (Figure 20.93)

Diagnosis. Sub-gelatinous consistency, 2 long supraocular cirri, mantle covered with covered

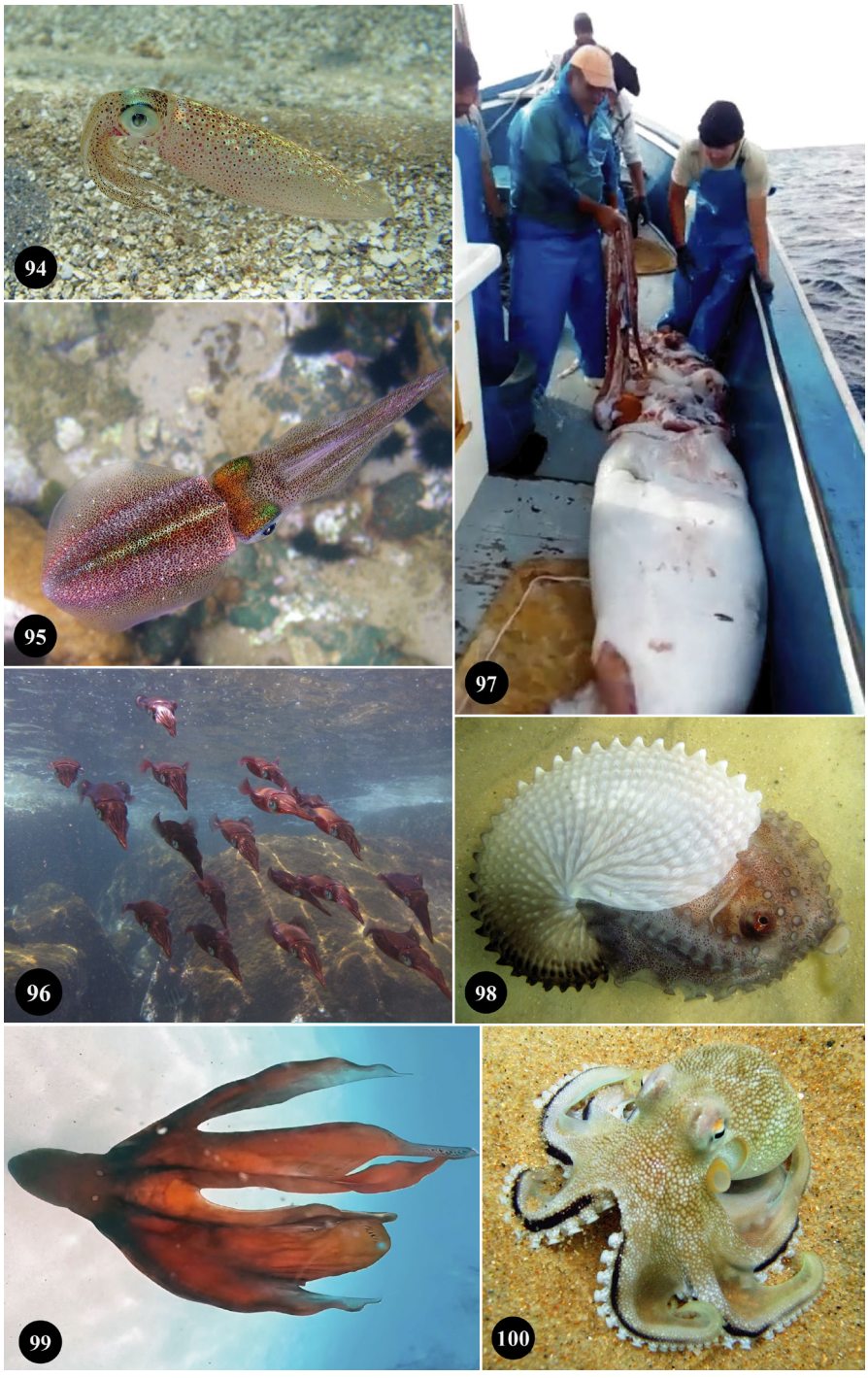


Figure 21. Images of living specimens. 94: *Lolliguncula brevis* (Claudio Sampaio). 95 and 96: *Sepioteuthis* aff. *sepioidea* (Tatiana Silva Leite and Carlos E. L. Ferreira). 97: *Architeuthis dux* recovered by fishers. 98: *Argonauta nodosus* (Tatiana Silva Leite). 99: *Tremoctopus violaceus* (N. Noronha). 100: *Amphioctopus burryi* (Claudio Sampaio).

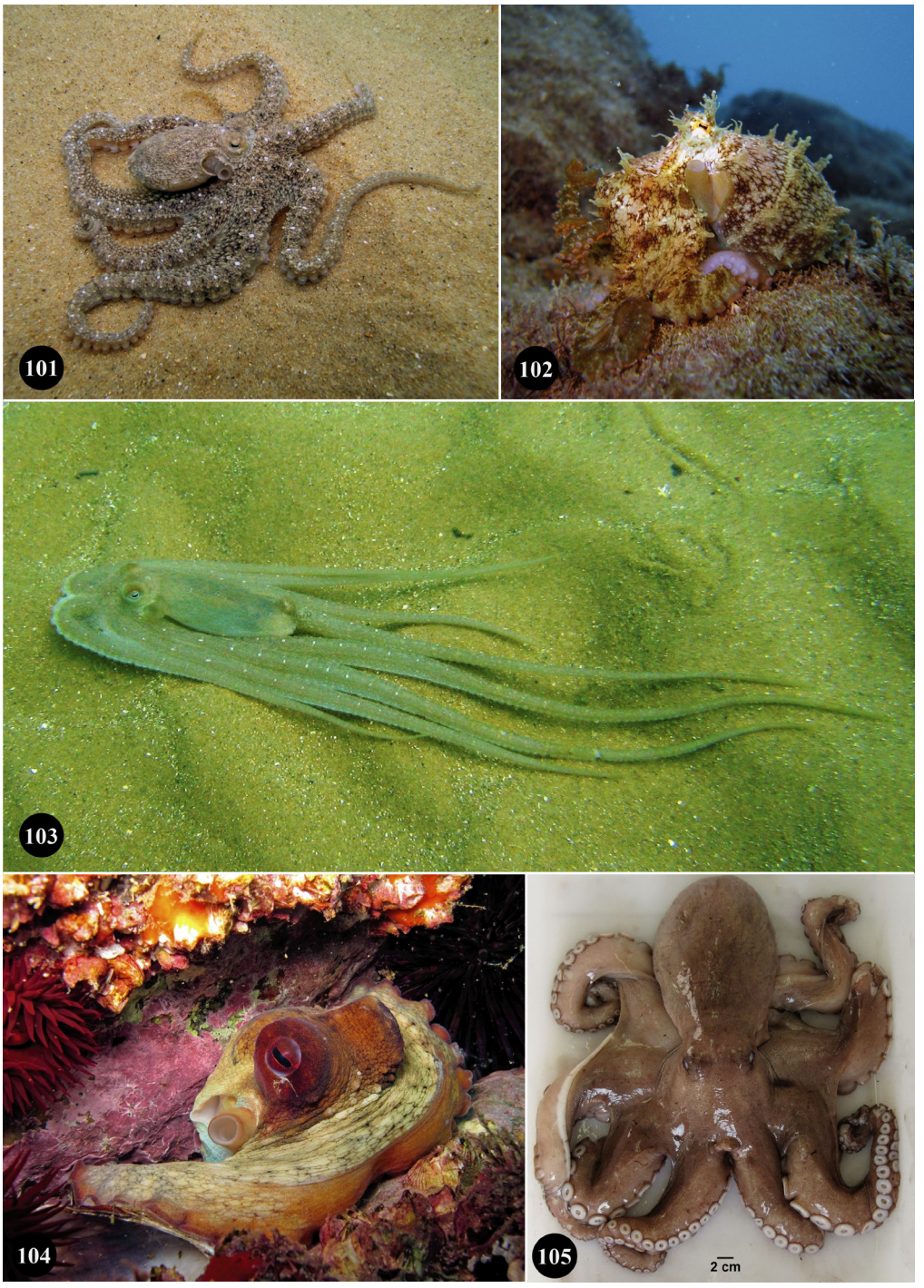


Figure 22. Images of living specimens. 101 and 102: *Macrotritopus* cf. *defilippi* (Claudio Sampaio). 103: *Octopus hummelincki* (Claudio Sampaio). 104 and 105: living and recently caught *Octopus americanus* (F. Moraes and Roberta Aguiar dos Santos).

Figure 23. Images of living specimens. 106: living *Octopus insularis* (A. Bertoncini). 107 and 108: *Pinnoctopus furvus* (Claudio Sampaio and Manuela Jesus). 109: *Paroctopus tehuelchus* (Paulo Okamoto). 110 and 111: *Paroctopus cthulu* (Tatiana Leite).

with tightly spaced low papillae. Wide mantle and head, no neck constriction. Deep web. First 4 to 5 suckers in single row, rest biserial. Third left arm hectocotilized short and stout with a large lateral membrane and big broad ligula. Nine to ten gill lamellae in outer demibranches. Medium sized, up to 16 cm ML. A full description in Guerra (1992).

Habitat and distribution. Benthic species, Atlantic Ocean from the latitude of North Carolina to Uruguay and Mediterranean Sea (Roper et al. 1984). Lives on muddy bottoms up to 720 m, usually 200 to 400 m. Specimens recorded in Rio de Janeiro (Palacio 1977) and deep waters along central Brazil (Haimovici et al. 2007).

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REFERENCES

Adam W. 1937. Résultats scientifiques des croisiéres du navire-école Belge 'Mercator'. IV. Cephalopoda. Mem Mus R d'Hist Nat Belg. 2 (9): 43-82.

Allcock LA. Collins MA. Vecchione M. 2003. A redescription of *Graneledone verrucosa* (Verrill, 1881) (Octopoda: Octopodidae). J Molluscan Stud. 69: 135-143.

Alvarenga MET, Andrade AB, Leite TS, editors. 2024. Guia de identificação de polvos de águas rasas do território brasileiro [livro eletrônico]. 1st ed. Florianópolis. 42 p.

Arfelli CA, Amorim AF, Tomas AR. 1991. First record of a giant squid *Architeuthis* sp Steenstrup, 1857 (Cephalopoda: Architeuthidae) in Brazilian waters. Bol Instit Pesca São Paulo. 18: 83-88.

Arkhipkin AI, Rodhouse PGK, Pierce GJ, Sauer W, Sakai M, Allcock L, Arguelles J, Bower JR, Castillo G, Ceriola L, et al. 2015. World squid fisheries reviews. Fish Sci Aquacult. 23: 92-252.

Arocha F, Marcano L, Cipriani R. 1991. Cephalopods trawled from Venezuelan waters by the R/V Dr. Fridtjof Nansen in 1988. Bull Mar Sci. 49 (1-2): 231-234.

Avendaño O, Roura Á, Cedillo-Robles CE, González ÁF, Rodríguez-Canul R, Velázquez-Abunader I, Guerra Á. 2020. *Octopus americanus*: a cryptic species of the *O. vulgaris* species complex redescribed from the

Caribbean. Aquat Ecol. 54 (4): 909-925.

Avila-Da-Silva A, Assunção R, Tomás AR. 2014. Surgimento e evolução da pesca do polvo-comum, *Octopus vulgaris* Cuvier, 1797, com potes no Estado de São Paulo, Brasil. In: Haimovici M, Andriguetto Filho JM, Sfair Sunye P, editors. A pesca marinha e estuarina no Brasil. Estudos do casos multidisciplinares. Rio Grande: Univesdidade Federal do Rio Grande. p. 101-110.

Begossi A, Duarte, LFL. 1988. New occurrence of *Sepioteuthis sepioidea* (Cephalopoda, Loliginidae) in the Brazilian coast. Malacol Rev. 21: 133-134.

Bolstad KSR. 2010. Systematics of the Onychoteuthidae Gray, 1847 (Cephalopoda: Oegopsida). Zootaxa. 9626. 186 p.

Bolstad KSR, Braid H E, Strugnell J M, Lindgren, AR, Lischka A, Kubodera T, Laptikhovsky VL, Roura Labiaga A. 2018. A mitochondrial phylogeny of the family Onychoteuthidae Gray, 1847 (Cephalopoda: Oegopsida). Mol Phylogenet Evol. 128: 87-97. DOI: https://doi.org/10.1016/j.ympev.2018.05.032

Boyle PR, Rodhouse PG. 2005. Cephalopods. Ecology and fisheries. Oxford: Blackwell Publishing. 452 p.

Brackoniecki TF. 1984. A full description of *Loligo sanpaulensis* Brackoniecki, 1884 and a redescription of *Loligo gahi* d'Orbigny, 1835 two species from the Southwest Atlantic. Bull Mar Sci. 34 (3): 435-448.

Burguess LA. 1966. A study of the morphology and biology of *Octopus hummelincki* Adam, 1936 (Mollusca: Cephalopoda). Bull Mar Sci. 16 (4): 762-813.

Clarke MR. 1996. The role of cephalopods in the world's oceans: an introduction. Phil Trans R Soc Lond. B. 351: 979-983.

Clarke MR, Trueman ER, editors. 1988. The Mollusca. Vol. 12. Paleontology and neontology of cephalopods. San Diego: Academic Press. 355 p.

Collins MA, Henriques C. 2000. A revision of the family Stauroteuthidae (Octopoda: Cirrata) with redescriptions of *Stauroteuthis syrtensis* and *S. gilchristi*. J Mar Biol Assoc UK. 80: 685-697.

Collins MA, Villanueva R. 2006. Taxonomy, ecology and behaviour of the cirrrate octopods. Oceanogr Mar Biol Annu Rev. 44: 277-322.

Cooke AH, Shipley AE, Reed FRC. 1895. Molluscs and brachiopods. Cambridge Natural History. Vol. 3. London: Macmillan. 535 p.

Costa PAS, Haimovici M. 1990. A pesca de polvos e lulas no litoral de Rio de Janeiro. Cienc Cult. 42 (12): 1124-1130.

Costa TA, Sales JB, Markaida U, Granados-Amores J, Gales SM, Sampaio I, Vallinoto M, Rodrigues-Filho LFS. Ready JS. 2021. Revisiting the phylogeny of the genus *Lolliguncula* Steenstrup 1881 improves understanding of their biogeography and proves the validity of *Lolliguncula argus* Brakoniecki and Roper, 1985. Mol Phylogenet Evol. 154: 106968.

D'Orbigny A. 1839. In Ferussac and Orbigny (1834-1848) Voyage dans l'Amerique Meridionale executeé pendant les anneés 1826, 1827, 1828, 1829, 1830, 1831, 1832 et 1833. Tome V. Partie 3. Mollusques. Paris et Strasbourg.

D'Orbigny A. 1845-1855. Mollusques vivants et fossiles. Paris.

Demicheli M, Martínez A, Ortega L, Scarabino F, Maytía S, Demichel A. 2006. Mass stranding of *Argonauta nodosa* Lightfoot, 1786 (Cephalopoda, Argonautidae) along the Uruguayan coast (southwestern Atlantic). Rev Biol Mar Oceanogr. 41 (2): 147-153.

Deville D, Mori S, Kawai K, Escánez A, Macali A, Lishchenko F, Heather B, Githaiga Mwicigi J, Mohamed KLS, et al. 2023. Cryptic biodiversity in the commercial diamondback squid *Thysanoteuthis rhombus* Troschel 1857. Rev Fish Biol Fish. 34: 293-313. DOI: http://doi.org/10.1007/s11160-023-09813-3

Escánez A, Roura A, Riera R, González AF, Guerra A. 2018. New data on the systematics of comb-fin squids *Chtenopteryx* spp. (Ceph-

alopoda: Chtenopterygidae) from the Canary Islands. Zool Stud. 57: 40. DOI: https://doi.org/10.6620/ZS.2018.57-40

[FAO] Food and Agriculture Organization of the United Nations. 2024. The state of world fisheries and aquaculture 2024. Blue transformation in action. Rome: FAO. 264 p. DOI: https://doi.org/10.4060/cd0683en

Fernández-Álvarez FÁ, Braid HE, Nigmatullin CM, Bolstad KS, Haimovici M, Sánchez P, Sajikumar KK, Ragesh N, Villanueva R. 2020. Global biodiversity of the genus *Ommastrephes* (Ommastrephidae: Cephalopoda): an allopatric cryptic species complex. Zool J Linn Soc. 190 (2): 460-482.

Fernández-Álvarez FÁ, Sanchez G, Deville D, Taite M, Villanueva R, Allcock AL. 2023. Atlantic oceanic squids in the "grey speciation zone". Integr Comp Biol. 63 (6): 1214-1225.

Finn JK. 2016. Family Argonautidae. In: Jereb P, Roper CFE, Norman MD, Finn JK, editors. Cephalopods of the world. An annotated and illustrated catalogue of cephalopod species known to date. Octopods and vampire squids. FAO Species Catalogue for Fishery Purposes. 4 (3): 228-237.

Gleadall IG. 2004. Some old and new genera of octopus. Interdiscip Inf Sci. 10 (2): 99-112.

González-Gómez R, Avendaño O, Barriga-Sosa IA, Bastos P, Caamal-Monsreal C, Castillo-Estrada G, Cedillo-Robles C, Daw A, Díaz-Santana-Iturrios M, Galindo-Cortes G, et al. 2024. Biodiversity of octopuses in the Americas. Mar Biol. 171 (10): 189.

Gould AA. 1852. U.S. Exploring expedition. Vol. XII. Mollusca and shells. Boston: Gould and Lincoln. 510 p.

Guerra A. 1992. Mollusca-Cephalopoda. Fauna ibérica. Vol. 1. Madrid: Museo Nacional de Ciencias Naturales, CSIC. 1. 327 p.

Guerra A, Gonzalez AF, Chere Y. 2000. *Graneledone gonzalezi* sp. nov. (Mollusca: Cephalopoda): a new octopod from the Îles Kerguelen. Antarct Sci. 12 (1): 33- 40.

Guerra A, Villanueva R, Nesis KN, Bedoya J. 1998. Redescription of the deep-sea cirrate octopod, *Cirroteuthis magna* Hoyle, 1885, and considerations on the genus *Cirroteuthis* (Mollusca: Cephalopoda). Bull Mar Sci. 63 (1): 51-81.

Guerrero-Kommritz J. 2000. A new species of Graneledone (Cephalopoda: Octopodidae) from the Southwest Atlantic Ocean. J Mollus Stud. 66 (4): 43-49.

Guerrero-Kommritz J. 2006. Octopods (Cephalopoda: Octopoda) with uniserial suckers from the southwest Atlantic Ocean in the Zoological Museum Hamburg. Mitteilungen Hamburgisches Zoologisches Museum und Institut. 103: 11-32.

Haimovici M. 1985. Class Cephalopoda. In: Rios EC, editor. Seashells of Brazil. Rio Grande: Univesdidade Federal do Rio Grande. p. 283-288.

Haimovici M. 1988. *Eledone gaucha*, a new species of eledonid octopod (Cephalopoda: Octopodidae) from southern Brazil. Nautilus. 102 (2): 82-87.

Haimovici M. 1997. Cephalopods. In: Seeliger U, Oderbretch C, Castello JP, editors. Subtropical convergence environments: the coastal and sea in the southwestern Atlantic. Springer. p. 146-149.

Haimovici M, Andriguetto JM. 1986. Composição de espécies e distribuição de cefalópodes costeiros do Rio Grande do Sul. Arquivos Biologia Tecnologia do Paraná. 29 (3): 473-495.

Haimovici M, Brunetti NE, Rodhouse PG, Csirke J, Leta RH. 998. *Illex argentinus*. In: Rodhouse PG, Dawe EG, O'Dor RK, editors. Squid recruitment dynamics. FAO Fish Tech Pap. 376. p. 27-52.

Haimovici M, Costa PAS, Santos RA, Martins AS, Olavo G. 2007. Composição de espécies, distribuição e abundância de cefalópodes do talude da região central do Brasil. In: Costa PAS, Olavo G, Martins AS, editors. Biodiversidade da fauna marinha profunda na costa central brasileira. Série Livros 24. Rio de Janeiro: Museu

Nacional. p. 109-132.

Haimovici M, Leite TS, Marinho RA, Batista B, Madrid RM, Oliveira JE, Lima FD, Candice L. 2014. Capítulo 13: As pescarias de polvos do nordeste do Brasil. In: Haimovici M, Andriguetto JL, Sunye PS, editors. A pesca marinha e estuarina no Brasil: estudos de caso. Rio Grande: Univesdidade Federal do Rio Grande. p. 147-160.

Haimovici M, Perez JAA. 1990. Distribución y maduración sexual del calamar argentino, *lllex argentinus* (Castellanos, 1960) (Cephalopoda: Ommastrephidae), en el sur de Brasil. Scient Mar. 54 (2): 179-185.

Haimovici M, Perez JAA. 1991a. Abundância e distribuição de cefalópodes em cruzeiros de prospeção pesqueira demersal na plataforma externa e talude continental do sul do Brasil. Atlantica. 13 (1): 189-200.

Haimovici M, Perez JAA. 1991b. The coastal cephalopod fauna of southern Brazil. Bull Mar Sci. 49: 221-230.

Haimovici M, Perez JAA, Costa PAS. 1989. A review of cephalopods occurring in the waters of Rio de Janeiro state, Brazil with first record of four species. Rev Bras Biol. 49 (2): 503-510.

Haimovici M, Perez JAA, Santos RA. 1994. Class Cephalopoda Cuvier, 1798. In: Rios EC, editor. Seashells of Brazil. 2nd ed. Rio Grande: Univesdidade Federal do Rio Grande. p. 311-320.

Haimovici M, Perez JAA, Santos RA. 2006. Diagnóstico e orientações para o ordenamento pesqueiro de *Illex argentinus*. In: Cergole MC, Ávila-da-Silva AO, Rossi-Wongtschowski CLDB, editors. Análise das principais pescarias comerciais da região sudeste, sul do Brasil: dinâmica populacional das espécies em explotação. II. Série Documentos Revizee - Score Sul. São Paulo: Instituto Oceanográfico. p. 19-28.

Haimovici M, Piatkowski U, Santos RA. 2002. Cephalopod paralarvae around tropical seamounts and oceanic islands off the north-eastern coast of Brazil. Bull Mar Sci. 71 (1): 313-330.

Haimovici M, Rossi-Wongtschowski CLDB, Bernardes RA, Fischer LG, Santos RA, Rodrigues AR, Vooren CM, Santos S. 2008. A prospecção pesqueira de espécies demersais com rede de arrasto-de-fundo na região sudeste-sul do Brasil. Programa Revizee, Série Relatórios - Score Sul. São Paulo: Instituto Oceanográfico. 183 p.

Haimovici M, Santos RA, Fischer LG. 2009. Cephalopoda. In: Rios EC, editor. Compendium of Brazilian sea shells. Rio Grande: Univesdidade Federal do Rio Grande. p. 610-649.

Hanlon R, Messenger JB. 1996. Cephalopod behaviour. Cambridge: Cambridge University Press. 232 p.

Hoving HJT, Zeidberg LD, Benfield MC, Bush SL, Robison BH, Vecchione M. 2013. First *in situ* observations of the deep-sea squid *Grimalditeuthis bonplandi* reveal unique use of tentacles. Proc R Soc B. 280: 20131463. DOI: http://doi.org/10.1098/rspb.2013.1463

Hoyle WE. 1886. Report on the Cephalopoda collected by H.M.S. Challenger during the years 1873-1876. The voyage of H.M.S. Challenger. Zoology. Vol. 44. Edinburgh: Neill. 246 p.

[ICMBio] Instituto Chico Mendes de Conservação da Biodiversidade. 2024. Sistema de avaliação do risco de extinção da biodiversidade-SALVE. ICMBio. [accessed 2024 Oct]. https://salve.icmbio.gov.br/#/.

Jatta G. 1889. Elenco dei cefalopodi della Vettor Pisani. Bol Soc Nat Napoli Ser I. 3: 63-67.

Jatta G. 1899. Supra alcuni cefalopodi dela Vettor Pisani. Bol Soc Nat Napoli Ser I. 12: 17-32.

Jereb P, Roper CFE, editors. 2005. Cephalopods of the world. An annotated and illustrated catalogue of species known to date. Vol. 1. Chambered nautiluses and sepioids (Nautilidae, Sepiidae, Sepiolidae, Sepiadariidae, Idiosepiidae and Spirulidae). FAO Species Catalogue for Fishery Purposes. 4 (1). 260 p.

Jereb P, Roper CFE, editors. 2010. Cephalopods of the world: an annotated and illustrated cat-

alogue of cephalopod species known to date. Myopsid and oegopsid squids. FAO Species Catalogue for Fishery Purposes. 4 (2). 605 p.

Jereb P, Roper CFE, Norman MD, Finn JK, editors. 2016. Cephalopods of the world. An annotated and illustrated catalogue of cephalopod species known to date. Octopods and vampire squids. FAO Species Catalogue for Fishery Purposes. 4 (3). 370 p.

Jesus MD, Sales JBDL, Martins RS, Ready JS, Costa TAS, Ablett JD, Schiavetti A. 2021. Traditional knowledge aids description when resolving the taxonomic status of unsettled species using classical and molecular taxonomy: the case of the shallow-water octopus *Callistoctopus furvus* from the Western Atlantic Ocean. Front Mar Sci. 7: 595244.

Juanicó M. 1979. Contribuição ao estudo da biologia dos Cephalopoda Loliginidae do Atlântico Sul Ocidental, entre o Rio de Janeiro e Mar del Plata [PhD thesis]. São Paulo: Instituto Oceanográfico Universidade de São Paulo. 102 p.

Kawashima Y, Nishihara H, Akasaki T, Nikaido M, Tsuchiya K, Segawa S, Okada N. 2013. The complete mitochondrial genomes of deep-sea squid (*Bathyteuthis abyssicola*), bobtail squid (*Semirossia patagonica*) and four giant cuttlefish (*Sepia apama*, *S. latimanus*, *S. lycidas* and *S. pharaonis*), and their application to the phylogenetic analysis of Decapodiformes. J Mol Phylogenet Evol. 69 (3): 980-993.

Kelly JT. 2019. Systematics of the Octopoteuthidae Berry, 1912 (Cephalopoda: Oegopsida) [dissertation]. Auckland: Auckland University of Technology.

Leite TS, Andrade LCA, Santos RA, Haimovici M, Oliveira EJL. 2009. Cefalópodes do Arquipélago de São Pedro e São Paulo, Brasil. In: Mohr LVM, Castro JWA, Costa PMS, Válka R, editors. Ilhas Oceânicas Brasileiras: da Pesquisa ao Manejo. Vol. II. Brasília: Ministério do Meio Ambiente. p. 426-446.

Leite TS, Haimovici M. 2006. Conhecimento presente da biodiversidade e habitat dos polvos (Cephalopoda: família Octopodidae) de águas rasas das ilhas oceânicas do nordeste brasileiro. In: Alves RJV, Alencar Castro JW, editors. Ilhas Oceânicas Brasileiras-da pesquisa ao manejo. Brasília: Ministério do Meio Ambiente. p. 119-214.

Leite TS, Haimovici M, Molina W, Warnke K. 2008. Morphological and genetic description of *Octopus insularis* new species (cephalopoda: octopodidae), a cryptic species in the *Octopus vulgaris* complex from the tropical Southwestern Atlantic. J Molluscan Stud. 74 (1): 63-74.

Leite TS, Melo CC, Vidal EAG, Sales JBL, Specht LM, Côrtes MO, Schroeder R, Schwarz R, Martins RS, Santos RA, editors. 2024. *Macrotritopus defilippi* (Vérany, 1851). Sistema de avaliação do risco de extinção da biodiversidade-SALVE. Instituto Chico Mendes de Conservação da Biodiversidade (ICMBio). DOI: https://doi.org/10.37002/salve.ficha.38989.1

Leite TS, Vidal EAG, Lima FD, Lima, SM, Dias, RM, Giuberti GA, Vasconcellos D, Mather JA, Haimovici M. 2021. A new species of pygmy *Paroctopus* Naef, 1923 (Cephalopoda: Octopodidae): the smallest southwestern Atlantic octopod, found in sea debris. Mar Biodivers. 51 (4): 1-23.

Lima F, Leite TS, Mendes L, Veras L, Lima SMQ. 2017. The seven-arm octopus, *Haliphron atlanticus* Streenstrup, 1861 (Cephalopoda, Alloposidae), in the Fernando de Noronha archipelago, Brazil. Check List. 13 (1): 1-5. DOI: https://doi.org/10.15560/13.1.2036

Martins RS, Perez JAA. 2009. A new record of giant squid *Architeuthis* sp. (Cephalopoda: Oegopsida) in Brazilian waters. Zoologia (Curitiba). 26 (4): 613-623.

Massy A. 1916. Mollusca. Part II. Cephalopoda. British Antartic Terra Nova Expedition, 1910. Zool. 2: 141-175.

Migliavacca PP, Simone LRL. 2020. Morphological comparison between *Doryteuthis pleii* and *D. sanpaulensis* (Cephalopoda, Myopsida,

Loliginidae) from Brazil. Pap Avulsos Zool. 60: e20206001.

Nesis KN. 1999. Cephalopoda. In: Boltoskoy D, editor. South Atlantic zooplankton. Leiden: Bachhuys Publishers. p. 707-795.

Nesis KN. 1982. Abridged key to the cephalopod mollusks of the world's ocean. Moscow: Light and Food Industry Publishing House. 385 p. Russian.

Nishiguchi MK, Lopez JE, Boletzky SV. 2004. Enlightenment of old ideas from new investigations: more questions regarding the evolution of bacteriogenic light organs in squids. Evol Develop. 6 (1): 41-49.

Nixon M, Young JZ. 2003. The brains and lives of cephalopods. Oxford: Oxford University Press. 392 p.

Norman MD. 2003. Cephalopoods of the world guide. 2nd ed. Hackenheim: Conchbooks. 320 p.

Norman MD, Hochberg FG, Boucher-Rodoni R. 2005. A revision of the deep-water octopus genus *Scaeurgus* (Cephalopoda: Octopodidae) with description of three new species from the southwest Pacific Ocean. J Molluscan Stud. 71 (4): 319-337.

O'Shea S. 1999. The marine fauna of New Zealand: Octopoda (Mollusca: Cephalopoda). NIWA Biodivers Mem. 112. 280 p.

Okutami T. 1995. Cuttlefishs and squids of the world. Tokyo: National Cooperative Association of Squid Processors. 185 p.

Ortiz DO, Baldoni LC, Muxagata E, Vidal EAG. 2024. Cephalopod paralarvae from the southeast-south Brazilian outer shelf and slope. Mar Biol. 171 (4): 84. DOI: https://doi.org/10.1007/s00227-024-04401-w

Palacio JF. 1977. A study of the coastal cephalopods from Brazil with reference to Brazilian zoogeography [PhD thesis]. Miami: University of Miami. 311 p.

Palacio JF. 1978. *Vosseledone charrua*: a new Patagonian cephalopod (Octopodidae) with notes on related genera. Bull Mar Sci. 2812: 282-296.

Perez JAA, Aguiar DC, Oliveira UC. 2002. Biology and population dynamics of the long-finned squid *Loligo plei* (Cephalopoda: Loliginidae) in southern Brazilian waters. Fish Res. 58 (3): 267-279.

Perez JAA, Haimovici M. 1991a. A review of cephalopod collection of "Museu de Zoologia" of the Universidade de São Paulo. Pap Avulsos Zool. 37 (16): 251-258.

Perez JAA, Haimovici M. 1991b. Sexual maturation and reproductive cycle of *Eledone massyae* Voss, 1964 (Cephalopoda: Octopodidae) in southern Brazil. Bull Mar Sci. 49 (1-2): 270-279.

Perez JAA, Haimovici M. 1993. Cefalópodes coletados em quatro cruzeiros de prospecção pesqueira demersal no talude continental do Sul do Brasil entre Chuí (34°30'S) e o Cabo de Santa Marta Grande (28°40'S). Atlantica. 15: 49-72.

Perez JAA, Haimovici M. 1995. The descriptive ecology of two South American eledonids (Cephalopoda; Octopodinae). Bull Mar Sci. 56: 752-766.

Perez JAA, Haimovici M, Santos RA. 1997. Observations on the sexual maturation and reproductive cycle of *Eledone gaucha* Haimovici, l988 in southern Brazil. Bull Am Malacol Soc. 141 (1): 81-84.

Perez JAA, Martins RS, Santos RA. 2004. Cefalópodes capturados pela pesca comercial de talude no Sudeste e Sul do Brasil. Notas Téc FACIMAR. 8: 65-74.

Perez JAA, Pereira BN, Pereira DA, Schroeder R. 2013. Composition and diversity patterns of megafauna discards in the deep-water shrimp trawl fishery off Brazil. J Fish Bio. 83 (4): 804-825.

Pfeffer G. 1912. Die cephalopoden der plankton expedition. Ergebnisse der Plankton-Expedition der Humboldt-Stiftung. 2: 1-815.

Piatkowski U, Pierce GJ, Cunha MM. 2001. Impact of cephalopods in the food chain and their interaction with the environment and fisheries: an overview. Fish Res. 52 (1-2): 5-10.

Pickford GE. 1945. Le poulpe Americain. A study

of the littoral Octopoda of the western Atlantic. Trans Conn Acad Sci. 36: 701-811.

Pickford GE. 1955. A revision of the Octopodinae in the collections of the British Museum. Bull Br Mus Nat Hist. 3 (3): 152-157.

Pratt A, Baldwin C, Vecchione M. 2020. Octopods of deep reefs off Curaçao, southern Caribbean including description of one newly discovered species. Bull Mar Sci. 96 (2): 297-308.

Pujals MA. 1984. Variaciones morfológicas de *Octopus tehuelchus* d'Orbigny, 1835 y la validez de *Octopus lobensis* Castellanos y Menni, 1969 (Mollusca: Cephalopoda). Neotrópica. 30 (84): 181-186.

Qiu D, Liu B, Guo Y, Lakmini ASW, Tan Y, Li G, Kel Z, Huang L. 2023. *Vampyroteuthis pseudoinfernalis* sp. nov.: the second extant widespread deep sea squid species of Vampyromorpha (Cephalopoda: Coleoidea). bioRxiv.

Ré ME. 1998. Pulpos octopódidos (Cephalopoda, Octopodidae). In: Boschi EE, editor. El Mar Argentino y sus recursos pesqueros. Tomo 2. Mar del Plata: Instituto Nacional de Investigación y Desarrollo Pesquero (INIDEP). p. 69-98.

Ré ME. 2007. Cefalópodos. *Illex argentinus*. In: Boltovskoy D, editor. Atlas de sensibilidad ambiental de la costa y el Mar Argentino [CD-ROM]. Buenos Aires: Secretaría de Ambiente y Desarrollo Sustentable.

Rios EC. 1975. Brazilian marine mollusks iconography. Rio Grande: Univesdidade Federal do Rio Grande. 329 p.

Robson GC. 1929a. A monograph of the recent cephalopoda. Part I. Octopodinae. London: British Museum. 236 p.

Robson GC. 1929b. Notes on Cephalopoda. IX. Remarks on Atlantic octopoda in the Zoologisch Museum, Amsterdan. Ann Mag Nat Hist. 3 (10): 609-618.

Robson GC. 1931. A monograph of the recent cephalopoda. Part II. The Octopoda. London: British Museum. 369 p.

Roper CFE, Sweeney MJ. 1976. The pelagic octopus *Ocytoe tuberculada* Refinesque, 1814. Bull Am Malacol Union. p. 21-28.

Roper CFE, Sweeney MJ, Nauen CE. 1984. FAO species catalogue. Vol 3. Cephalopods of the world. Annoted and illustrated catalogue of species of interest to fisheries. FAO Fish Synop. 125 (3). 227 p.

Rotermund N, Guerrero-Kommritz J. 2010. Taxonomy and biogeography of the genus *Heteroteuthis* (Mollusca: Cephalopoda) in the Atlantic Ocean. J Mar Biol Assoc UK. 90 (2): 367-390.

Salcedo-Vargas MA. 1996. Cephalopods from the Netherlands Indian Ocean Programme (NIOP)-1. *Chiroteuthis spoeli* n.spec. and *Chiroteuthis picteti somaliensis*, n.subspec. Beaufortia. 46 (2): 11-26.

Salcedo-Vargas MA, Guerrero-Kommritz J. 2000. Three new cephalopods from the Atlantic Ocean. Mitt Hamburgischen Zool Mus Inst. 97: 31-44.

Sales JBL, Anderson E, Paiva BL, Cunha YT, Rodrigue AÉS, Ferreira Y, Rodrigues-Filho LFS, Shaw PW, Haimovici M, Markaida U, et al. 2024. The vicariant role of Caribbean formation in driving speciation in American loliginid squids: the case of *Doryteuthis pealeii* (Lesueur 1821). Mar Biol. 171 (4): 82. DOI: http://doi.org/10.1007/s00227-024-04391-9

Sales JBL, Haimovici M, Ready J, Souza FR, Ferreira YS, Pinon JCS, Costa LFC, Asp NE, Sampaio I, Schneider H. 2019. Surveying cephalopod diversity of the Amazon reef system using samples from red snapper stomachs and description of a new genus and species of octopus. Sci Rep. 9: 5956.

Sales JBL, Markaida U, Shaw PW, Haimovici M, Ready JS, Figueredo-Ready WMB, Angioletti F, Carneiro MA, Schneider H, Sampaio I. 2014. Molecular phylogeny of the genus *Lolliguncula* Steenstrup, 1881 based on nuclear and mitochondrial DNA sequences indicates genetic isolation of populations from North and South Atlantic, and the possible presence of further cryptic species. PLoS ONE. 9 (2):

e88693. DOI: https://doi.org/10.1371/journal.pone.0088693

Sales JBL, Rodrigues-Filho LFDS, Ferreira YDS, Carneiro J, Asp NE, Shaw PW, Haimovici M, Markaida U, Ready J, Schneider H, et al. 2017. Divergence of cryptic species of *Doryteuthis plei* Blainville, 1823 (Loliginidae, Cephalopoda) in the Western Atlantic Ocean is associated with the formation of the Caribbean Sea. Mol Phylogenet Evol. 106: 44-54.

Sales JBL, Shaw PW, Haimovici M, Markaida U, Cunha DB, Ready J, Figueiredo-Ready WMB, Schneider H, Sampaio I. 2013. New molecular phylogeny of the squids of the family Loliginidae with emphasis on the genus *Doryteuthis* Naef, 1912: mitochondrial and nuclear sequences indicate the presence of cryptic species in the southern Atlantic Ocean. Mol Phylogenet Evol. 68 (2): 293-299.

Sánchez P, Gonzalez AF, Jareb P, Lapitikhovsky KM, Nigmatillin CHM, Ragonese S. 1998. *Illex coindetii*. In: Rodhouse PG, Dawe EG, O'Dor RK, editors. Squid recruitment dynamics. FAO Fish Tech Pap. 376: 59-76.

Sánchez P, Perez JAA. 1988. *Scaeurgus unicirrhus* (d'Orbigny, 1840) (Cephalopoda, Octopodidae): first record from the South-East Atlantic. S Afr J Mar Sci. 7 (1): 69-74.

Santos RA, Haimovici M. 2001. Cephalopods in the diet of marine mammals stranded or incidentally caught along southeastern and southern Brazil (21-34°S). Fish Res. 52: 99-112.

Santos RA, Haimovici M. 2002. Cephalopods in the trophic relations off southern Brazil. Bull Mar Sci. 71 (1): 753-770.

Santos RA, Haimovici M. 2007. Composição de espécies, distribuição e abundância de cefalópodes do ambiente pelágico da plataforma externa e talude superior da Região Sudeste e Sul do Brasil. In: Bernardes RA, Rossi-Wongtschowski CLDB, editors. Prospecção pesqueira de espécies pelágicas de pequeno porte com rede de meia-água na Zona Econômica Exclusiva da Região Sudeste-Sul do Brasil. Série Documentos Revizee - Score Sul. São Paulo: Instituto Oceanográfico. p. 101-135.

Sauer WHH, Gleadall IG, Downey-Breedt N, Doubleday Z, Gillespie G, Haimovici M, Ibañez CM, Katugin ON, Leporati S, Lipinski MR, et al. 2021. World octopus fisheries. Rev Fish Sci Aquacult. 29 (3): 279-429. DOI: https://doi.org/10.1080/23308249.2019.1680603

Scarabino F. 2003. Lista sistemática de los Cephalopoda vivientes de Uruguay. Comun Soc Malacol Urug. 8 (78-79): 197-202.

Simone LRL. 1997. Redescription of *Lolliguncula brevis* (Blainville) (Myopsida, Loliginidae), from Southeastern Brazil. Iheringia Ser Zool. 82: 141-150.

Strugnell JM, Norman MD, Vecchione M, Guzik M, Allcock AL. 2014. The ink sac clouds octopod evolutionary history. Hydrobiologia. 725 (1): 215-235. DOI: https://doi.org/10.1007/s10750-013-1517-6

Sweeney MJ, Roper CFE, Mangold K, Clarke MR, Boletszky SV, editors. 1992. "Larval" and juvenile cephalopods: a manual for their identification. Smithsonian Contributions to Zoology. 513. Washington: Smithsonian Institution Press. p. 282.

Thomas RF. 1977. Systematics, distribution and biology of cephalopods of the genus *Tremoctopus* (Octopoda: Tremoctopodidae). Bull Mar Sci. 27: 353-392.

Toll RB. 1981. *Benthoctopus oregonae*, a new species of octopod (Mollusca; Cephalopoda) from the southern Caribbean with a redescription of *Benthoctopus januarii*. Bull Mar Sci. 31 (1): 83-95.

Tyron GW. 1879. Manual of conchology, structural and systematic. Vol. I. Cephalopoda. Philadelphia. 316 p.

Vaske T. 2005. Cefalópodes oceânicos da Zona Econômica Exclusiva do Nordeste do Brasil. Bol Inst Pesca. 31 (2): 137-146.

Vaske T, Costa FAP. 2011. Lulas e polvos da Costa Brasileira. 1st ed. Fortaleza: UFC/LABOMAR/

NAVE. Coleção Habitats. 5. 184 p.

Vaske T, Lessa RP. 2005. Estratégia alimentar do espadarte (*Xiphias gladius*) no Atlântico Equatorial Sudoeste. Trop Oceanogr. 33 (2): 219-227.

Vaske T, Lessa RP, Gadig OBF. 2009a. Feeding habits of the blue shark (*Prionace glauca*) off the coast of Brazil. Biota Neotrop. 9: 1-7.

Vaske T, Vooren CM, Lessa RP. 2009b. Feeding strategy of the night shark (*Carcharhinus signatus*) and scalloped hammerhead shark (*Sphyrna lewini*) near seamounts off northeastern Brazil. Braz J Oceanogr. 57 (2): 97-104.

Vidal EAG, Marian JEAR, Martins RS. 2013. *Doryteuthis sanpaulensis*, São Paulo squid. In: Rosa R, Pierce G, O'Dor R, editors. Advances in squid biology, ecology and fisheries. Part I-myopsid squids. 1st ed. New York: Nova Science Publishers. p. 197-242.

Villanueva R, Collins MA, Sanchez P, Voss NA. 2002. Systematics, distribution and biology of the cirrate octopods of the genus *Opisthoteuthis* (Mollusca, Cephalopoda) in the Atlantic Ocean, with description of two new species. Bull Mar Sci. 71 (2): 933-985.

Voss GL. 1956. A review of the cephalopods of the Gulf of Mexico. Bull Mar Sci Gulf Carib. 6 (2): 87-178.

Voss GL. 1964. A note on some cephalopods from Brazil with a description of a new species of octopod, Eledone massyae. Bull Mar Sci Gulf Carib. 14 (3): 511-516.

Voss GL. 1974a. *Loligo surinamensis* a new species of loliginid squid (Cephalopoda, Myopsida) from northeastern South America. Zool Meded. 48 (6): 43-53.

Voss GL. 1974b. On the absence of Cuttlefish in the Western Atlantic. The Veliger. 16 (4): 367-369.

Voss GL, Pearcy WG. 1990. Deep water octopus (Mollusca: Cephalopoda) of the northeastern Pacific. Proc Calif Acad Sci. 47 (3): 49-94.

Voss GL, Stephen SJ. 1992. Family Lycoteuthidae. In: Sweeney MJ, Roper CFE, Mangold K, Clarke MR, Boletszky SV, editors. "Larval" and juvenile cephalopods: a manual for their identification. Washington: Smithsonian Institution Press. p. 67-71.

Voss NA. 1969. A monograph of the cephalopoda of the North Atlantic. The family Histioteuthidae. Bull Mar Sci. 19 (4): 713-867.

Voss NA. 1974c. Studies on the cephalopod family Cranchidae. A redescription of *Egea inermis* Joubin, 1933. Bull Mar Sci. 24 (4): 939-956.

Voss NA. 1980. A generic revision of the Cranchiidae (Cephalopoda, Oegopsida). Bull Mar Sci. 30 (2): 365-412.

Voss NA, Nesis K, Rodhouse PG. 1998a. The Cephalopod Family Histioteuthidae (Oegopsida): systematics, Biology, and Biogeography. In: Voss NA, Vecchione M, Toll RB, Sweeney MJ, editors. Systematics and biogeography of cephalopods. Vol. II. Washington: Smithsonian Institution Press. p. 293-372.

Voss NA, Stephen SJ, Dong, ZH. 1992a. Family Cranchiidae. In: Sweeney MJ, Roper, CFE, Mangold,K, Clarke MR, Boletszky SV, editors. "Larval" and juvenile cephalopods: a manual for their identification. Washington: Smithsonian Institution Press. p. 187-210.

Voss NA, Stephen SJ, Dong ZH. 1992b. Family Histioteuthidae. In: Sweeney MJ, Roper CFE, Mangold K, Clarke MR, Boletszky SV, editors. "Larval" and juvenile cephalopods: a manual for their identification. Washington: Smithsonian Institution Press. p. 73-91.

Warneke-Cremer C. 1986. Contributions to the systematics and distribution of ommastrephids based on the catches of the FFS "Walther Herwig", 1966 and 1968. Mitt Inst Seefisch, Hamburg. 401: 1-116. German.

Warnke K, Söller R, Blohm D, Saint-Paul U. 2004. A new look at geographic and phylogenetic relationships within the species group surrounding *Octopus vulgaris* (Mollusca, Cephalopoda): indications of very wide distribution from mitochondrial DNA sequences. J Zool Syst Evol Res. 42 (4): 306-312. DOI: https://doi.org/10.1111/j.1439-0469.2004.00277.x

Winkelmann I, Campos PF, Strugnell J, Cherel Y, Smith PJ, Kubodera T, Allcock L, Kampmann ML, Schroeder H, Guerra A, et al. 2013. Mitochondrial genome diversity and population structure of the giant squid *Architeuthis*: genetics sheds new light on one of the most enigmatic marine species. Proc R Soc B. 280: 20130273.

[WoRMS] World Register of Marine Species. 2024. https://www.marinespecies.org.

Young RE, Burgess LA, Roper CFE, Sweeney MJ, Stephen SJ. 1998. Classification of the Enoploteuthidae, Pyroteuthidae, and Ancistrocheiridae. In: Voss NA, Vecchione M, Toll RB, Sweeney MJ, editors. Systematics and biogeography of cephalopods. Vol. I. Washington: Smithsonian Institution Press. p. 239-256.

Young RE, Roper CFE. 1969. A monograph of the Cephalopoda of the North Atlantic: the Family Cycloteuthidae. Smithson Contrib Zool. 5: 1-24.

Young RE, Vecchione M, Mangold KM. 2019. Cephalopoda Cuvier 1797. Octopods, squids, nautiluses, etc. Version 26 March 2019 (under construction). The Tree of Life Web Project. http://tolweb.org.

Zaleski T, Perez JAA, Gandara-Martins AL. 2012. Morphological and morphometric variability of the squid *Lolliguncula brevis* (Mollusca: Cephalopoda) in Brazilian waters: evidence for two species in the Western Atlantic. An Acad Bras Cienc. 84: 1015-1028.

APPENDIX

Artificial key for the identification of cephalopods from Brazilian waters

Eight or ten circumoral appendages; suckers (and/or hooks) present; no external shell ..... Subclass Coleoidea 1

1a Suckers stalked with chitinous rings; 10 circumoral appendages, 8 arms and 2 ventrolateral tentacles (tentacles may be lost in some species). Mantle cavity communicates with the exterior via 3 openings ..... bobtail squids, ram's horn squid, myopsid squids, oegopsid squids 2

1b Suckers without stalks, bases sometimes constricted in finned (cirrate) octopods and vampire squids, without chitinous rings; 8 arms, no ventrolateral tentacles. Mantle cavity communicates with the exterior via one opening, rarely 2 ..... octopods and vampire squid 3

2a Internal shell calcified, coiled, chambered (Spirulidae) or rudimentary, straight and chitinous (Sepiolidae); tentacles contractile and retractile into pockets between 3rd and 4th arms; fins not joined posteriorly; mantle edge near mantle cartilages straight ..... bobtail squids, ram's horn squid 4

2b Internal shell straight, feather-or rod-shaped, chitinous; tentacles contractile, not retractile, no pockets; fins usually joined posteriorly; mantle edge near mantle cartilages with small projections or 'angles' ..... orders Myopsida, Oegopsida and Bathyteuthida squids 10

3a Internal shell chitinous, thin, broad plate; a pair of small filamentous appendages in pouches between bases of arms I and II; photophore present at base of each fin and medial to each eye dorsally; color black to dark red or brown. Order Vampyromorpha, Family Vampyroteuthidae ..... *Vampyroteuthis* cf. *infernalis* (Figure 14.62)

3b Internal shell vestige either small cartilaginous rods or a U-shaped support or absent; secondary filamentous appendages absent; suckers sessile, without stalks and without chitinous rings; color extremely variable but never black ..... Order Octopoda 59

4a Internal shell calcified, coiled, chambered. Family Spirulidae (monospecific) ..... *Spirula spirula* (Figure 3.1)

4b Internal shell (gladius) chitinous, rudimentary and straight, sometimes absent; one only or both dorsal arms or one dorsolateral arm hectocotylized ..... Family Sepiolidae

..... 5

5a Anterior edge of mantle fused with head ..... Subfamily Sepiolinae
..... *Rondeletiola minor* (Figure 3.4)

5b Anterior edge of the mantle not fused with the head 6

6a Anterior ventral edge of the mantle extended covering the funnel from below. Fins large, 60-100% of mantle length. Gladius is absent.....
.....Subfamily Heteroteuthinae
..... 7

6b Anterior edge of mantle not extended ventrally. Gladius present.....
.....Subfamily Rossiinae
..... 8

7a Fins attached to the posterior half of the mantle, not reaching its posterior edge ..... *Heteroteuthis dagamensis* (Figure 3.2)

7b Anterior edge of the mantle reaches the level of arm bases. Fins large, attached to the middle of the mantle and extend beyond the posterior edge of the mantle.
.....*Nectoteuthis pourtalesi* (Figure 3.3)

8a Tentacular club widened and bent (curved) with a swimming keel and 6 to 7 rows of small suckers..... *Semirossia* cf. *tenera* (Figure 3.7)

8b Tentacular club not widened nor bent (curved) with around 10-20 transversal rows of small rounded suckers..... 9

9a Large semicircular fins are wider than long. Arms with 2 rows of barrel-shaped suckers. Dorsal mantle reddish brown in living animals .....
..... *Austrorossia* sp. 2 (Figure 3.6)

9b Relatively small semicircular fins longer than wide. Arms with 2 rows of globular suckers. Dorsal mantle gray in living animals.....
.....*Autrorossia* sp. 1 (Figure 3.5)

10a Eye covered by transparent membrane (cornea). Suckers on buccal lappets present. Funnel-locking apparatus: a simple straight groove and ridge. 2 rows of suckers on arms.....Order Myopsida
.....11

10b Eye without cornea; lens in open contact with seawater.....Order Oegopsida
..... 16

10c Eye covered by transparent membrane (cornea). Suckers in the buccal membrane present. Arms suckers in four or more series at some point on arms I-III. In the tentacles, club suckers in more than 7 irregular series, without carpal locking-apparatus and not divided into manus and dactylus. ..... Order Bathiteuthida
..... 34

11a Fins kidney-shaped not united posteriorly. Two rows of suckers on tentacular clubs .....*Pickfordiateuthis pulchella* (Figure 4.13)

11b Fins united posteriorly. Four rows of suckers on tentacular clubs..... 12

12a Fins occupying almost the whole length of the mantle. Mantle broad, widest at the anterior opening, blunt posterior end. .....
.....*Sepioteuthis* aff. *sepioidea* (Figures 4.12, 21.95, and 21.96)

12b Fins less than 2/3 of mantle length. Mantle moderately broad. 13

13a Fins length equal or over 50% of mantle length 14
13b Fins length shorter than 50% of mantle length 15
14a Fins long, more than half of the ML (up to 65%) and almost as wide as long. Mantle moderately wide and long, medium-sized squid. Gladius with maximum raquis width less than 25-40% of the maximum vane width .... *Doryteuthis sanpaulensis* (Figure 4.9)
14b Fins at least 50% of the ML. Gladius with raquis more than 50% of the vane width..... *Doryteuthis surinamensis* (Figure 4.10)
15a Mantle long and slender, diamond shaped fins narrower than long. Gladius with raquis width of more than 50% of the vane width. Mature males with cutaneous ridge along the ventral midline and ventro-lateral strips of chromatophores .... *Doryteuthis pleii* (Figure 4.8)
15b Short semicircular fins (< 1/3 ML). Mantle moderately long, arms short, unequal in size, first arm very short..... *Lolliguncula brevis* (Figures 4.11 and 21.94)
16a Funnel free from mantle; funnel-locking apparatus present 17
16b Funnel fused to mantle on each side; no funnel-locking apparatus present... 35
17a Funnel-locking apparatus a simple, straight groove and ridge 18
17b Funnel-locking apparatus not a simple, T-shaped, oval etc. 39
18a Arms with hooks or with suckers in 4 longitudinal rows on proximal half of ventral arms 19
18b Arms without hooks and with suckers in 2 longitudinal rows on proximal half of ventral arms 29
19a Very long rhomboidal fins. Armature (suckers, hooks) of arms in 2 rows. Tentacles are absent in adults although present in larvae or occasionally in juveniles (*Taningia*) but, when present, with rudimentary clubs armed with few suckers ..... Family Octopoteuthidae 20
19b Armature (suckers, hooks) of arms in 2 rows. Tentacles present; fully developed clubs present..... 21
20a Short and wide mantle, wide fins almost as long as the mantle. In juveniles fins much wider than mantle. Large photophores on the tip of 2nd arms. Single large photophore on the ink sac ..... *Taningia danae* (Figure 9.43)
20b Long tail acuminate. Tips of all arms with one elongated photophore. No photophore on ink sac ..... *Octopoteuthis* cf. *megaptera* (Figure 9.44)
21a Photophores on the viscera and on mantle or surface of head or arms .... Family Pyroteuthidae 22
21b Photophores on ventral side of mantle and surface of head, around eyes and arms but not on viscera 23
22a More than 13 hooks per arm. Tentacular manus with one row of hooks and three series of suckers ..... *Pyroteuthis margaritifera* (Figure 12.57)
22b Less than 8 hooks per arm, Tentacular club with 4 series of suckers on the manus and without hooks ..... *Pteryogioteuthis giardi* (Figure 12.58)
23a Photophores on mantle, head and tentacles but not on eyeballs .....

..... Family Ancistrocheiridae
Mantle conical, forming a tail. Large rhomboidal fins. Eighteen to 24 photophores on the ventral side of the mantle and 8-12 on the head. Tentacle with 12 photophores on the stalk, the 7th or 8th of the ventral row being larger than the 8th of dorsal row. Arms with 2 rows of hooks. Arm IV hectocotylized.....
..... *Ancistrocheirus lesueurii* (Figures 5.14)

23b Photophores on ventral side of eyeballs but not on tentacles.....
..... Family Enoploteuthidae
..... 24

24a Row of 5 unequal photophores on the ventral side of the eyeball 25

24b Row of 8 to 12 photophores on the ventral side of the eyeball, two marginal ones larger .....Genus *Enoploteuthis*
..... 28

25a Large black globular photophores on the tip of the ventral arms, hooks on club in 2 rows..... Genus *Abraliopsis*
..... 26

25b No large black globular photophores on the tip of the ventral arms, hooks on club in one row.....Genus *Abralia*
..... 27

26a Mantle conical with fins occupying 75-80% of its length. Photophores on ventral side of head and mantle disposed diffusely and not forming distinct longitudinal rows. Left ventral arm in male not modified ....*Abraliopsis morisii* (Figure 7.31)

26a Mantle conical with fins occupying less than 70% of its length. Photophores on the ventral side of the head are disposed in 7 longitudinal well-defined rows, median row unpaired. Left ventral arm of male with widened ventral protective membrane..... *Abraliopsis atlantica* (Fig 7.30)

27a Mantle conical with a small pointed tail. Fins length half of the ML. Five photophores in the ventral side of the eyeball, 1st in adults oval, much larger than the central ones and the 5th only smaller than the 1th. Left ventral arm hectocotylized .....*Abralia veranyi* (Figure 7.33)

27b Mantle conical with a small blunt tail. Fins less than half of the ML. Five eyeball photophores round, lst, 3rd and 5th larger than 2nd and 4th. Hooks on the tentacular club in one row. Right ventral arm hectocotylized.....
.....*Abralia redfieldi* (Figure 7.32)

28a Mantle conical with short flashy tail. 8 1/2 longitudinal rows of photophores on ventral side of head, unpaired median row of photophores formed by fusion of rows extending along inner edges of arms IV and terminating at level of anterior margin of eyes, rest of head midline without photophores. Tentacles are robust and very long, club with many suckers in 4 rows on dactylus .....
..... *Enoploteuthis anapsis* (Figure 7.34)

28b Mantle conical with relatively long flashy tail. 8 longitudinal rows of photophores on the ventral side of head; 2nd and 3rd lateral rows not joining on arm IV bases. Nine photophores on the eyeball, terminal ones slightly larger than others and situated a little apart from each other. Midline of the head without

photophores. Seven longitudinal rows of photophores on the ventral side of the mantle, the three medians extending to the tail. Tentacles are slender with a short club with few suckers in 2 rows on dactylus. Three rows of chromatophores on arms IV..... *Enoploteuthis leptura* (Figure 7.35)

29a Buccal membrane connectives attach to ventral sides of the arms IV.....30

29b Buccal membrane connectives attach to dorsal sides of the arms IV.....35

30a Hooks present on tentacular clubs, tentacles are lost in mature females .... Family Onychoteuthidae 31

30b Hooks lacking on tentacular clubs 33

31a Skin smooth, an elongated photophore on the ventral side of the eyeball and two others on the ink sac. Nuchal folds well developed. Fins long and wide, heart shaped and attenuated in a small tail..... *Onychoteuthis banksii* (Figure 12.55)

31b Skin rugose, with presence of warts or wrinkles. Photophores absent. Nuchal folds well developed ..... genera *Moroteuhtopsis* and *Onykia* 32

32a Fin rhomboidal not attenuated into a tail, fin length half or somewhat more of the ML, fin width exceeds length. Skin covered with flat, elongated or curved tubercules .....*Moroteuthopsis ingens* (Figure 11.53)

32b Fin heart shaped, attenuated into a long tail, fin length 2/3 of mantle length, fin width exceeds length. Skin covered with flat, irregular tubercules..... ..... *Onykia robsoni* (Figure 12.54)

33a Cartilaginous scales present. Tentacular clubs with numerous laterally compressed club suckers. Tentacular clubs with 4 longitudinal rows of suckers..... .....*Pholidoteuthis adami* (Figure 12.56)

33b Fins less than half the body length and without muscular supporting ribs. Minute suckers present on the oral surface of the buccal membrane. Tentacular clubs with 4 longitudinal rows of suckers on distal portion, numerous rows on proximal portion; no long, spike-like tail..... *Brachioteuthis* aff. *riisei* (Figure 5.16)

34a Mantle width 40-60% of mantle length, with fringe-like fins extending along all or most of the mantle length, with a series of soft rays joined by a thin membrane..... Family Chtenopterygidae More than 4 rows of sucker in distal part of arms..... ..... *Chtenopteryx canariensis* (Figure 13.61)

34b Short and broad mantle. Short fins, subterminal kidney-shaped. Wide head with projected eyes. Long and slender tentacles, no distinct club with 8-10 rows of small suckers..... *Bathiteuthis* sp. (Figure 13.60)

35a Ventral surface of eye with a row of photophores; buccal membrane with 8 separate lappets ..... Family Lycoteuthidae 36

35b No photophores on eyes; buccal membrane with 7 lappets or less..... 37

36a Five luminous organs on the ventral side of the eyeball..... ..... *Lycoteuthis lorigera* (Figure 8.39)

36b One large luminous organ on the tip of the posterior end of the body in males

and females ..... *Selenoteuthis scintillans* (Figure 8.40)

37a Surface of the mantle, head and arms are covered with numerous photophores (usually large and distinct). Left eye is usually much larger than the right one ... .Family Histioteuthidae, see description of the species in the diagnosis

37b Surface of mantle and head without photophores (arms may have a few photophores)..... 38

38a Fins long and narrow, posterior borders slightly convex; In the tentacles carpal knobs in a single dorsal row or absent; adults attain small size..... .....*Neoteuthis thielei* (Figure 9.42)

38b Posterior borders of fins concave; fins small and ovoid, carpal knobs in a cluster alternating with carpal suckers; adults attain gigantic size..... ..... *Architeuthis dux* (Figures 5.15 and 21.97)

39a Funnel-locking cartilage with a longitudinal groove crossed by a transverse groove at its posterior end, shaped; fins less than 60% of mantle length .... Family Ommastrephidae 40

39b Funnel-locking cartilage oval, triangular, or oval with inward projecting knobs. 47

40a Funnel groove simple without foveola. Carpal group of club suckers short. Luminous organs are absent. Suckers on the dactylus of tentacular clubs in 8 rows..... Subfamily Illicinae 41

40b Funnel groove with foveola. Suckers on dactylus of tentacular clubs in 4 rows..... 42

41a Head as wide as the mantle. Short and broad fins, rounded anteriorly. Hectocotylus less than one third of hectocotylized arm .....*Illex coindetti* (Figure 10.46)

41b Head slightly narrower than the mantle. Short and broad fins, less rounded anteriorly Hectocotylus more than half of the hectocotylized arm..... ..... *llex argentinus* (Figure 10.45)

42a Funnel groove with foveola but not with lateral pockets. No small subcutaneous photophores..... Subfamily Todarodinae Mantle length cylindrical fin length < 50% ML. No cirri-like projections beyond the edge of protective membranes along arms. One ventral arm hectocotiyzed .....*Todarodes filippovae* (Figure 11.52)

42b Funnel groove with foveola, longitudinal cutaneous ridges and lateral pockets. Presence of photophores deeply buried in tissue of mantle, head or arms .... Subfamily Ommastrephinae 43

43a Mantle narrow, conical, attenuates posteriorly in a thin tail. Fin narrow heart-shaped strongly attenuates posteriorly. Two photophores in the viscera and one on the eyeball .....*Ornithoteuthis antillarum* (Figure 10.49)

43b Mantle not attenuated posteriorly into a thin tail. 44

44a Presence of a long golden stripe along the ventral midline. Small photophores under the skin of the ventral mantle and head surface. Ventral protective mem-

branes of arm III very wide.....*Ommastrephes cylindraceus* (Figure 10.48)

44b Absence of a long golden stripe along ventral midline. One photophore on the ventral side of the eyeball and one or two in the viscera. 45

45a Two photophores on intestines, one near the anus and other near the posterior end of the mantle, are very visible in juveniles. Adults with single large oval photophores on the anterior part of the back of the mantle No luminous spots or stripes on ventral side of the mantle, head or 4-th arm.....
.....*Sthenoteuthis pteropus* (Figure 11.50)

45b One photophores on the intestine. Luminous spots or stripes on the ventral side of the mantle, head or 4-th arm. No dorsal photophores.....46

46a Pair of oval luminous spots anteriorly on the ventral mantle and base of ventral arms followed by two long ventral strips of luminous tissue. Mantle conical, narrowing posteriorly. Mantle and funnel cartilages fused in juveniles and adults .....*Eucleoteuthis luminosa* (Figure 11.51)

46b Nineteen (19) round luminous spots arranged in a strict order on the ventral side of the mantle. Mantle and funnel cartilages are not fused. Mantle cylindrical with straight posterior edges .....*Hyaloteuthis pelagica* (Figure 10.47)

47a Funnel-locking cartilage oval with 1 or 2 knobs directed toward the center of the concavity, or fused to mantle 48

47b Funnel-locking cartilage oval or sub-triangular, without knobs 49

48a The arms IV are generally wider and longer than other arms. Rounded fins, shorter than 50% ML. Club, if present, with only 4 longitudinal rows (series) of suckers .....
..... Family Chiroteuthidae, see description of the species in the diagnosis

48b Arm IV longer but not wider than the others. Rounded fins, longer than 50% ML. Club, if present, with 15 or more longitudinal rows (series) of minute suckers
.....Family Mastigoteuthidae
Skin smooth. Fin length about 67% of ML and width comprises 70-80% of the ML. Suckers on arms IV extending to the end arms. Tentacular club with more than 15 rows of microscopic suckers along its entire perimeter. Photophores absent in the eye sinus. Small sucker (1.5 mm), same size in all arms.....
.....*Magnoteuthis inermis* (Figure 9.41)

49a Suckers in 4 to 6 longitudinal row series on arms 50

49b Suckers on arms in 2 rows; tail short, less than half of mantle length or absent
..... 51

50a Suckers on tentacular club in 4 longitudinal rows with carpal fixing apparatus; Large fin almost entire mantle length, wider than longer. Mantle in conical shape ..... Family Cycloteuthidae
Mantle not extended into a tail. Fins almost equal or somewhat larger than ML. Diagonal groove in the funnel-locking apparatus. No photophores on the ink sac or near the anterior edge of the mantle or on the head. A single dark photophore at the distal end of the mantle in ventral view .....
.....*Discoteuthis* cf. *discus* (Figure 7.29)

50b Mantle fused with funnel and head in the occipital area.... Family Cranchiidae

..... 51

51a Mantle covered with tubercles or presence of longitudinal hyaline stripes of cartilaginous tubercles on the ventral mantle beginning at sites of the mantle funnel fusion. Funnel fused to head laterally ..... Subfamily Cranchiinae
..... 52

51b No hyaline stripes of cartilaginous tubercles on ventral mantle and only separate tubercles may be found on ventral mantle fusion in some genera. Funnel not fused to head laterally ..... Subfamily Taoniinae
..... 54

52a Mantle and dorsal fins surface totally covered by cartilaginous tubercles; whose tops have 3-5 spines. 14 photophores on eyeballs. A large photophore on end of all arms in adult females ..... *Cranchia scabra* (Figure 6.22)
Mantle with stripes of cartilaginous tubercles but not totally covered 53

53a One tubercular cartilaginous stripe from each anterior apex of funnel-mantle fusion on the ventral surface of the mantle. Fin length 20-30% ML. Five to six oval photophores on eyeball. In juveniles tubercular stripes with 7-8 large, rosette-shape tubercles with intervening small tubercles.....
..... *Leachia atlantica* (Figure 6.22)

53b A pair of hyaline stripes of tubercles with a 'V' inverted shape on ventral surface of mantle and tubercles also present along the mantle dorsal median line. Fourteen photophores on eyeballs. A large photophore on the end of arms III in mature females ..... *Liocranchia reinhardti* (Figure 6.23)

54a Presence of 2 small cartilaginous tubercles on anterior mantle-funnel fusion sites. Mantle does not attenuate into a long tail. Fins short semi-circular with big lanceola. Funnel reaches the bases of arms IV, without a valve. Two photophores on eyeballs. In juveniles mantle stout, spindle-shape. Fins paddle-shaped and become oval with growth with a diamond-shaped lanceola on the dorsal mantle end. Eyes oval on long stalks. Tentacles are moderately long, widening on the distal part ..... *Liguriella podophthalma* (Figure 6.26)

54b Absence of cartilaginous tubercles on mantle. 55

55a No photophores on ends of arms. Funnel valve absent. 56

55b Photophores on ends of arms. Funnel valve present. 58

57a Mantle not attenuated into a long tail. Funnel very large covering the side of the head and passing the bases of 4th arms. One large photophore on the ventral side of the eyeballs ..... *Helicocranchia pfefferi* (Figure 6.25)

57b Mantle attenuated into a long acuminate tail. Fins long with anterior edges attached dorsally. Arms short. No photophore on the liver.....
..... *Taonius pavo* (Figure 7.28)

58a Mantle attenuated into a long acuminate tail. Greatly enlarged suckers in distal part of 3rd arms. Large photophore on the ends of 3rd or first three arms in adult females. Two large bilobulated photophores on the liver. Juveniles with small terminal fins, long tentacles, long arm-crown stalks on head, and oval eyes on long stalks ..... *Megalocranchia maxima* (Figure 6.27)

58b Mantle attenuated into a long acuminate tail. Large photophore on the end of

arms in adult females. No photophore on the liver. In juveniles mantle elongate, spindle-shape. Fins small, terminal paddle-shaped with a diamond-shaped lanceola. Head with short, stout arm crown stalk. Eyes oval on short to medium stalks .....*Egea inermis* (Figure 6.24)

59a Body gelatinous, fins present on mantle; cirri on arms..... Suborder Cirrata 60

59b Fins absent and cirri on arms absent .....Suborder Incirrata 63

60a Body flattened along the dorso-ventral axis. Not pronounced anterior-posterior elongation of body and arms. Short and thick lateral (subterminal) pad-like fins. Well-developed web in a single layer. U-shaped shells. Reddish to chocolate-colored. The umbrella of the primary web reaches 2/3 of the arm length. Arms subequal in length. In males, two fields of enlarged bulbous suckers, the proximal field typically with suckers 6th to 10th enlarged and the distal field beginning in the 30th at border of the umbrella and with the 3rd to 36th the largest .....*Opisthoteuthis agassizii* (Figure 14.63)

60b Body with pronounced anterior-posterior elongation of the mantle and arms... 61

61a Expanded fin-attachment areas. Saddle-shaped shell. Secondary web present. Long cirri.....Family Cirroteuthidae 62

61b Moderate fins and U-shaped shell. Arms long with extremely long cirri on midsection. Mantle opening forms a complete tube around the funnel..... ..... Family Stauroteuthidae
Equal sized arms 3 to 4 times the mantle length U-shaped shell..... ..... *Stauroteuthis gilchristi* (Figure 15.66)

62a Head as large as the mantle, equal sized arms 3 to 4 times the mantle length. Eyes well developed with lens and iris. Moderately large fins. Shell saddle-shaped wide with very large wings ..... *Cirroteuthis muelleri* (Figure 15.65)

62b Fins over two times the mantel length. Eyes large, with developed lens. Butterfly-like shell..... *Cirrothauma magna* (Figure 14.64)

63a Muscle tissue of body gelatinous, often transparent in life.....64

63b Muscle tissue of body firm (may be covered by gelatinous subdermal layer)... 68

64a Head wide with very large eyes. Mantle short and broad up to 40 cm. Arms relatively short in relation to mantle with a very deep web. Suckers small in one row within the web, two rows outside the web and again one row in the tip of the arms. Third right arm hectocotylized developed in a sac in front of the right eye. Funnel embed in the head tissue and opens in front of the eyes..... .....*Haliphron atlanticus* (Figure 15.67)

64b Suckers uniserial along all the arm length or can be arranged similar to two series only near the arm tips.....Family Amphitrethidae 65

65a Body semitransparent, involved in a layer of gelatinous tissue. Eyes telescopic

elongate, tubular directed upward, situated close together on dorsal surface of head. Mantle fused to the head with a very long funnel. Mantle opening reduced to two small lateral lists. Arms long with two series of sucker near de arm tips ..... *Amphitretus pelagicus* (Figure 17.72)

65b Eyes lateral, not tubular telescopic, single opening to mantle, digestive gland oblong, not pointed at the end. Single series of suckers along all arms' length.... 66

66a Gelatinous, transparent and almost colorless body. Rectangular-shaped eyes in frontal view. Suckers in a single series abruptly enlarged beyond the web and widely separated from one another. Arms longer than mantle length..... ..... *Vitreledonella richardi* (Figure 17.75)

66b Body gelatinous, pigmented. Arms shorter than mantle length, 3rd pair is the longest. A luminous organ under the integument around the mouth in adult females. 67

67a Eyes large (diameter approximately equal with optic stalk length), located on sides of the head. Mature males without hectocotylized arm. Third right arm in mature males modified with enlargement of distal suckers, not as extreme as in Bolitaena. Suckers large, distance between neighbouring suckers shorter than sucker diameter. Maximum depth of umbrella 25-33% of longest arm .... *Japetella diaphana* (Figure 17.74)

67b Eyes small, in adults less than 6% ML. Optic nerves long and optic ganglia near the eyes. Suckers small, distance between neighbouring suckers larger than sucker diameter. 3rd arm left hectocotylized, with enlarged suckers after the midline part of 3rd arm. Maximum depth of umbrella 33-50% of longest arm ..... *Bolitaena pygmaea* (Figure 17.73)

68a Pelagic forms, with distinct locking apparatus present, joining inner edge of lateral mantle to funnel base. Species can present water pores on head. Dwarf males are much smaller than females. Females with web or modified arms..... 69

68b Benthic forms, without distinct locking apparatus, no water pores, males and females with similar sizes and no modified arms in females. 72

69a Present water pores on head. External shell absent in females. 70

69b Funnel-locking apparatus present absent; water pores on head absent, males with left or right ventrolateral arm hectocotylized (never in pocket), with spoon-shaped, non-filamentous tip; females with dorsal first pair of arms with a broad membranous flap that secretes and holds a thin shell to which the eggs are attached. Wide flange of web present on distal half of dorsal arm pair..... ..... Family Argonautidae 71

70a Two pairs of cephalic water pores, one on the dorsal surface of head, between the eyes and another pair ventrally, adjacent to the funnel. Network of semi-rigid cartilaginous rods present under skin on ventral mantle. Females with the first two pairs of arms are much longer than 3rd and 4th ones and connected by a web continuing into a fringe on both sides of 1st arm and dorsal side of 2nd.

Adult females dark blue-purple dorsally and light golden ventrally. Males and juveniles reddish bright with small dark points ..... Family Tremoctopodidae ..... *Tremoctopus violaceus* (Figures 16.71 and 21.99)

70b One pair of water pores on the ventral side of head at base of arms IV. Females with no obvious web modifications and arms fringe. Permanent network of semi-rigid cartilaginous rods present under skin on ventral mantle. Funnel very short. Arms long, 1st and 4th much longer than 2nd and 3rd arms .... Family Ocythoidae ..... *Ocythoe tuberculata* (Figure 16.70)

71a Fourth arm much longer (1.5 to 2 times) than 3rd arm and 10-20% longer than 2nd arm. Shell compressed with narrow keel width up to 6% of the shell diameter. Ribs smooth, more than 50 in large shells, each rib terminating on the keel in an acute tubercle. Early part of the shell stained with dark brown, the rest white. Sides of shell with projections or 'ears' .... *Argonauta argo* (Figure 16.68)

71b Fourth arm shorter than 2nd and not longer than 3rd. Shell inflated with broad keel width about 15% of the total diameter. Up to 30-40 ribs representing chains of separate tubercles or nodules (3 to 5 per 20 mm)..... ..... *Argonauta nodosus* (Figures 16.69 and 21.98)

72a Arms with suckers clearly arranged in one single row 73

72b Arms clearly arranged in two paired rows of suckers, where the suckers could be side by side or in a zigzag arrangement 77

73a Dorsal mantle, head and part of the arms covered with papillae or warts. Very small gills. Hectocotylus small but clearly differentiated into ligula and calamus ..... Family Megaeledonidae 74

73b Dorsal mantle, wide mantle aperture head and arms smooth, not covered with papillae or warts. Arms with suckers clearly arranged in one single row. Mature males with hectocotylized third arm tip that lacks a distinct ligula and calamus, or has a normal ligula but no calamus; suckers highly modified on tips of normal arms of mature males-as ridges, stellate suckers or frills of papillae .... Family Eledonidae 76

74a Skin beset with raised conical or composite papillae hardened with cartilaginous inclusions (wart-like tubercles). VV funnel 75

74b Globular and wide mantle covered with well-spaced papillose warts. Ink sac present. No neck constriction, eyes prominent with 2 papillose cirri over them. Strong arms with one row of large suckers. Hectocotylized arm with well-defined ligula and deeply grooved calimus. Radula reduced to a single row of highly modified teeth with vane-like lateral wings. Big eggs, around 13 mm. Radula reduced to 3 elements (a single row of highly modified teeth with vane) like lateral wings plus marginal plates..... ..... *Vosseledone charrua* (Figure 18.81)

75a Mid-sized species. Dorsal mantle, head and part of the arms with composite

papillae with up to 10 spines. Ink sac absent. The specimen has long stout arms, four times the ML..... *Graneledone* sp. (Figure 18.80)

75b Small to medium sized, short arms around 2 times ML with uniserial suckers, 35-80 on females and 26-70 on males. Ink sac absent. Two well developed 'horns' above the eyes. The third right arm is hectocotylized, with ligula up to 14% of the arm length with a long and well differentiated .... *Graneledone yamana* (Figure 18.79)

76a Medium sized octopus (up to 75 mm ML). Mantle oval, broad, lateral periphery surrounded by a cutaneous fold or ridge, no neck constriction. Arms equal sized and stout. Big eggs 7 to 10 mm long excluding stalk. Smooth skingray dorsally and whitish ventrally..... *Eledone massyae* (Figure 18.77)

76b Small species (up to 65 mm ML), narrow head and constricted neck, wide mantle aperture. No skin ridge present around the lateral margin of the mantle. Arms thin and decreasing in size from pair I to IV. Smooth skin brownish gray dorsally and ventrally. Eggs up to 7 mm larger diameter .... *Eledone gaucha* (Figure 18.76)

77a Ink-sac absent. Sub-gelatinous consistency. Stout, medium sized, deep-sea octopus. Skin on mantle, head and arms smooth not covered by warts. Arms 2.5 to 4 times the ML. Hectocotylized third arm 25-33% shorter than opposite. Ligula 5-7% of hectocotylized arm length. Posterior salivary glands reduced. Gills with 7-8 lamellae ..... *Muusoctopus oregonae* (Figure 18.78)

77b Ink sac present. Muscular consistency (*Peteroctopus* is an exception with a sub-gelatinous consistency) ..... Family Octopodidae 78

78a Left third arm of males hectocotylized with muscular or sub-gelatinous body (*Peteroctopus* is an exception with a third arm hectocotilized in a right or left position). 79

78b Right third arm of males hectocotylized with muscular body 82

79a Small animals with muscular mantle covered with small or large rounded papillae or warts..... 80

79b Medium to large sized n (up to 160 mm) with sub-gelatinous consistency and smooth skin. Mantle opening narrow, one third or less of body circumference, fitting close to funnel; paired narrow papillae over each eye; skin ridge absents from lateral mantle; body markings absent, Deep web. First 4 to 5 suckers in single row, rest biserial. Male hectocotilized arm short and stout could be left or third arm, with a big broad ligula. Gills with 9-10 lamellae..... ..... *Pteroctopus tetracirrhus* (Figure 20.93)

80a Mantle covered with small rounded papillae or warts. 81

80b Mantle, head and base of arms covered with large rounded papillae-like dermal cushions more densely packed and larger on dorsal mantle and smaller on head and web; some papillae on dorsal mantle bear cirri branched in multiple tips; arms long, 1st and 2nd around 4.5 times ML, third left arm of males hectocotylized, ~ 3/4 of the opposite third arm with a short conical calamus and slender ligula with a deep longitudinal groove ending in blunt tip .....

.....*Lepidoctopus joaquini* (Figure 19.83)

81a Medium to small sized octopus (up to 90 mm M). Mantle covered with small rounded papillae or warts, surrounded by a peripheral ridge and one multifid supraocular cirrus. Hectocotilized arm with a spoon-shaped conspicuous big ligula with a peanut-shaped with deep groove, 7 to 11% of arm length. Calamus long and sharp, over half ligula length. Eleven to fourteen lamellae on outer demibranch of gills.....*Scaeurgus unicirrhus* (Figure 20.90)

81b Small sized subadults (25 mm ML) with muscular body. Mantle and head with spaced small rounded papillae. Mantle with no peripheral ridge. Hectocotilized with a small spoon-shaped conspicuous ligulae in subadult. Gills with 7-9 lamellae .....*Scaergus* sp. (Figure 20.91)

82a Elongated animals, with long arms (4-8 times mantle length)..... 83

82b Medium to large animals (up to 200 mm), with medium arms (3-5 times mantle length). with lateral (2nd and 3rd) arms thicker than dorsal and ventral arms. Rugose skin. 84

83a Large and elongated octopus (up to ML 200 mm). Dorsal arms are distinctly longest (1 > 2 > 3 > 4), 5 to 8 times mantle length. Web depth shallow to moderate, about 5 to 20% of longest arm length. Mantle surface with papillae. Body pattern with a reddish color with presence of clear white spots. Hectocotylus small with a well-developed ligula, with deep groove and slightly folded calimus .....*Pinnoctopus furvus* (Figures 20.92, 23.107, and 23.108)

83b Small to middle-sized elongated octopod (up to 90 mm ML). Mantle is small when compared to the total length. Long arms (4-6 times mantle length) asymmetrical in length. First 4 to 5 suckers in a single row, then remainder biserial. Very small ligula. Smooth mantle surface, with a cream pale color .... *Macrotritopus* cf. *defilippi* (Figures 19.84, 22.101, and 22.102)

84a Medium to large species, with ovoid large mantle. Skin with patch and groove trellis arrangement. Moderately long and stout arms, typically over 3-5 times ML. First pair shorter, second and third wider. Ligula diminute (< 3% of arm length). 85

84b Small to medium size. All arms are approximately almost equally size..... 86

85a Large species (up to 250 mm ML), with wide mantle and narrow head. Body with irregular reticulate pattern, with a smooth skin and a cream color in preserved specimens. Presence of 4 primary papillae in a diamond shape over the mantle. Small ligula with a very small calamus ....*Octopus americanus* (Figures 19.85, 22.104, and 22.105)

85b Medium to large size octopus (up to 150 mm ML) with rugose reddish-brown skin in preserved specimens. Large head is almost the same width as the mantle. Body with regular reticulate pattern. The ventral surface of the arms has a distinct configuration of dark purple/red/brown 'patches' against a light background in animals in nature. In some cases (not always) this pattern can be seen even after conservation. One primary papillae over each eye. Small ligula with a medium calamus (up to 50% ligula) .... *Octopus insularis* (Figures 19.86 and 23.106)

86a Small to pygmy octopus species with smooth skin. Males or females with enlarged suckers. Medium to large eggs (4-17 mm)..... 87

86b Small to medium size octopus (up to 70 mm), with mantle and head covered with long dermal branched papillae or round papillae. No enlarged suckers on males or females. Small eggs (< 2 mm)..... 88

87a Pigmy species (up to 40 mm ML). Mantle globular, smooth. Arms typically 3 to 4 times ML. Males with one to three conspicuous enlarged suckers near base of arms II, III and sometimes IV arms, located at 5th or 6th row). Gills with 5-8 lamellae. Medium size eggs ranged from 4.2 to 9 mm..... .....*Paroctopus cthulu* (Figures 20.88, 23.110 and 23.111)

87b Small sized species (up 80 mm ML) Mantle globular and narrower head. Arms moderately long and thick frequently with enlarged suckers in males and females. Smooth skin with granulations around the eyes. Gills with 5-7 lamellae. Large bentonic elongated eggs of 15 to 17 mm longer diameter..... ..... *Paroctopus tehuelchus* (Figures 20.89 and 23.109)

88a Mantle with conspicuous long dermal papillae branched into 3 points. Protruding eyes surrounded by ocular cirri. Presence of two ocellus with a dark blue iridescent ring below each eye, on the web. Gills with 5-9 lamellae..... .....*Octopus hummelincki* (Figures 19.87 and 22.103)

88b Mantle with small rounded papillae. Purplish brown dark band extending over the inner dorsal surface of each arm. Gills with 9-11 lamellae..... .....*Amphioctopus burryi* (Figures 19.82 and 21.100)