

Article

Richness and Distribution of Mexican Pacific Cephalopods (Mollusca, Cephalopoda)

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Abstract: Cephalopods have been widely studied around the globe. However, some areas are poorly understood. In Mexico, there is a significant lack of knowledge, particularly in the coastal zone of the eastern Pacific Ocean, where most studies have focused on commercial fisheries. An exhaustive review of documents (articles, books, theses, and regional reports) dealing with the cephalopods of the eastern Pacific in general and of Pacific Mexico in particular was undertaken along with an examination of malacological collections and databases available in Mexico and the USA. As a result, we obtained 3752 records corresponding to 3339 taxonomic records, featuring two superorders, six orders, 29 families, 60 genera, and 105 species. Of these, 89 species occurring in Mexican waters were confirmed, 76% pelagic, 21% in strictly benthic habitats, 2% benthopelagic, and 1% corresponding to demersal species. We proposed a modification for the distribution of 21 species and found 10 new records for Mexican waters.

Keywords: squid; octopus; malacological collections; pelagic species; new records; Mexico

Key Contribution: This is the first comprehensive evidence-based review of cephalopod fauna within the Mexican Pacific Exclusive Economic Zone (EEZ). The observed richness values differ from both the maximum and minimum previously reported in the literature. Furthermore, all reported distributions are supported by physical specimens housed in scientific collections.



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1. Introduction

Cephalopod species richness estimations vary between 700 and 1000 [1], with the Indo-Pacific being the richest area for this group [2]. The first global analysis of cephalopod diversity was conducted by Voss in 1973 [3]. This work became obsolete because of the discovery of new species. This urged Nesis (1982) to produce and update monographic work that was in turn updated by the FAO catalogues [1,4–6], currently considered the most complete report of worldwide cephalopods. A significant increase in the knowledge of cephalopod species richness, as shown by the aforementioned publications, is certainly related to increasing fisheries and interest in cephalopods as a fisheries resource [7].

In the Mexican Pacific, most studies of cephalopods have been related to fisheries [8–10] or limited to biological aspects of the Octopoda [11,12]. The vast majority of studies have been performed in the Gulf of California [13,14]. To complicate the matter, records provided by governmental agencies, i.e., the local fishery department, usually refer to them as a general resource without distinguishing species or even genera. As an example, fishery

statistics for the *recurso pulpo* (octopus resource) include data for all species from the whole country within the same statistic [15]. This prevents any reliable analysis or conclusions regarding occurrence and distribution of species. Whenever more precise information is available, it is often unreliable due to misidentification [16,17]. The significant increase in cephalopod richness species knowledge shown in these publications is certainly related to the increase in fisheries activity and interest in cephalopod fisheries [7,18].

An earlier regional analysis of pelagic cephalopod fauna along the west coast of California [19] and a review of commercial species in the eastern central Pacific [20] serve as good starting points for synthesizing known information on Mexican cephalopods. The FAO catalogues are very useful, as they provide a large-scale view of species distribution. There is, however, a strong need for more precise, small-scale knowledge of this resource to improve our understanding of the species richness and distribution [21–25].

The aims of this study were threefold: firstly, to provide an exhaustive review of all records of western Mexico cephalopods; secondly, to give the first up-to-date checklist for the area; and thirdly, to provide a baseline for further studies of this ecologically important group of marine invertebrates. Due to the taxonomic complexity within some groups of cephalopods, the scarcity of material, and the wide distribution of several species, this study represents the first comprehensive evidence-based review within the Mexican Pacific Exclusive Economic Zone (EEZ).

2. Materials and Methods

Our compilation of records for the Mexican Pacific cephalopod species was based on four main sources: first, an extensive post-1983 bibliographic search (for information prior to 1983, we referred to FAO publications); second, gray literature (i.e., regional reports, graduation theses) available in local libraries and government offices; third, the taxonomic information sources ITIS (<http://www.itis.gov> (accessed on 30 August 2020)) and WoRMS (<http://www.marinespecies.org> (accessed on 28 March 2025)) TolWeb (<http://tolweb.org/Cephalopoda/19386> (accessed on 5 April 2025)); and fourth, the cephalopod holdings in Mexican collections and the most relevant USA collections. In several cases, we examined unidentified material. In cases where a collection could not be physically examined, we relied on verified records—specifically those based on expert identification—available in collection catalogues. In addition to adult specimens reported in these sources, when reliable, we also included indirect cephalopod records obtained from the stomach contents of marine mammals, birds, and fish and records of developmental stages.

For each species considered in the checklist, we provide the following information: (1) species name, authority, and year of description; (2) type locality, the name of the collection where the type is held, and the catalogue number if any; (3) prime synonym (PS) if distinct from the accepted name, junior (JS) synonyms if any, and common names (for species with no common name, we provide a new one based on criteria used in FAO publications [1,5,6] or considering the characteristics of the species); (4) geographic distribution worldwide and in Mexico; and (5) habitat, indicating ontogenic or seasonal changes in habitat if the information were available. When available, we added additional information into the remarks section.

Throughout the manuscript, we use the classification scheme proposed by Ponder and Lindberg [26], but have adjusted it to the Linnean classification used by Jereb et al. [6] and Jereb and Roper [1]. For some lower categories, we followed WoRMS (2025). These three classifications are generally compatible, with the exception of certain families and a few higher or lower taxonomic ranks. In these cases, we added an explanatory note to the text.

3. Results

During this study, we were able to find a total of 4132 records for species of cephalopods in the Mexican Pacific. However, in a sizable number of cases, records were not properly documented and were therefore omitted, leaving a final total of 3752 reliable records that corresponded to 3339 taxonomic records. Reliable records included material for two superorders (Decapodiformes and Octopodiformes), six orders (Myopsida, Oegopsida, Sepioidea, Octopoda, Vampyromorpha, and one undefined group including species of *Bathyteuthis*), 29 families, 60 genera, and 105 species. Of these 105 species, 16 are considered dubious and are included in a separate section (see Doubtful Records in Supplementary Materials S1). We found and examined specimens of 89 species in the collection holdings. Refer to Table 1 for additional information regarding the collection holdings and data sources.

Table 1. Data sources used during this study. Percentages reviewed in each collection or database are indicated, together (in parentheses) with the number of records available at the time of our visit or consultation and, if any, the records added after reviewing unidentified material. ND, no data.

Institution	Collection Name (Acronym)/Curator	Action/Year	% Reviewed (Records in Database/Records Added)
Instituto de Biología, UNAM	Colección Nacional de Moluscos (CNMO)/Edna Naranjo	Physical/2013	100 (0/38)
Instituto de Ciencias del Mar y Limnología, UNAM	Colección Malacológica “Antonio García-Cubas” (COMA)/Martha Reguero	Physical/2013	100 (0/13)
Instituto de Ciencias del Mar y Limnología, Unidad Mazatlán, UNAM	Colección Regional de Invertebrados Marinos (EMU)/Michel E. Hendrickx	Physical/2012–2015	100 (29/108)
Instituto Politécnico Nacional, Escuela Nacional de Ciencias Biológicas	Colección “María Guadalupe López Magallón” (CLEMGLM)	Physical/2013	25 (ND/34)
Universidad Autónoma de Guadalajara, Centro Universitario de Ciencias Biológicas y Agropecuarias (CUCBA)	Colección de Invertebrados del CUCBA (CUCBA)/Eduardo Ríos Jara	Verbal consultation	No formal cephalopod collection
Universidad del Mar	Colección de Cefalópodos de la Universidad del Mar (UdM)/Carmen Alejo Plata.	Verbal consultation	Collection in process. Most specimens belong to <i>Octopus hubbsorum</i>
Natural History Museum of Los Angeles	Malacology Section (LACM)/Lyndsey T. Groves	Physical/2013	100 (0/112)
Santa Barbara Natural History Museum	Malacology Collection (SBMNH)/Richard Hochberg & Daniel Geiger	Electronic and physical/2013	About 65 (166/2518)
California Academy of Sciences	Malacology Collection (CAS)/Christina Piotrowski	Physical and electronic/2013	100 (187/0) 12 new identifications
Scripps Institution of Oceanography (SIO)	Pelagic Invertebrate Collections (SIO-PIC)/Mark D. Ohman	Physical and electronic/2013	ND (423/333)
Scripps Institution of Oceanography (SIO)	Benthonic Invertebrate Collection (SIO-BIC)/Greg Rouse	Physical and electronic/2013	85 (ND/193)

Table 1. Cont.

Institution	Collection Name (Acronym)/Curator	Action/Year	% Reviewed (Records in Database/Records Added)
University of California, Museum of Paleontology	USGS Invertebrate Collections (USGS)/Erica Clites	Physical (most of the collection moved to CAS)/2013	100 (1/1)
Smithsonian Natural History Museum	Malacology Collection (USNM)/Michael Veccione	Electronic/2015	100 (354/0)
Chicago Field Museum	Department of Zoology, Invertebrate Collection (FMNH)/Janeen Jones	Electronic/2013	100 (5/0)
Harvard University, Museum of Comparative Zoology	Zoological Collection (MCZ)/Gonzalo Giribet	Electronic/2012	100 (12/0)
Arizona-Sonora Desert Museum	Gulf of California Invertebrate database/Richard C Brusca & Michel E Hendrickx	Electronic/2014	100 (20/0)

Systematic Section

Class Cephalopoda Cuvier, 1797

Subclass Neoccephalopoda Ponder & Lindberg 2020

Cohort Coleoidea Ponder & Lindberg 2020

Superorder Decabrachia Ponder & Lindberg 2020

Order Myopsida Naef, 1916

Family Loliginidae Lesueur, 1821

Genus *Doryteuthis* Naef, 1912

1. *Doryteuthis (Amerigo) opalescens* (Berry, 1911). **Type locality.** Puget Sound, Washington, USA, Pacific Ocean. Holotype at NMNH (214388). **Synonym and common name.** *Loligo opalescens* Berry, 1911 (PS). Opalescent inshore squid (FAO). **Geographic distribution.** South of Alaska, USA, to Los Cabos and Gulf of California, Mexico. In Mexico from 15°04'15" N, 94°13'26" W to 32°52'00" N, 117°22'48" W (Figure 1). **Habitat.** Neritic, mesopelagic. Migrate to surface.

Genus *Lolliguncula* Steenstrup, 1881

2. *Lolliguncula (Lolliguncula) argus* Brakoniecki & Roper, 1985. **Type locality.** La Plata Island, Ecuador, Pacific Ocean. Holotype at NMNH (815750). **Synonym and common name.** *Lolliguncula argus* Brakoniecki & Roper, 1985 (PS). Argus brief squid (FAO). **Geographic distribution.** Sonora, Mexico, to Ecuador. In Mexico from 29°57'48" N, 114°28'00" W to 18°12'00" N, 103°04'00" W (Figure 1). **Habitat.** Neritic, epipelagic.

3. *Lolliguncula (Loliolopsis) diomedae* (Hoyle, 1904). **Type locality.** 16°47'30" N, 99°59'30" W, near Acapulco Bay, Mexico, Pacific Ocean. Holotype at NMNH (574847). **Synonym and common name.** *Loligo diomedae* Hoyle, 1904 (PS). Dart squid (FAO). **Geographic distribution.** Baja California, Mexico, to Chile. In Mexico from 31°55'00" N, 116° 48'60" W to 14°52'00" N, 93°00'52" W (Figure 1). **Habitat.** Neritic, epipelagic.

4. *Lolliguncula (Lolliguncula) panamensis* Berry, 1911. **Type locality.** Panama Pacific coast. Holotype at CAS (TYX 39714). **Synonym and common names.** *Lolliguncula panamensis* Berry, 1911 (PS). Panama thumbstall squid (FAO), Panama brief squid (WoRMS). **Geographic distribution.** East coast of Baja California, Mexico, to Ecuador. In Mexico from 31°49'00" N, 114°47'00" W to 15°30'42" N, 93°00'31" W (Figure 1). **Habitat.** Neritic, epipelagic.

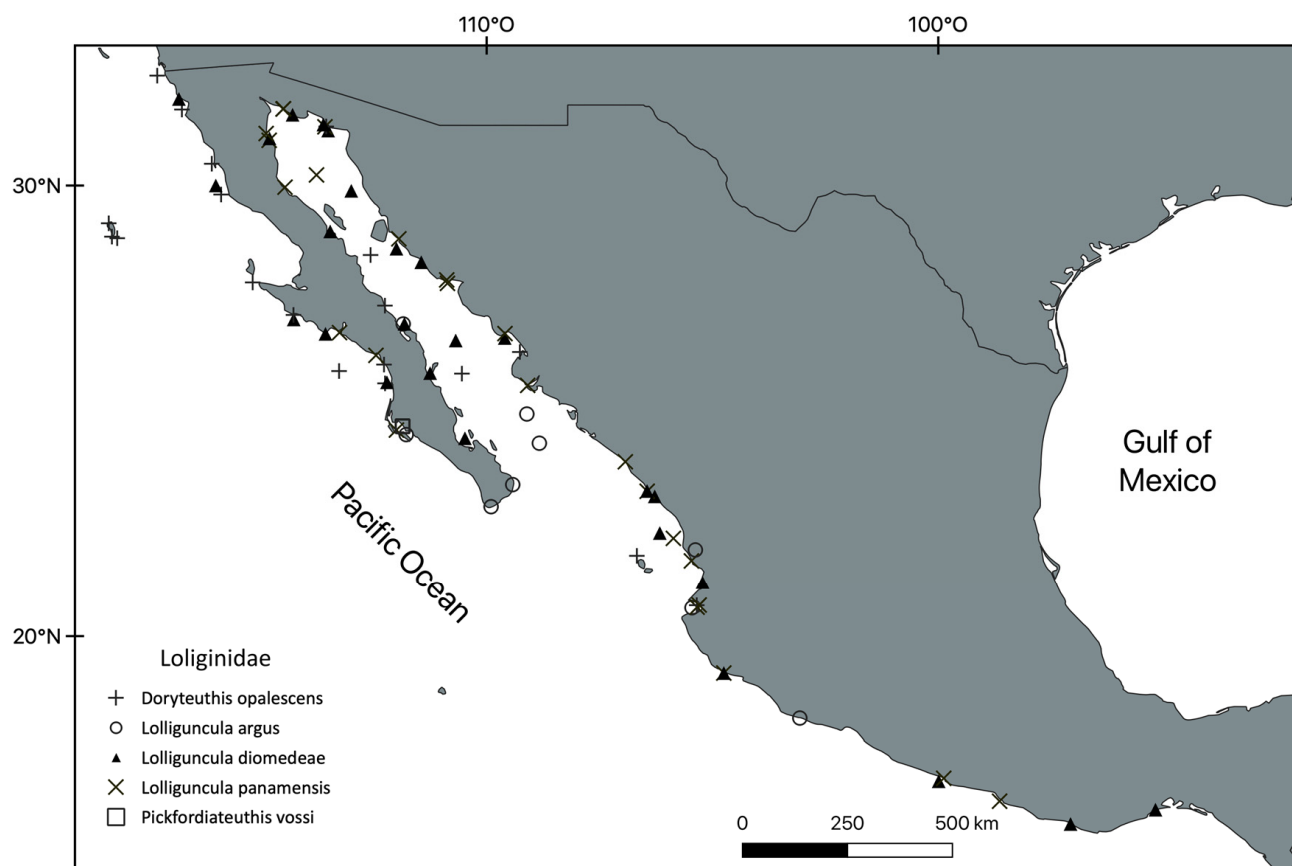


Figure 1. Distribution of the Loliginidae family in the Mexican Pacific Ocean.

Genus *Pickfordiateuthis* Voss, 1953

5. *Pickfordiateuthis vossi* Brakoniecki, 1996. **Type locality.** 24.6° N, 112.1° W, Magdalena Bay, Baja California Sur, Mexico. Holotype at NMNH (884276). **Common name.** Voss' grass squid (FAO). **Geographic distribution.** Tijuana, Baja California, to Sinaloa and Gulf of California, Mexico. In Mexico from 24°34'31" N, 112°07'49" W to 25°48'30" N, 111°18'43" W (Figure 1). **Habitat.** Neritic, epipelagic.

Order Oegopsida Orbigny, 1845

Family Ancistrocheiridae Pfeffer, 1912

Genus *Ancistrocheirus* Gray, 1849

6. *Ancistrocheirus lesueurii* (d'Orbigny, 1842). **Type locality.** Not designated. Holotype at MHNN (2-14-614). **Synonym and common names.** *Enoploteuthis lesueurii* d'Orbigny, 1842 (PS). Sharpear enope squid (FAO), jewel enope squid (WoRMS). **Geographic distribution.** Circumglobal anti-polar. In Mexico from 30°00'00" N, 116°00'00" W to 16°00'00" N, 107°00'00" W (Figure 2). **Habitat.** Oceanic, mesopelagic to bathypelagic.

Order Bathyteuthoidea

1 Remarks. The position of this clade is uncertain. According to [1], it is part of the Oegopsida. Based on molecular analysis, Lindgren et al. [27] and Allcock et al. [28] mention that there is enough evidence supporting the classification scheme of Young et al. [29], which we have followed herein.

Family Bathyteuthidae Pfeffer, 1900

2 Remarks. Members of the family Bathyteuthidae are anatomically well defined [30], but recent molecular studies could not assign this family a clear position within the Neocoleoidea [28,31,32].

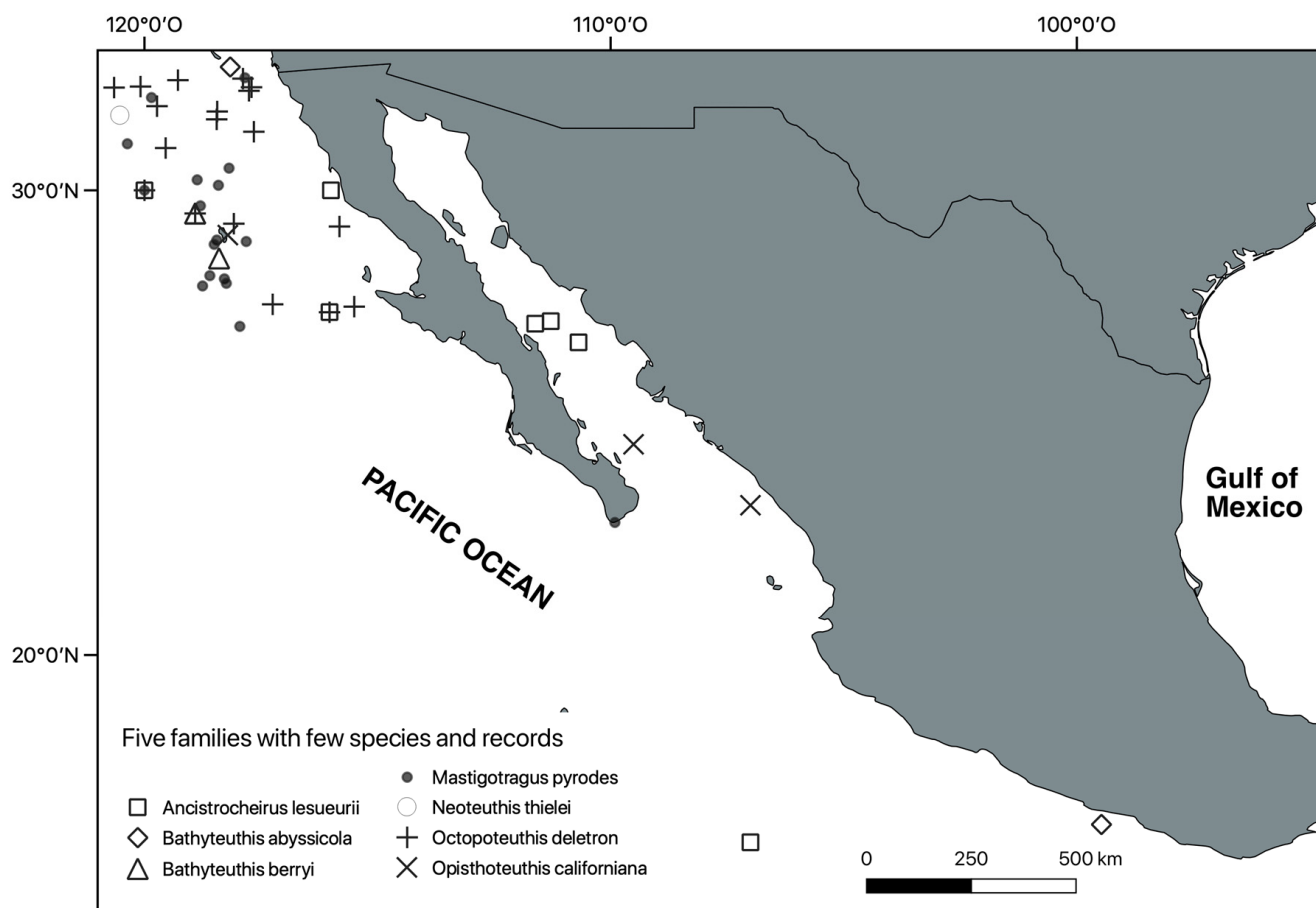


Figure 2. Distribution of the Ancistrocheridae, Bathyteuthidae, Mastigoteuthidae, and Neoteuthidae species in the Mexican Pacific Ocean.

Genus *Bathyteuthis* Hoyle, 1885

7. *Bathyteuthis abyssicola* Hoyle, 1885. **Type locality.** 46°16' S, 48°27' E, Indian Ocean. Holotype at BMNH (1890.1.24.15). **Common names.** Bathyal deep-sea squid (FAO), deep-sea squid (WoRMS). **Geographic distribution.** Circumglobal, more abundant in the Southern Hemisphere. In Mexico from 32°39'00" N, 118°09'36" W to 16°22'49" N, 99°28'12" W (Figure 2). **Habitat.** Epipelagic to bathypelagic.

8. *Bathyteuthis berryi* Roper, 1968. **Type locality.** 33°14'45" N, 118°37'20" W. Holotype at SBMNH (35007). **Common name.** We propose a new common name herein: berry deep-sea squid. **Geographic distribution.** N Pacific to Baja California, Mexico. In Mexico from 29°30'12" N, 118°54'45" W to 28°32'15" N, 118°24'00" W (Figure 2). **Habitat.** Bathypelagic, probably deeper.

Family Chiroteuthidae Gray, 1849

Genus *Chiroteuthis* Orbigny, 1841

9. *Chiroteuthis calyx* Young, 1972. **Type locality.** "Santa Catalina Basin?," California, USA, Pacific Ocean. Holotype at SBMNH (34989). **Common name.** We propose a new common name herein: tentacle whip squid. **Geographic distribution.** Bering Strait, Alaska, USA, to 13°00'00" N, 102°00'00" W Pacific Ocean. In Mexico from 32°33'00" N, 117°27'00" W and 16°52'00" N, 119°24'00" W (Figure 3). **Habitat.** Oceanic, mesopelagic to bathypelagic; ontogenetic depth preferences.

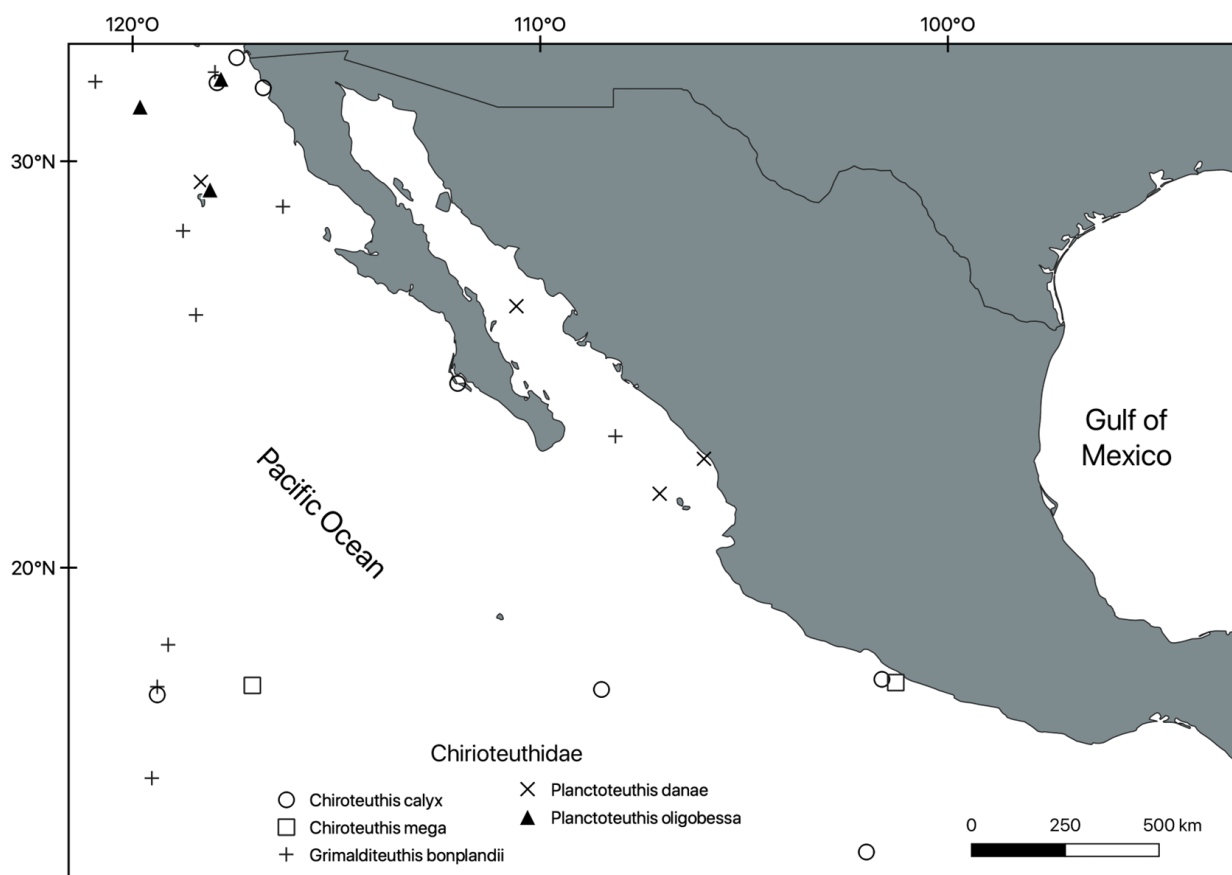


Figure 3. Distribution of the Chroteuthidae family in the Mexican Pacific Ocean.

10. *Chroteuthis mega* (Joubin, 1932). **Type locality.** 25°50' N, 76°55' W, Bahamas, NW Atlantic Ocean. Holotype presumably at ZMUC. **Synonym and common name.** *Chiropsis mega* Joubin, 1932 (PS). We propose a new common name herein: mega-long-arm squid. **Geographic distribution.** NW Atlantic, SE Atlantic tropical to subtropical. In Mexico from 17°10'12" N, 101°16'48" W and 17°06'00" N, 117°04'00" W (Figure 3). **Habitat.** Oceanic, mesopelagic to bathypelagic.

3 Remarks. This material represents the first record for the species in the Pacific Ocean.

Genus *Grimaldoteuthis* Joubin, 1898

11. *Grimalditeuthis bonplandii* (Vérany, 1839). **Type locality.** 29° N, 39° W, eastern central Atlantic Ocean. Holotype repository undetermined. **Synonym and common name.** *Loligopsis bonplandii* Vérany, 1839 (PS). Grimaldi's chroteuthid squid (FAO). **Geographic distribution.** Circumglobal, except boreal and polar. In Mexico from 32°11'32" N, 117°59'00" W to 14°49'00" N, 119°32'00" W (Figure 3). **Habitat.** Oceanic, mesopelagic to bathypelagic.

Genus *Planctoteuthis* Pfeffer, 1912

12. *Planctoteuthis danae* (Joubin, 1931). **Type locality.** 07°30'00" N, 79°19'00" W, Panama, eastern central Pacific Ocean. Holotype at ZMUC (uncatalogued). **Synonym and common name.** *Valbyteuthis danae* Joubin, 1931 (PS). We propose a new common name herein: long-tail squid. **Geographic distribution.** Circumglobal, except boreal and polar. In Mexico from 29°29'26" N, 118°19'43" W to 21°49'5" N, 107°04'21" W (Figure 3). **Habitat.** Oceanic, mostly bathypelagic.

13. *Planctoteuthis oligobessa* (R. E. Young, 1972). **Type locality.** 32°27' N, 120°27' W, eastern North Pacific Ocean. Holotype at SBNHM (34993). **Synonym and common name.** *Valbyteuthis oligobessa* Young, 1972 (PS). We propose a new common name herein: chubby

deep squid. **Geographic distribution.** From Indonesia through North Pacific to California, USA. In Mexico from 32°01'46" N, 117°50'14" W to 29°18'19" N, 118°06'20" W (Figure 3).

Habitat. Oceanic, bathypelagic.

Family Cranchiidae Prosch, 1847

Genus Bathothauma Chun, 1906

14. *Bathothauma lyromma* Chun, 1906. Type locality. 17°28' N, 29°42' W, west of Cape Verde Islands, Atlantic Ocean. Holotype at ZBM (1980384). **Synonym and common name.** *Leucocranchia pfefferi* Joubin, 1912 (JS). Lyre cranch squid (FAO). **Geographic distribution.** Circumglobal, tropical to temperate waters, except in the tropical Pacific. In Mexico, only one record of it, with no latitude/longitude data (this study). **Habitat.** Epi- to bathypelagic with ontogenetic migration to deep water.

Genus Cranchia Leach, 1817

15. *Cranchia scabra* Leach, 1817. Type locality. Congo, East Atlantic Ocean. Holotype at BMNH (1986265). **Synonym and common name.** *Loligo cranchia* Blainville, 1823 (JS). Rough cranch squid (FAO). **Geographic distribution.** Circumglobal, subtropical and temperate. In Mexico from 31°36'20" N, 117°38'47" W to 17°57'00" N, 111°57'00" W (Figure 4). **Habitat.** Paralarvae and juveniles epipelagic and mesopelagic; adults mesopelagic and bathypelagic.

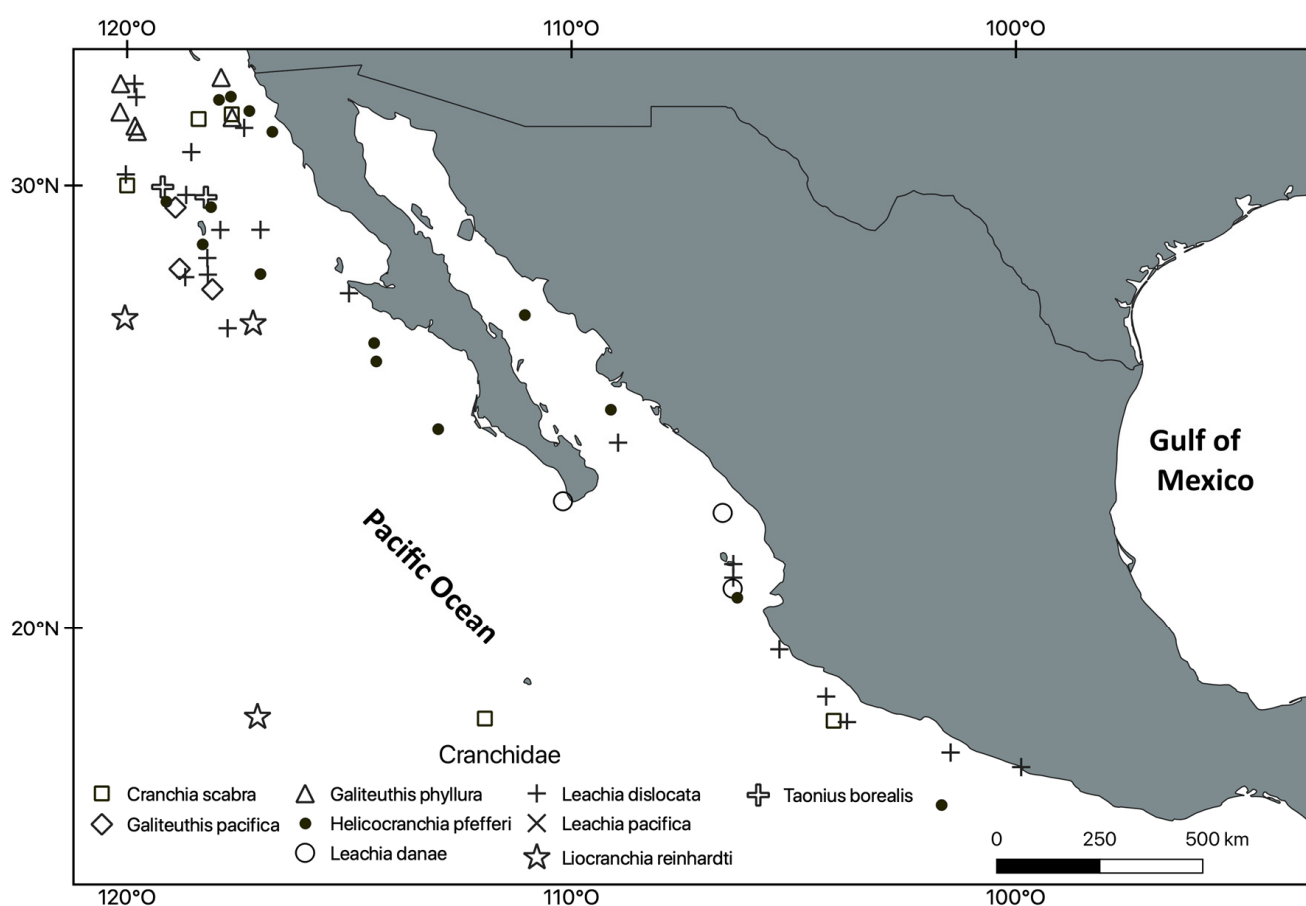


Figure 4. Distribution of the Cranchiidae family in the Mexican Pacific Ocean.

Genus *Galiteuthis* Joubin, 1898

16. *Galiteuthis pacifica* (G. C. Robson, 1948). Type locality. Cocos Island, Costa Rica, Pacific Ocean. Syntypes at BMNH (1947.7.7.8.1-2 h). **Synonym and common name.** *Taonidium pacificum* Robson, 1948 (PS). We propose a new common name herein: Pacific galiteuthid. **Geographic distribution.** Indo-Pacific; California to Chile, Pacific. In Mexico,

27°39'19" N, 118°04'57" W (Figure 4). **Habitat.** Early forms epipelagic to mesopelagic; subadults and adults bathypelagic.

17. *Galiteuthis phyllura* S. S. Berry, 1911. **Type locality.** Point Piños, Monterey Bay, California, USA, Pacific Ocean. Holotype at NMNH (214325). **Common name.** We propose a new common name herein: giant galiteuthid. **Geographic distribution.** Bering Sea, Alaska, USA, to Baja California, except the Gulf of California, Mexico. In Mexico, from 32°26'21" N, 117°53'10" W to 16°00'00" N, 107°00'00" W (Figure 4). **Habitat.** Paralarvae epipelagic; juvenile and adults mesopelagic and bathypelagic

Genus *Helicocranchia* Massy, 1907

18. *Helicocranchia pfefferi* Massy, 1907. **Type locality.** 51°44' N, 11°57' W, off the southwestern Irish coast, temperate western North Atlantic Ocean. Holotype at BMNH (1890.1.24.10). **Common names.** Pfeffer's cranch squid (FAO), piglet squid (WoRMS). **Geographic distribution.** Temperate, subtropical and tropical Atlantic; temperate and subtropical Indo-Pacific. In Mexico from 32°00'15" N, 117°39'57" W to 16°00' N, 101°40'12" W. (Figure 4). **Habitat.** Early forms epipelagic; adults mesopelagic and bathypelagic.

Genus *Leachia* Lesueur, 1821

19. *Leachia danae* (Joubin, 1931). **Type locality.** 06°40' N, 80°47' W, Gulf of Panama, eastern tropical Pacific. Holotype presumably lost. **Synonym and common name.** *Drechselia danae* Joubin, 1933 (PS). We propose a new common name herein: fat squid. **Geographic distribution.** Equatorial, Pacific Ocean. In Mexico from 22°42'24" N, 105°44'45" W to 20°41'43" N, 106°16'03" W (Figure 4). **Habitat.** Paralarvae and juvenile epipelagic; adults bathypelagic.

20. *Leachia dislocata* R. E. Young, 1972. **Type locality.** 32°35' N, 118°06' W, eastern North Pacific Ocean. Holotype at SBNHM (34999). **Common name.** We propose a new common name herein: broken squid. **Geographic distribution.** California Current, 45° N to 25° N, westwards to 160°. In Mexico only one record at 33°20'59" N, 118°37'56" W (Figure 4). **Habitat.** Juveniles epipelagic; older individuals bathypelagic.

21. *Leachia pacifica* (Issel, 1908). **Type locality.** 14°32' S, 167°43' W, between Tahiti Island and Pago Pago Island, Pacific Ocean. Holotype repository unresolved. **Synonym and common name.** *Zygaenopsis pacifica* Issel, 1908 (PS). We propose a new common name herein: Pacific leachia. **Geographic distribution.** Indo-Pacific and North Pacific. In Mexico, 28°45'48" N, 117°18'07" W (Figure 4). **Habitat.** Juveniles epipelagic; adults mesopelagic to bathypelagic.

Genus *Liocranchia* Pfeffer, 1884

22. *Liocranchia reinhardtii* (Steenstrup, 1856). **Type locality.** 15°19' N, 24°54' W and 23° N, 32° W, North Atlantic Ocean. Syntypes in the ZMUC (uncatalogued). **Synonym and common name.** *Liocranchia reinhardtii* Steenstrup, 1856 (PS). Reinhardt's cranch squid (FAO). **Geographic distribution.** Circumglobal, except polar. Probably in NW Mexico (Figure 4). **Habitat.** Juveniles epipelagic; adults mesopelagic.

Genus *Megalocranchia* Pfeffer, 1884

23. *Megalocranchia* sp. Remarks. This genus contains only two species. Neither has been reported in the eastern Pacific. *Megalocranchia maxima* Pfeffer, 1884, is known in Japan, southern Africa, and the Pacific coast of South America, and *M. oceanica* (G. L. Voss, 1960) is an Atlantic species. The SIOPI collection (Table 1 and Supplementary Materials S2, Table S1) contains one specimen identified as *Megalocranchia* sp., collected in June 1965 (27°07'48" N, 114°16'48" W) and closely resembling *M. maxima*. However, this material should be compared in detail with the two known species of the genus in order to confirm its presence in the eastern Pacific.

Genus *Taonius* Steenstrup, 1861

24. *Taonius borealis* (Nesis, 1972). **Type locality.** 44°07.8' N, 150°26.7' E, North Pacific Ocean. Holotype unknown. **Synonym and common name.** *Belonella borealis* Nesis, 1972 (PS). We propose a new common name herein: sad cranchid. **Geographic distribution.** Northern Pacific across Japan, Alaska to California, USA. In Mexico, 29°58'00" N, 119°12'00" W and 29°37'50" N, 118°25'00" W (Figure 4). **Habitat.** Paralarvae epipelagic; juveniles mesopelagic and adults bathypelagic.

4 Remarks. Two specimens of *T. borealis* from Pacific Mexico were found in the SBNHM (9899-64 and 10842-65), both collected in the sixties. It would be useful, however, to more closely examine this material, particularly considering that Jorgensen [33] reported a third species, *T. pavo* (Lesueur, 1821), for the northern Pacific but its southernmost distribution limit is undefined.

Family Enoploteuthidae Pfeffer, 1900

Genus *Abraliopsis* Joubin, 1896

5 Remarks. These taxa have been reviewed a couple of times since the eighties. Subgenera were not considered by Jereb et al. [6], while WoRMS, It is, and Tree of Life Web Project include the subgenera in an inconsistent way.

25. *Abraliopsis affinis* (Pfeffer, 1912). **Type locality.** 02°34' N, 82°29' W, Cape San Francisco; Mariato Point, 06°21' N, 80°41' W. Holotype repository not determined. **Common name.** We propose a new common name herein: keyhole abralia. **Geographic distribution.** Tropical eastern Pacific, southern Mexico to Ecuador (approximately 20° N to 30° N). In Mexico from 31°47'32" N, 119°43'19" W to 13°13'00" N, 92°04'00" W (Figure 5). **Habitat.** Mesopelagic; nocturnal migrations to epipelagic zone.

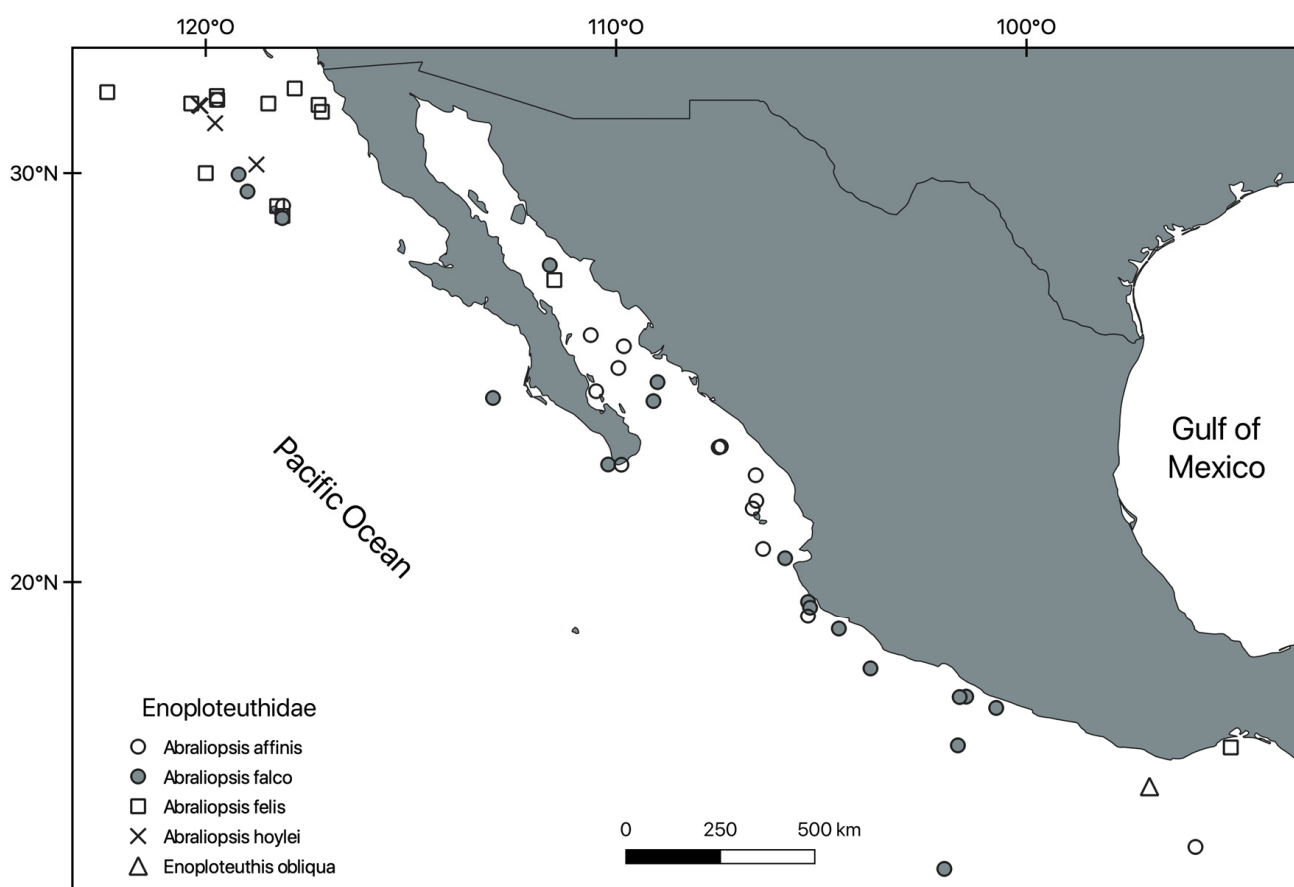


Figure 5. Distribution of the Enoploteuthidae family in the Mexican Pacific Ocean.

26. *Abraliopsis falco* R. E. Young, 1972. **Type locality.** 28°54' N, 118°08' W, eastern North Pacific Ocean. Holotype at SBMNH (34957). **Common name.** We propose a new common name herein: three-stripe abralia. **Geographic distribution.** Eastern tropical Pacific. In Mexico from 29°58'12" N, 119°12'00" W to 13°00' 00" N, 102°00'00" W (Figure 5). **Habitat.** Epipelagic and mesopelagic.

27. *Abraliopsis felis* McGowan & Okutani, 1968. **Type locality.** 31°59' N, 122°24' W, Pacific Ocean. Holotype at NMNH (678792). **Common name.** We propose new common name herein: three-color squid. **Geographic distribution.** NW America (43° N to 27° N) and Japan. In Mexico from 32°10'56" N, 120°18'35" W to 15°56'60" N, 95°01'12" W (Figure 5). **Habitat.** Mesopelagic, migrating to depths of 300–500 m.

28. *Abraliopsis hoylei* (Pfeffer, 1884). **Type locality.** Mascarene Islands, southwestern Indian Ocean. Holotype at ZMN, presumably lost. **Synonym and common name.** *Enoploteuthis hoylei* Pfeffer, 1884 (PS). Hoyle's enope squid (FAO). **Geographic distribution.** Indo-Pacific, including the northeastern Pacific. In Mexico 31°41'50" N, 120°25'20" W to 30°27'0" N, 118°55'30" W (Figure 5). **Habitat.** Mesopelagic to epipelagic migrant.

Genus *Enoploteuthis* d'Orbigny, 1844

29. *Enoploteuthis obliqua* L. A. Burgess, 1982. **Type locality.** 11°47' N, 144°47' W, central Pacific Ocean. Holotype at NMNH (729722). **Common name.** We propose a new common name herein: arrow striped squid. **Geographic distribution.** Eastern equatorial Pacific to Central America. In Mexico, 15°00'00" N, 97°00'00" W (this study, see remarks) (Figure 5). **Habitat.** Oceanic, mesopelagic to epipelagic.

6 Remarks. Only one record of *E. obliqua* was located in the NMNH collection catalogue (Id. L.A. Burgess) and was apparently never published. This represents the first record for the Mexican Pacific.

Family Gonatidae Hoyle, 1886

Genus *Berryteuthis* Naef, 1921

30. *Berryteuthis magister* (S. S. Berry, 1913). **Type locality.** 42°30' N, 113°42' E, Puget Sound, Washington, USA, Pacific Ocean. Holotype at CASIZ (017965). **Synonym and common names.** *Gonatus magister* Berry, 1913 (PS). Schneider and magister armhook squid (WoRMS), schoolmaster gonate squid (FAO). **Geographic distribution.** Alaska, USA, to Baja California, Mexico. In Mexico, 28°10'07" N, 115°08'51" W (Figure 6). **Habitat.** Mesopelagic to bathypelagic; demersal.

Genus *Gonatopsis* Sasaki, 1920

31. *Gonatopsis borealis* Sasaki, 1923. **Type locality.** Eastern Hokkaido Islands, Japan, Pacific Ocean. Syntypes presumably at FMHU. **Common name.** Boreopacific gonate squid (FAO). **Geographic distribution.** North Pacific, from Japan to Baja California, Mexico. In Mexico from 32°07'48" N, 117°55'12" W to 29°10'45" N, 115°41'21" W (Figure 6). **Habitat.** Mesopelagic, occasionally bathypelagic upper boundary.

Genus *Gonatus* Gray, 1849

32. *Gonatus berryi* Naef, 1923. **Type locality.** Monterey Bay, California, USA, Pacific Ocean. Syntypes at NMNH (214652 and 214658). **Common name.** Berry armhook squid (WoRMS). **Geographic distribution.** North Pacific, from Japan to Baja California, Mexico. In Mexico from 32°30'35" N, 117°58'56" W to 23°13'60" N, 107°00'00" W (Figure 6). **Habitat.** Mesopelagic and bathypelagic.

33. *Gonatus californiensis* R. E. Young, 1972. **Type locality.** 33°32' N, 118°24' W northeast Pacific Ocean. Holotype at SBNHM (34978). **Common name.** California armhook squid (WoRMS). **Geographic distribution.** Northeastern Atlantic, from Vancouver, Canada, to Baja California and the Gulf of California. In Mexico from 31°20'40" N, 119°53'00" W to 24°56'17" N, 109°06'42" W (Figure 6). **Habitat.** Neritic, oceanic; mesopelagic, bathypelagic.

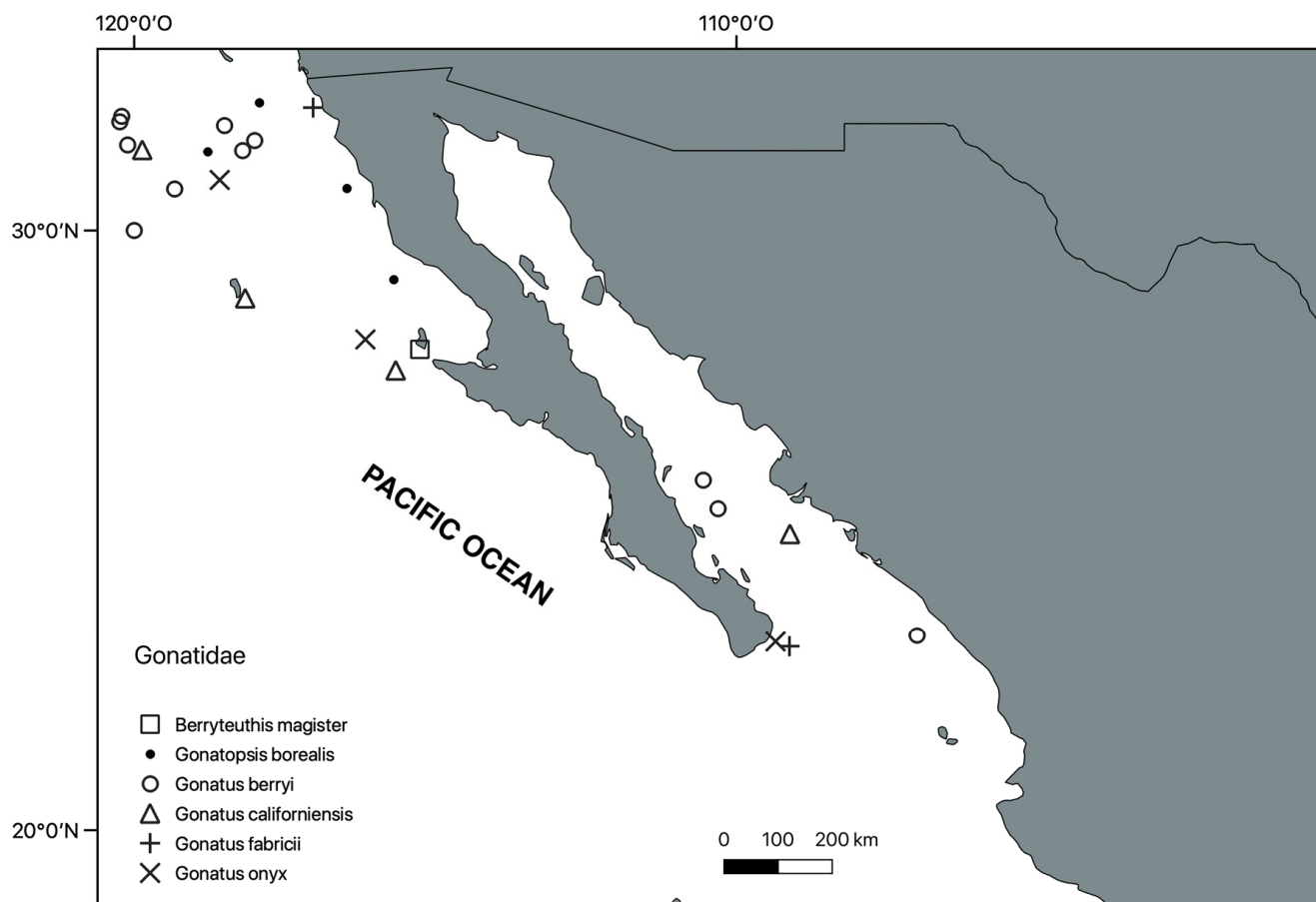


Figure 6. Distribution of the Gonatidae family in the Mexican Pacific Ocean.

34. *Gonatus fabricii* (Lichtenstein, 1818). **Type locality.** Amerloq Fjord, west Greenland. Neotype at ZMUC (uncatalogued). **Synonym and common names.** *Onychoteuthis fabricii* Lichtenstein, 1818 (PS). Boreoatlantic gonate squid (FAO), Boreoatlantic armhook squid (WoRMS). **Geographic distribution.** North Atlantic. In Mexico from 32°31'00" N, 117°02'00" W to 23° 03'00" N, 109°07'12" W (Figure 6). **Habitat.** Epipelagic to mesopelagic, occasionally bathypelagic.

35. *Gonatus onyx* R. E. Young, 1972. **Type locality.** 33°19' N, 118°45' W, northeast Pacific. Holotype at SBNHM (34969). **Common name.** Clawed armhook squid (WoRMS). **Geographic distribution.** Panboreal Pacific, from Japan to Baja California and Gulf of California (this study). In Mexico from 23°03'00" N, 109°07'12" W to 23°07'48" N, 109°20'60" W (Figure 6). **Habitat.** Early stages epipelagic; adults mesopelagic and bathypelagic.

36. *Gonatus pyros* R. E. Young, 1972. **Type locality.** 33°37' N, 118°26' W, northeastern Pacific. Holotype at SBNHM (34973). **Common name.** Fiery armhook squid (WoRMS). **Geographic distribution.** Northwestern Pacific, from the Bering Sea, USA, to Baja California, Mexico. In Mexico only in the Gulf of California (see Remarks). **Habitat.** Paralarvae rarely epipelagic; juvenile migrating to mesopelagic.

7 Remarks. Paralarvae of this species have been found in the Gulf of California [34]. All the other records in the Mexican Pacific correspond to the stomach contents of fish [35,36] and birds [37].

Family Histioteuthidae A. E. Verrill, 1881

Genus *Histioteuthis* d'Orbigny, 1841

37. *Histioteuthis pacifica* (G. L. Voss, 1962). **Type locality.** Dammi Island, between Jolo and Tawi Tawi, Philippines, western Pacific Ocean. Holotype at NMNH (575453). **Synonym and common name.** *Calliteuthis celetaria pacifica* Voss, 1962 (PS). We propose a

new common name herein: Pacific flashing squid. **Geographic distribution.** Indo-Pacific. In Mexico from 27°33'00" N, 117°15'00" W to 16°28'12" N, 99°32'60" W (Figure 7). **Habitat.** Mesopelagic to bathypelagic.

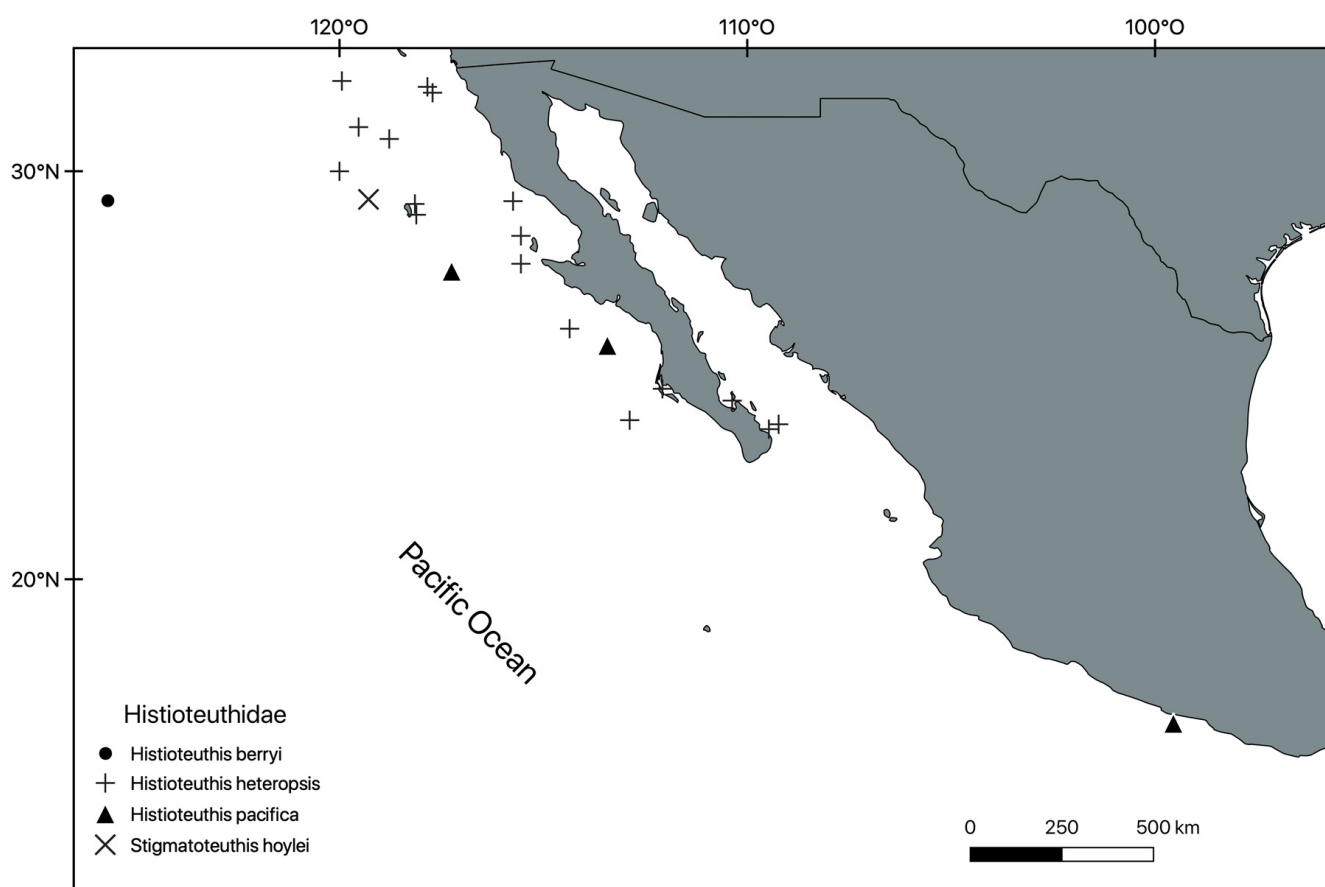


Figure 7. Distribution of the Histioteuthidae family in the Mexican Pacific Ocean.

8 Remarks. Species of *Histioteuthis* have been treated either as species or subspecies e.g., [1,29]. In this respect, we have followed Finn and Bouchet [38]. This is the first record of *H. pacifica* in the Mexican Pacific.

38. *Histioteuthis berryi* N. A. Voss, 1969. **Type locality.** 29°17' N, 125°41' W, North Pacific Ocean. Holotype at NMNH (576079). **Synonym and common name.** *Histioteuthis corona berryi* N. A. Voss, 1969 (PS). We propose a new common name herein: red flashing squid. **Geographic distribution.** California Current, from 37° N to 26° N. In Mexico, 29°16'48" N, 125°40'48" W (Figure 7). **Habitat.** Mesopelagic.

39. *Histioteuthis heteropsis* (S. S. Berry, 1913). **Type locality.** Santa Barbara, California, USA. Holotype at NMNH 214620 (nonextant). **Synonym and common name.** *Calliteuthis heteropsis* S. S. Berry, 1913 (PS). We propose a new common name herein: asymmetric red-eye squid. **Geographic distribution.** Western Pacific from California, USA, to Peru–Chile. In Mexico from 32°34'10" N, 118°04'03" W to 23°21'00" N, 108°09'00" W (Figure 7). **Habitat.** Mesopelagic.

40. *Stigmatoteuthis hoylei* (E. S. Goodrich, 1896). **Type locality.** Andaman Islands, India, St. 50B = 75/7, west Indo-Pacific. Holotype at NMWZ (1978.014.00422). **Synonym and common name.** *Histiopsis hoylei* E. S. Goodrich, 1896 (PS). Flowervase jewel squid (FAO). **Geographic distribution.** Anti-boreal throughout the Pacific. In Mexico from 31°53'24" N, 120°29'06" W to 29°18'44" N, 119°17'18" W (Figure 7). **Habitat.** Mesopelagic.

Family Magnapinnidae Vecchione & R.E. Young, 1998

Genus *Magnapinna* Vecchione & R.E. Young, 1998

41. *Magnapinna pacifica* Vecchione & R.E. Young, 1998. **Type locality.** 33°49' N, 121°51' W, Pacific. Holotype unknown. **Common name.** Pacific bigfin squid (FAO). **Geographic distribution.** Oregon, USA, to Guatemala and westwards to middle western Pacific. In Mexico, border limit with the USA. **Habitat.** Pelagic.

9 Remarks. *Magnapinna pacifica* is an uncommon species. In a general distribution map of a FAO document, Jereb and Roper [1] included it in the west coast of Mexico. We were not able to locate any precise records of this species for Mexico in the literature or in any collection. Young et al. [29] consider only three localities in the eastern Pacific, one just on the border between the USA and Mexico.

4. Discussion

Based on this study, we report a total of 105 species of cephalopods living in the Mexican Pacific. Of these, only 89 could be reliably confirmed in the region based on the literature or specimen collections (Supplementary Materials S2, Table S1). This figure is still considerably higher than the estimation made by Castillo-Rodríguez [39] of 37 species for Mexican waters. This difference might be due to three main issues: (a) subsampling efforts in the area, (b) overestimation of the distributional range of the species, and (c) lack of consistent public record databases.

Regarding subsampling, our search represents 114 years of sampling and 100 cruises around the area. Hence, we believe subsampling can probably explain some cases, but not all of them. Several species have been reported very close to the USA–Mexico border and have a wide geographic distribution in the North Pacific, for example, *Enteroctopus dofleini* (Wülker, 1910), occurring from Japan to southern California. This species is therefore likely to occur off the northern part of the Baja California Peninsula or maybe even further south, but it was not included in the list for lack of Mexican records (Table 2). Another case is *Chtenopteryx sicula* (Vérany, 1851), a rare species. In spite of having few records for other parts of America, we did not find any records in our sources, and thus the subsampling argument must be considered. Other species have been registered off western Mexico, but at a considerable distance from shore and from the western limits of the exclusive economic zone. *Eledone leucoderma* (San Giovanni, 1829) is another good example. It was not recorded for western Mexico in the literature, but material examined at the SBNHM was collected at 12°49'08.04" N, −103°56'39.12" W, approximately 500 km off Mexico. Again, this rare species [40] might occur closer to shore.

Table 2. Species previously reported for western Mexico with no physical record found in electronic databases or among material reviewed in collections (see list in Table 1).

Species	Habitat	Geographic Distribution	Recorded by
<i>Enteroctopus dofleini</i> (Wülker, 1910)	Neritic to oceanic	Panboreal in Pacific, from Japan to Baja California, Mexico. In Mexico only a marginal part of Baja California	Wolff [41]; Young [19]
<i>Rossia pacifica pacifica</i> S.S. Berry, 1911	Neritic, mesopelagic to epipelagic	From Japan to Baja California, Mexico	Okutani and McGowan [42]; Young [19]; Hedgpeth [43], Hochberg [44], Pablo-Rodríguez et al. [45]
<i>Taningia danae</i> Joubin, 1931	Epipelagic, oceanic	Circumglobal except poles	Jereb and Roper [1]

Table 2. Cont.

Species	Habitat	Geographic Distribution	Recorded by
<i>Octopoteuthis sicula</i> Rüppell, 1844	Meso to bathypelagic	Circumglobal, antiboreal	Jereb and Roper [1]
<i>Octopoteuthis nielsenii</i> G. C. Robson, 1948	Meso to bathypelagic	Tropical and subtropical Pacific	Jereb and Roper [1]
<i>Octopoteuthis megaptera</i> (A. E. Verrill, 1885)	Meso to bathypelagic	Cosmopolitan	Jereb and Roper [1]
<i>Magnapinna pacifica</i> Vecchione & R. E. Young, 1998	Pelagic	Oregon, USA, to Guatemala and westwards to middle western Pacific	Jereb and Roper [1]
<i>Joubiniteuthis portieri</i> (Joubin, 1916)	Meso to bathypelagic	Circumglobal, except boreal	Jereb and Roper [1]
<i>Abralia astrodicta</i> S. S. Berry, 1909	Mesopelagic	Central and western Pacific Ocean	Jereb and Roper [1]
<i>Abralia andamanica</i> E. S. Goodrich, 1896	Mesopelagic	Indian and western Pacific	Jereb and Roper [1]
<i>Sandalops melancholicus</i> Chun, 1906	Epi to bathypelagic	Circumglobal except poles	Jereb and Roper [1]
<i>Liguriella podophthalma</i> Issel, 1908	Epi to bathypelagic	Circumglobal, except boreal and equatorial	Jereb and Roper [1]
<i>Helicocranchia joubini</i> (G. L. Voss, 1962)	Meso to bathypelagic	Tropical and subtropical Atlantic, SW Pacific	Jereb and Roper [1]
<i>Egea inermis</i> Joubin, 1933	Epi to bathypelagic	Circumglobal, except poles	Jereb and Roper [1]
<i>Brachiotheuthis picta</i> Chun, 1910	Epi to mesopelagic	Circumglobal, tropical and subtropical	Jereb and Roper [1]

One of the difficulties we faced was an overestimation of the distribution area described for many species. For instance, for *Magnapinna pacifica*, a circumtropical distribution is based on three specimens from the Pacific area [1] and one from the Atlantic side [46]. Nonetheless, most of the distribution patterns of cephalopods are estimated considering mainly bibliographical records (Norman, personal communication 2015 and Norman 2000). In our case, we assigned more importance to collection records than the literature to reduce misidentification probabilities and to offer the possibility of corroboration. Additionally, sometimes the records provide additional information that could help in obtaining niche maps, such as depth catch and abiotic parameters associated with the sampling [47].

Through this work, we also want to highlight the urgency of having an electronic version of the available material in all collections [48]. This is critical for the Mexican collections, where delays can be a significant issue. Nonetheless, even though many US collections are making concerted efforts and investments in updating their catalogues in terms of technology and number of specimens, there is still much to do in this respect. These must be supported and promoted by government, students, the scientific community, and more importantly society at large.

In our checklist, 15 species do not show any kind of record of their existence in the Mexican Pacific Ocean. It should be noted that we visited and reviewed data from the most important and representative collections for the zone. They represent more than 100 years

of sampling in the whole territory and many depths and sampling gadgets. Therefore, it is our belief that it is reasonable to conclude that those species do not live in the Mexican EEZ or close to it (Table 2).

The poor state of the Mexican cephalopod collections must be quickly improved. It is paramount to increase, curate, and make public their specimen records (i.e., <https://www.ibdata.abaco2.org/web/web-content/admin-queryfilter/queryfilter.php> (10 April 2025)). If we consider all the Mexican collections, they have specimens for only 33 species (almost one third) of the total of species recorded from the country. This gave us an idea of the current extent of knowledge on this class in the Mexican Pacific Ocean. Additionally, it is critical to mention that none of the Mexican materials in the Mexican collections belongs to any kind of type specimen. This seems to be incongruous and paradoxical, considering that Mexico has 16 type localities among the total species living there.

Filling the gaps in our knowledge of cephalopod distribution has been a considerable challenge for teuthologists, biogeographers, and fisheries. The vagility of these species, their paralarvae stage, and the scarcity of records for non-commercial species has compounded the problem. Additionally, we know of the existence of at least five to eight possible new species (to be described soon, personal communication, Erick Hochberg). Those species have similar diagnostic features to well-known ones, but the bathymetric records do not seem realistic (e.g., *O. hubbsorum* S. S. Berry, 1953 and *O. rubescens* S. S. Berry, 1953). Furthermore, many of the Pacific Octopodiformes (especially members of the *Octopus* genus) that are treated as “species” by Jereb et al. [6] could be a complex species, probably containing more than one individual species. At the same time, considering the FAO reports, we can confirm the existence of *Euaxocephalus panamensis* G. L. Voss, 1971, which had a previous record [49]. Currently, we have enough evidence to extend their distribution to the Gulf of California and Oaxaca [34,50], as reported in this study. Species such as *Octopus penicillifer* S. S. Berry, 1954, *O. pusillus* A. Gould, 1852, *O. micropyrsus* S. S. Berry, 1953, *Pinnoctopus ornatus* (A. Gould, 1852), and *Eledone leucoderma* (San Giovanni, 1829), need their taxonomic status as a species clarified or a correction to any misidentification produced by errors in labeling and preserving their material.

As far as we know, this is the first formal checklist of the Cephalopoda class from the Mexican Pacific Ocean. Other efforts, such as FAO guides, have limitations imposed by their scale, the time dedicated to conduct the work, and/or the field of knowledge encompassed by the study [5]. Compared to the Gulf of Mexico [51–54] the Mexican Pacific Ocean has no regional studies, but countless local analyses [34,50,55]. Our results demonstrate that an exhaustive sampling is still pending, with special attention to be paid to the swallow octopuses in the deepwater and oceanic regions of the Mexican territory. It is also necessary to track the paralarvae stage, since this form does not always have the same distribution, richness, or abundance as the adults. We certainly included all stages of development in our study, and the general picture does indeed change when the paralarvae are included (personal communication, Dra. Roxana De Silva Davila 2015), especially in terms of richness.

As with every checklist, this is also a partial contribution. However, we are confident that our efforts may greatly contribute to an outstanding comprehension of cephalopods in the Mexican Pacific Ocean, a baseline for other studies in the near future. Our knowledge of cephalopod richness and distributions is far from complete. We urge institutions holding zoological collections to further improve their cephalopod sections and to create new electronic databases for their records.

5. Conclusions

The Mexican cephalopod fauna had not been thoroughly analyzed for many years. Our work presents the first comprehensive evidence-based review, including the literature, collections, and systematized samples, covering almost all the Mexican EEZ. This effort has allowed us to construct a more accurate picture of the richness and diversity of this group in the region. The new distributional updates and first records included are essential for advancing our understanding of the biogeography and systematics of cephalopods.

Supplementary Materials: The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/fishes10060281/s1>, Supplementary Material S1: Doubtful records. In this section, we include species for which distribution or taxonomic status are ill defined. Their presence in the Mexican Pacific needs to be confirmed, particularly if these are species occurring primarily in other regions of the world. Supplementary Material S2: Table S1. Cephalopods recorded in the Mexican Pacific Ocean based on review of literature and collection data.

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