

Research Article

First record and description of *Planctoteuthis* (Cephalopoda: Chiroteuthidae) paralarvae in the Gulf of California, Mexico

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ABSTRACT. We report for the first time the presence of doratopsis stages of *Planctoteuthis* sp. 1 (Cephalopoda: Chiroteuthidae) in the Gulf of California, Mexico, including a description of the morphological characters obtained from three of the five best-preserved specimens. The specimens were obtained from zooplankton samples collected in oblique Bongo net tows during June 2014 in the southern Gulf of California, Mexico. Chromatophore patterns on the head, chambered brachial pillar, and buccal mass, plus the presence of a structure, possibly a photophore, at the base of the eyes covered by thick, golden reflective tissue are different from those of the doratopsis stages of *Planctoteuthis danae* and *Planctoteuthis lippula* known from the Pacific Ocean. These differences suggest *Planctoteuthis* sp. 1 belongs to *Planctoteuthis oligobessa*, the only other species known from the Pacific Ocean or an unknown species. Systematic sampling covering a poorly sampled entrance zone of the Gulf of California was important in the collection of the specimens.

Keywords: Paralarvae, *Planctoteuthis*, doratopsis, description, Gulf of California.

INTRODUCTION

Considerable morphological differences exist among the adults of the gelatinous, slow moving, deep-sea squids of the family Chiroteuthidae characterized by elongate necks, and extremely long and slender tentacles. The four genera *Chiroteuthis* D'Orbigny, 1841, *Grimalditeuthis* Joubin, 1898, *Planctoteuthis* Pfeffer, 1912, and *Asperoteuthis* Nesis, 1980; however, share a very distinctive paralarvae stage known as doratopsis (Young, 1991).

The doratopsis stage is characterized by: elongate, chambered neck and brachial pillar at some point in their development and a gladius that extends posteriorly beyond the fins with a secondary fin in some species or a flotation device or ornamentation usually lost during capture. In advanced stages, doratopsis paralarvae also have: a posterior region of the mantle just anterior to the fins that contains vesicular tissue; vesiculate arms; greatly elongate ventral arms; and tentacular clubs covered over most of their lengths by parallel protective

membranes and dorsal keels (Young, 1991). The exact form of the funnel locking-apparatus, oval in most taxa but often with posterior inward protruding knobs (antitragus), has a strong value as a species-specific character (Young *et al.*, 2006).

Species of the genus *Planctoteuthis* are rare and very fragile squids often badly damaged when captured. In plankton samples, paralarvae usually have certain degree of damage and are also adversely affected by the fixation method.

Recent records of adult and juveniles of *Planctoteuthis* in the Pacific Ocean are scarce. Young (1972) described a new species of *Planctoteuthis*: *P. oligobessa* (originally described as *Valbyteuthis oligobessa*) based on a gravid female (76 mm mantle length, ML). This author found another 18 specimens (10-70 mm ML) of this species distributed in the oceanic area in the Eastern Pacific from California, USA to north of Cedros Island, off the west coast of Mexico. He also reported one specimen of *Planctoteuthis danae* Joubin, 1931 (described as *Valbyteuthis danae*) (44 mm ML)

that was previously known only for Peru and Panama. The Monterey Bay Aquarium Research Institute recorded a subaquatic video of one adult specimen presumably of *Planctoteuthis oligobessa* off southern California (Young & Roper, 2014). Hoving *et al.* (2014) also reported the capture of two adult *P. danae* from the Gulf of California in 2013. Another MBARI expedition to the Gulf in 2015 captured four more adults identified as *P. danae* (A. Arkhipkin, *pers. comm.*).

Records of the paralarval stages of 11 species of chiroteuthids have been described from Hawaiian waters with a revision of previous historical records of doratopsis paralarvae and chiroteuthid juveniles around the world (from 1910 to 1988) by Young (1991). He described paralarvae of *Planctoteuthis danae* and *Planctoteuthis* sp. the latter currently recognized as *Planctoteuthis lippula* (Young & Roper, 2008). The paralarvae of *Planctoteuthis oligobessa* are not yet described. At the present time, no records of paralarvae of this genus have been reported inside the Gulf of California.

We report here the first capture of five *Planctoteuthis* paralarvae (two of which are represented by heads only) from the Gulf of California and describe their external morphology at three different sizes.

MATERIALS AND METHODS

In June 2014, a total of 61 plankton samples were collected during a single oceanographic cruise (BIPO-1406) made in the Gulf of California, Mexico (Fig. 1), on board of the Mexican government research ship B/I BIPO-INAPESCA of the Instituto Nacional de Pesca.

The plankton samples were obtained from oblique tows using standard Bongo nets (Smith & Richardson, 1977) fitted with calibrated General Oceanics flowmeters. Samples were fixed on board with 4% buffered formalin. Environmental data at each sampling station were recorded with a calibrated SBE 25 Sealogger CTD (Conductivity-Temperature-Depth) casts.

On land, all cephalopod paralarvae were sorted from the plankton samples, rinsed with distilled water, and preserved in 70% ethyl alcohol. The specimens were identified to the lowest possible taxonomic level (Young, 1972, 1991; Sweeney *et al.*, 1992; Young & Vecchione, 2008) and measured using a Stemi SV 11 Carl Zeiss stereomicroscope fitted with a calibrated ocular micrometer. When possible, mantle lengths (ML) were measured from the anterior edge of the dorsal mantle to the posterior edge of fins. Specimens of *Planctoteuthis* were sorted out from the cephalopod

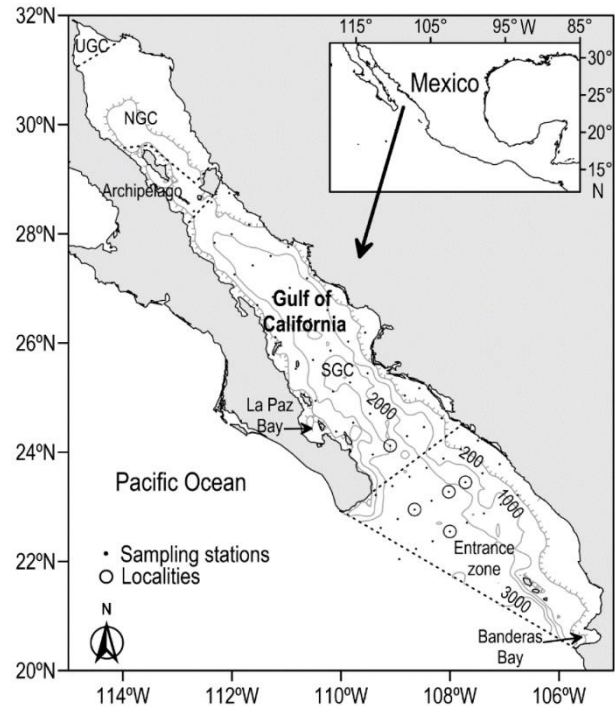


Figure 1. Study area showing sampling stations during oceanographic cruise BIPO-1406, and collection localities for *Planctoteuthis* sp. 1. Bathymetry (in meters) is shown. Dotted lines indicate regions of the gulf: UGC: Upper Gulf of California, NGC: Northern Gulf of California, SGC: Southern Gulf of California (taken from Lavin & Marinone, 2003).

subsamples and were described following the criteria of Roper & Voss (1983).

Drawings of both ventral and dorsal views, arm crown, manus of the tentacles, and other structures were made from the best-preserved specimens collected. An Olympus C5060 photographic camera (5 megapixels resolution) attached to the stereomicroscope was used to obtain the photographs of the specimens shown in this study; methylene blue was used in some cases to increase the contrast of structures.

All specimens used for this study are housed in the Collection of Cephalopods of Mexico (acronym: COCEM) in the Departamento de Plancton y Ecología Marina at the Centro Interdisciplinario de Ciencias Marinas of the Instituto Politécnico Nacional (CICIMAR-IPN), in La Paz, Baja California Sur, Mexico.

Abbreviations used: ML: mantle length; DHCP: dorsal head chromatophore pattern; VHCP: ventral head chromatophore pattern; DBCP: dorsal brachial pillar chromatophore pattern; VBCP: ventral brachial pillar chromatophore pattern; AI, AII, AIII, AIV: arms I, II, III, and IV respectively.

RESULTS

Planctoteuthis paralarvae were collected from five localities in the southern and entrance zones of the Gulf of California (Lavín & Marinone, 2003) (Fig. 1). Four of the specimens were collected during the night from 11:40 h to 03:54 h and at an average tow depth of 210 m. One specimen was collected at 16:01 h and at a tow depth of 173.5 m. Average surface temperature and salinity at the collection localities were 27.6°C and 34.89 respectively.

The specimens typically have long, transparent necks and brachial pillars identifying them as members of the family Chiroteuthidae. Most of the specimens are in bad condition (wrinkled, twisted) therefore most length measurements (mantle length, mantle width, fin length, fin width, brachial pillar length, etc.) are only approximate. Specimens 1-3 are almost complete but the gladii are broken. Specimen 4 is a head with the arm crown, and specimen 5 is only a head without arm crown. Suckers in specimen 4 are incomplete.

We described here the morphology from the three most complete specimens (4.7 mm, 6.7 mm, and 11.4 mm ML) and included measurements and counts of some structures in all specimens (Table 1). These data are arranged by size (4.7 to 11.4 mm ML). Sucker counts are provided when possible. Some useful characters to identify *Planctoteuthis* species obtained from published literature and official web pages are summarized in Tables 2 and 3.

CLASS CEPHALOPODA

Subclass Coleoidea

Order Teuthida

Suborder Oegopsina

Family Chiroteuthidae Gray, 1849

Genus *Planctoteuthis* Pfeffer, 1912

Planctoteuthis sp. 1

(Figs. 1-2; Table 1).

Material examined: Gulf of California, Mexico (5 localities), 24°07'14.59"N to 22°32'47.6"N and 107°43'6.45"W to 109°05'45.67"W, 0-212 m [collected by Roxana De Silva-Dávila and Raymundo Avendaño-Ibarra, 14-17 June 2014], COCEM-GC-470, COCEM-GC-480, COCEM-GC-481, COCEM-GC-483, and COCEM-GC-489 at CICIMAR-IPN (three incomplete specimens of 4.7-11.4 mm ML, one head with arm crown plus one head).

Diagnosis of paralarvae: Mantle tubular and thin; head small, with statoliths clearly visible through posterior transparent tissue; neck transparent, chambered

brachial pillar showing the inner central esophagus and muscular stripes; eyes oval or elongate (width slightly greater than lens diameter) with thick reflective tissue covering a distinct structure, possibly a photophore; funnel-locking cartilage oval with single antitragus. Chromatophore patterns: DHCP = 2 + 4, VHCP = 2 + 2, DBCP = 1 near base of AI, VBCP = 3 in transverse line at base of AIV and tentacles, 5 to 6 on buccal mass.

Description (voucher specimens):

Mantle: At all sizes-tubular and thin, width of anterior margin larger than head width, posterior region pointed. Dorsal suture distinct. Funnel-locking cartilages oval with single antitragus and mantle-components human-nose-like. Gladius extends well posterior to fins but broken in all specimens. Small to medium sized chromatophores with no distinct pattern. Vesicular tissue at posterior region not clearly observed.

At 4.7 mm ML, without dorsal or ventral chromatophores (Fig. 2a).

At 6.7 mm ML, with few dorsal scattered chromatophores and two at base of fins (Fig. 2b); two ventral chromatophores near base of fins (Fig. 2b).

At 11.4 mm ML, same dorsal pattern as above plus three mid dorsal chromatophores; two dorsal (Fig. 2k) and two ventral chromatophores at base of fins plus two at posterior end of fins (Fig. 2j). Funnel with one (probably two) chromatophore on dorsal surface (Fig. 2f).

Arm crown: At all sizes-supported by a brachial pillar. Four pairs of arms unequal in length. Upper beak with pigmented edge. Vesicular tissue in AIV.

At 4.7 mm ML, arm formula: IV > II > I > III; AIII with one sucker; AI, AII, and AIV with three suckers each; aboral chromatophores on AI-III not observed; each AIV with one chromatophore near base (Fig. 2a); oral chromatophores on arms not observed. Edge of buccal mass with five chromatophores (seen in oral view): four at base of AI-AIII plus one between AIV (Fig. 2c). Vesicular tissue at tip of AIV (Fig. 2c).

At 6.7 mm ML, same arm formula and chromatophore patterns. Sucker counts on AI, AII, and AIV increase to one large sucker at base plus three pairs each. AIII with one pair of suckers. Vesicular tissue at ¼ to ½ distal part of AIV (Fig. 2d).

At 11.4 mm ML, AIV greatly enlarged (arm formula: IV > II ≈ III > I) and formed by transparent vesicular tissue. Base of each AIV with three chromatophores (*i.e.*, 2 lateral + 1 aboral). AI-III with 6-10 pairs of suckers; AIV with 12 small suckers in first half distributed over longitudinal muscular stripe observed on the arm surface. Edge of buccal mass with six chromatophores: four at base of AI-AIII, and one at

Table 1. *Planctoteuthis* sp. 1. Collection data and specimen measurements. Cruise: BIPO-1406, vessel: B/I BIPO-INAPESCA, sampling area: Gulf of California, sampling gear: Bongo net 505 μ m, oblique tow, fixative: 4% formol, preservative: 70% ethyl alcohol. FLC: funnel locking cartilage, L: large, b: at base, p: pair, s: suckers, smp: small pedunculated, vt: vesicular tissue, *Approximate, NO: not observed.

Specimen	1	2	3	4	5
Sampling station	156.7-90	540.80	156.7-70	160.110	156.7-130
Sampling sequence	49	37	48	59	51
Date:	16/Jun/2014	14/Jun/2014	15/Jun/2014	17/Jun/2014	16/Jun/2014
Time (h)	03:54	03:18	23:59	16:01	11:40
Geographic position	108°01.31'W 23°16.44'N	109°05.76'W 24°07.24'N	107°43.10'W 23°26.87'N	108°00.18'W 22°32.79'N	108°38.99'W 22°57.04'N
Tow depth (m)	211	201	208	209	173
Measurements (mm)					
Mantle length*	4.7	6.7	11.4	-	-
Mantle width*	2.8	3.3	5.3	-	-
Gladius length (broken)	5.0	8.0	12.7	-	-
Gladius width (at tip)	0.1	0.3	0.3	-	-
Fin length*	0.7 (damaged)	0.8 (damaged)	2.5 (damaged)	-	-
Fin width*	1.3 (damaged)	2.0 (damaged)	5.6 (damaged)	-	-
Arm formulae	IV>II>I>III	IV>II>I>III	IV>II≈III>I	IV≈II>I>III	-
Length:					
Arm I	0.3	0.3	1.0	0.3	-
Arm II	0.5	0.5	1.4	0.5	-
Arm III	0.1	0.1	1.4	0.1	-
Arm IV	0.5	0.8	3.7*	0.5	-
Tentacle	2.0	3.1	7.7	2.3	-
Manus	0.5	0.5	1.2	0.4	-
Sucker count:					
Arm I	3	1Lb + 3p	6-7p	1Lb + 1p	-
Arm II	3	1Lb + 3p	8-9p	1Lb + 1p	-
Arm III	1	1p	9p	1p	-
Arm IV	3 vt	1Lb + 3p vt	12 vt	1-2p	-
Tentacle	5-6 smp	1Lb	1 Lb	1Lb	-
Manus	cluster	>20	>55	-	-
Head length	1.9	1.4	2.8	1.1	-
Head width	1.0	1.2	1.7	0.9	1.7
Eye diameter >	0.6	0.7	1.0	0.7	1.2
Eye diameter <	0.4	0.4	0.6	0.4	0.7
Lens diameter	0.2	0.3	-	0.2	0.6
Photophores per eye	1?	No	No	No	1?
Funnel locking cartilage	oval	oval	oval	oval	-
Tragus/antitragus	antitragus	antitragus	antitragus	antitragus	-
FLC length	0.5	0.4	0.5	-	-
Brachial pillar	1 segment	1 segment	5-6 segments	-	-
Reflective tissue on eyes	No	Yes	Yes	No	Yes
Esophagus	Central	Central	Central	-	-

base of each AIV; with densely pigmented ring around mouth (Fig. 2e).

Tentacles: At all sizes-well-developed and very long: more than 3-7 times long axis of eye. With three aboral chromatophores: one at base of stalk, one at middle of stalk, and one at base of club approximately; with one oral chromatophore at base (Figs. 2c-2e). With suckers along stalk.

At 4.7 mm ML, with 5-6 small stalked suckers through its length. Club with cluster of suckers with no apparent arrangement; with 4-5 aboral chromatophores. Oral chromatophores not observed (Figs. 2a, 2c, 2g).

At 6.7 mm ML, stalk with two suckers: one relatively large near base and one smaller located at oral base of club (Figs. 2b, 2d). Club with two pairs of suckers, followed by 6-7 rows of suckers with no obvious

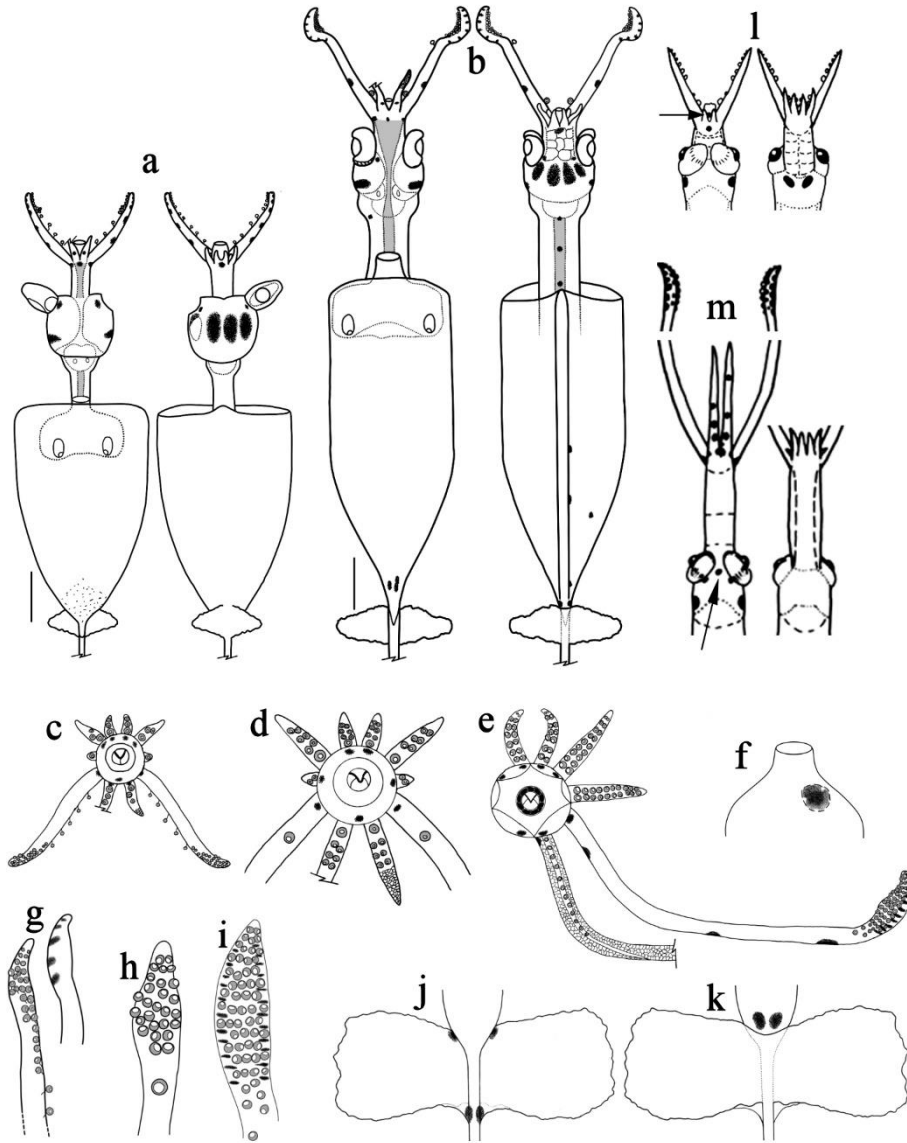


Figure 2. *Planctoteuthis* sp. 1. Ventral and dorsal views at: a) 4.7 mm ML and b) 6.7 mm ML; arm crown at: c) 4.7 mm ML, d) 6.7 mm ML, and e) 11.4 mm ML; f) chroma-topophores on dorsal funnel; g), h), and i) arrangement of suckers in the manus at the analyzed sizes respectively; j) and k) chromatophores at ventral and dorsal posterior mantle respectively at 11.4 mm ML; l) *Planctoteuthis lippula* (3.7 mm ML); m) *Planctoteuthis danae* (8.4 mm ML, chromatophore missing). Arrows in l and m show the midventral chromatophore in the buccal mass and between the eyes of the corresponding species. Scale bars represent 1 mm. Drawings of *P. lippula* and *P. danae* taken from Young (1991).

arrangement (Fig. 2h). With six aboral chromatophores (Fig. 2b).

At 11.4 mm ML, suckers not observed on stalk. Club base with six suckers followed by 12 transverse rows with approximately four suckers each, and 2-3 rows of few small suckers to the tip. With about 12 aboral chromatophores and about 12 very small oral chromatophores at each edge of the club (Figs. 2e, 2i).

Brachial pillar: At all sizes-short: 1.5-2.5 times long axis of eye. With inner central esophagus and muscular stripes. Vesicular tissue present. Probably with two

chambers not clearly observed. With one dorsal brachial pillar chromatophore (DBCP = 1) near base of AI, and three ventral brachial pillar chromatophores (VBCP = 3) in transverse row at base of AIV and tentacles (Figs. 2a-2b).

Head: At all sizes-small, with long neck. Statocysts transparent and statoliths clearly visible through posterior region of head. With oval or elongate ventrally protruding eyes (width slightly greater than lens diameter) with thick, golden reflective tissue covering a ventral structure, possibly a photophore at

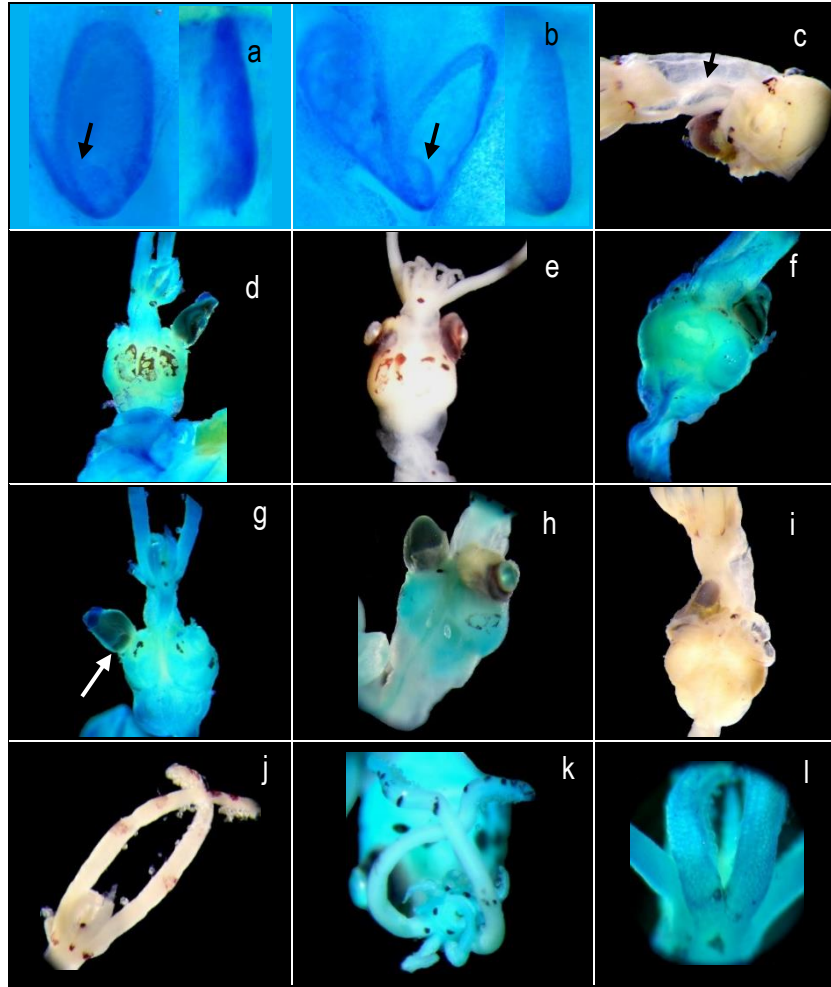


Figure 3. *Planctoteuthis* sp. 1. a) and b) funnel locking cartilage (left) showing antitragus (arrow) and mantle component (right) at 4.7 and 11.4 mm ML respectively; c) lateral view of specimen showing chromatophore pattern and central esophagus (arrow) in brachial pillar at 11.4 mm ML; d-f) dorsal head and chromatophore patterns at the analyzed sizes; g-i) ventral head showing photophore (arrow) at base of eye (4.6 mm ML), golden reflective tissue, and statoliths (6.7 and 11.4 mm ML); j) and k) arm crown showing chromatophore patterns; l) detail of vesiculate arms IV in 11.4 mm ML specimen.

base of eye (Fig. 3g). DHCP: two small posteromedial to eyes plus four large posteriors in transverse line (DHCP = 2 + 4); VHCP: two small posteromedial to eyes plus two posterolateral (VHCP = 2 + 2) (Figs. 2a-2b).

Neck: At all sizes-length increases with development. Inner central esophagus and internal structures observed throughout. Chambers not observed.

At 4.7 mm ML, chromatophores absent (Fig. 2a).

At 6.7 mm ML, with three chromatophores along mid-dorsal line and one (probably one pair) in ventral anterior region (Fig. 2b).

At 11.4 mm ML, only two chromatophores observed along mid-dorsal line. Specimen conditions (twisted neck) prevented further observations.

DISCUSSION

Some useful characters that help to identify paralarvae of *Planctoteuthis* from other chiroteuthid species with similar morphology are the presence of an antitragus but no tragus in the oval funnel locking cartilage (Figs. 3a-3b), and the central position of the esophagus in brachial pillar (Fig. 3c). Both characters were observed in the specimens collected in the oblique zooplankton trawls made in the Gulf of California, Mexico.

Table 2. Some useful characters to identify *Planctoteuthis* species. FLC: funnel locking cartilage, ND: Not described. *Needs confirmation.

Species	Distribution	FLC/antitragus	Esophagus
<i>P. levimana</i> ¹ (25-70 mm ML)	Atlantic Ocean	Oval/bilobed unequal (60 mm)	
<i>P. exophthalmica</i> ^{1,2} (9.5 mm ML)	Indian Ocean	ND	
<i>P. danae</i> ³ (2.0-21 mm ML)	Gulf of Panamá, Chile, tropical eastern Pacific. Ocean off California, Gulf of California, Hawaii, Eastern Polynesian Islands, Atlantic Ocean*	Straight groove/(5-6 mm) Oval/Just detectable (12 mm) Oval/bilobed nearly equal (>22 mm)	Dorsal
<i>P. lippula</i> ^{1,3,4} (2.0-19 mm ML)	Atlantic Ocean, Hawaii	Oval depression/ (4.0 mm) Oval/single (5.0-19 mm) Oval/single or slight double, low, broad (55 mm)	Center
<i>P. oligobessa</i> ^{5,6} (23-76 mm ML)	Southern California EU, Northern Baja California, Mexico. Indonesian waters*	Oval/single slender	Center
<i>Planctoteuthis</i> sp. 1 (This study)	Gulf of California	Oval/single (4.7-11.4 mm)	Center

¹Young *et al.* (2006); ²Young & Roper (1999); ³Young (1991); ⁴Young & Roper (2008); ⁵Young (1972); ⁶Young & Roper (2014).

Table 3. *Planctoteuthis*. Chromatophore patterns used to identify species. DHCP: dorsal head chromatophore pattern, VHCP: ventral head chromatophore pattern, p: pair, s: small, L: large, lat: lateral, beteye: between eyes, posteye: posterior to eyes, postlat: posterolateral to eyes, v: ventral, d: dorsal, vml: ventral mid-line, dml: dorsal midline, ab: aboral, transline: transversal line, ND: Not described.

Species	Chromatophore			
	DHCP	VHCP	Buccal mass	Brachial pillar
<i>P. levimana</i> ¹ (25-70 mm ML)	-	-	-	-
<i>P. exophthalmica</i> ^{1,2} (9.5 mm ML)	-	-	-	-
<i>P. danae</i> ³ (2.0-21 mm ML)	No chromatophores	5 1s vml (beteye) + 2 pairs (postlat)	2 (1s ab in vml, 2.0 mm 1s ab in dml, 5-6 mm)	1 vml
<i>P. lippula</i> ^{1,3,4} (2.0-19 mm ML)	2 pairs (1p posteye, 2.5-4.0 mm + 1p poslat, 5.0-19 mm)	1p (postlat)	1 posvml	2 vml
<i>P. oligobessa</i> ^{5,6} (23-76 mm ML)	ND	ND	ND	ND
<i>Planctoteuthis</i> sp. 1 (This study)	6 (2s beteye + 4L posteye)	2p (2s beteye + 2L postlat)	5-6 (1-2 at the base of AIV + 4 at the base of AI-AIII)	1d near AI 3v transline near AIV and tentacles

¹Young *et al.* (2006); ²Young & Roper (1999); ³Young (1991); ⁴Young & Roper (2008); ⁵Young (1972); ⁶Young & Roper (2014).

Four species are currently recognized in the genus *Planctoteuthis*. The International Taxonomic Information System (ITIS, 2016) recognizes three species *Planctoteuthis danae* (Joubin, 1931), *P. oligobessa* (Young, 1972), and *P. levimana* (Lönnberg, 1896). Young *et al.* (2006) also recognizes *P. lippula* (Chun, 1908) and *P. exophthalmica* (Chun, 1910) but considered the Atlantic syntype of the latter to be a

young *P. levimana*; this leaves the 9.5 mm ML Indian Ocean syntype as the only described specimen (Young *et al.*, 2006). *Planctoteuthis levimana* is known only from the Atlantic Ocean and *P. exophthalmica* only from the Indian Ocean, both *P. danae* and *P. oligobessa* are probably known only from the Pacific Ocean while *P. lippula* is known from both the Atlantic and Pacific oceans (Table 2).

The doratopsis stage of *Planctoteuthis danae*, differs from *P. lippula* (both described by Young, 1991) and *Planctoteuthis* sp. 1 collected in our study, in having the esophagus in a dorsal position in the brachial pillar rather than in a central position (Table 2), and in having a single chromatophore located in the ventral midline between the eyes (Fig. 2m) rather than none (Figs. 2a, 2b, 2l). *Planctoteuthis lippula* differs from *Planctoteuthis* sp. 1 in having two (Fig. 2l), rather than one (Figs. 2a-2b) chromatophores on the ventral midline near the arms (one is on the ventral base of the buccal mass) and in the presence of two, rather than four (Figs. 2a-2b), chromatophores across the dorsal surface of the head (Table 3).

The funnel locking cartilage in some species of *Planctoteuthis* and in other cephalopods seems to develop and acquire its final form through the development as observed in *P. danae* and *P. lippula* (Table 2). In these species, the funnel locking cartilage appears as a straight groove or oval depression at less than 6 mm ML. The antitragus develops by 5.0-19 mm ML, with a completely developed oval funnel locking cartilage with a bilobed nearly equal antitragus in *P. danae* (>22 mm ML) and a single or slight double, low, broad antitragus in *P. lippula* (55 mm ML) (Young *et al.*, 2006, 2014). However, the oval single slender antitragus clearly observed in our specimens at 4.7-11.4 mm ML differs from a just detectable antitragus at a larger size in *P. danae*. Specimens of *P. levimana* in the Atlantic Ocean have a different morphology of the funnel locking-cartilage (bilobed antitragus at 60 mm ML) (Young *et al.*, 2006) (Table 2), which suggests that our specimens are also not *P. levimana* either. Adult stages of *Planctoteuthis oligobessa* are known from the waters off southern California and northern Baja California, and the distribution of this species may extend to Indonesia waters (Young & Roper, 2014). This species has a single antitragus at the adult stage and is characterized by the presence of 2-4 suckers on each arm IV. *Planctoteuthis* sp. 1 at 11.4 mm ML has 12 suckers suggesting that these are different species.

Specimens of *Planctoteuthis* sp. 1 found in our study have a central esophagus similar to doratopsis of *P. lippula* and could have been collected at sizes in which the funnel locking cartilage is not completely developed. However, they show different chromatophore patterns (also different from those in *P. danae*). The different chromatophore patterns observed in the head (DHCP = 2 + 4, VHCP = 2 + 2), brachial pillar (DBCP = 1, VBCP = 3 in transverse line), buccal mass (Table 3), and the presence of a possible photophore at the base of the eyes covered by thick, golden reflective

tissue in the specimens collected in the Gulf of California (Fig. 3h), suggest a different species.

Planctoteuthis sp. 1 does not seem to belong to any known Pacific species of *Planctoteuthis*, hence it probably represents an undescribed species. However, since the doratopsis of *P. oligobessa* has not been described, some uncertainty remains, particularly because suckers on arms IV could disappear with growth.

Morphology and chromatophore patterns described for *Planctoteuthis* sp. 1 specimens from the Gulf of California are useful characters to help identify and separate them from other doratopsis paralarvae collected from the wild, suggesting they can be used as reliable taxonomic characters. However, the lack of specimens (paralarvae or adults) preserved and analyzed for genetic procedures from this study, do not allow a positive identification as to what specific species they represent. The collection of five doratopsis of *Planctoteuthis* sp. 1 in the Gulf of California was exceptional. Only three paralarvae of the family Chiroteuthidae (*Chiroteuthis* sp. 1, 1.0-1.1 mm ML), have previously been collected off the west coast of the Baja California peninsula and in the Gulf of California after 15 oceanographic cruises in which zooplanktonic cephalopod paralarvae were analyzed (Granados-Amores *et al.*, 2010; De Silva-Dávila *et al.*, 2015). Of these cruises, only two had trajectories from La Paz Bay to Banderas Bay, but they did not systematically cover the south and entrance zone of the Gulf of California as the analyzed cruise did. This new, recent, and systematic sampling effort in a poorly sampled region of the entrance zone of the Gulf of California seems to be a key factor in our findings of *Planctoteuthis* sp. 1.

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