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*Short Communication*

## Squids of the family Onychoteuthidae Gray, 1847 in the southeastern Pacific Ocean

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**ABSTRACT.** Hooked squids (Family Onychoteuthidae Gray, 1847) inhabit all oceans of the world except the Arctic. This family is currently comprised of 25 species belonging to seven genera. In the southeastern Pacific Ocean, approximately five onychoteuthid species have been previously identified, but true identity of these taxa is uncertain. We reviewed museum collections, from Chile, United States and New Zealand, and literature to elucidate the presence of hooked squids in the southeastern Pacific Ocean. The present status of the Onychoteuthidae from the southeastern Pacific only includes four species: *Onychoteuthis aequimanus*, *Onykia ingens*, *Onykia robsoni*, and *Kondakovia nigmatullini*.

**Keywords:** Onychoteuthidae, *Onychoteuthis*, *Onykia*, *Kondakovia*, hooked squids, Chile.

## Calamares de la familia Onychoteuthidae Gray, 1847 en el Océano Pacífico suroriental

**RESUMEN.** Los calamares ganchudos (Familia Onychoteuthidae Gray, 1847) habitan en todos los océanos excepto en el Ártico. Esta familia está compuesta actualmente de 25 especies pertenecientes a siete géneros. En el Océano Pacífico suroriental, aproximadamente cinco especies de Onychoteuthidae han sido identificadas previamente, pero su estatus taxonómico es incierto. Se revisaron las colecciones de museos de Chile, Estados Unidos y Nueva Zelanda, y la literatura para dilucidar la presencia de calamares con ganchos en el Pacífico suroriental. El estado actual de la familia Onychoteuthidae en esta área incluye solo cuatro especies: *Onychoteuthis aequimanus*, *Onykia ingens*, *Onykia robsoni* y *Kondakovia nigmatullini*.

**Palabras clave:** Onychoteuthidae, *Onychoteuthis*, *Onykia*, *Kondakovia*, calamares ganchudos, Chile.

Hooked squids (family Onychoteuthidae Gray, 1847) inhabit all oceans of the world except the Arctic (Bolstad, 2010). This family is composed of 25 species belonging to seven genera (Bolstad, 2010). In the southeastern Pacific Ocean (SEP), various studies have reported a total of seven onychoteuthid squid species and four genera (Thore, 1959; Roper *et al.*, 1984; Nesis, 1987; Fisher & Hureau, 1988; Rocha *et al.*, 1991; Cardoso, 1991; Alexeyev, 1994; Rocha, 1997; Paredes *et al.*, 1999). More recently, following reviews of specimens from Chilean museums and newer literature, the list has been reduced to five species and three genera (Vega *et al.*, 2001; Vega, 2009; Ibáñez *et al.*, 2009). A complete review of the family has also revealed new species, new records, and new combinations (Bolstad, 2007, 2008, 2010). However, few specimens from the SEP were available for these

studies. Herein, we have reviewed the literature and specimens from museum collections to elucidate the true onychoteuthid fauna of the SEP. Historically, the most commonly reported species from the SEP has been *Onychoteuthis banksii*. However, Bolstad (2008, 2010) recognized that many specimens attributable to this species are incorrectly identified, and *O. banksii* (*sensu stricto*) appears to only inhabit the Atlantic Ocean. Therefore, it is vital to reassess the *Onychoteuthis* specimens collected from the SEP.

The present work was based on a review of the museum collections from the Museo Nacional de Historia Natural (MNHNCL), Santiago, Chile; Museo Zoológico de la Universidad de Concepción (MZUC), Concepción, Chile; Colección Flora y Fauna, Profesor Patricio Sánchez, Pontificia Universidad Católica de Chile, Santiago, Chile (SSUC); Santa Barbara Museum

of Natural History (SBMNH), Santa Barbara, USA; National Institute of Water and Atmospheric Research, (NIWA), Wellington, New Zealand, and the Museum of New Zealand Te Papa Tongarewa (NMNZ), Wellington, New Zealand. Description, measurements, and counts followed Roper & Voss (1983). The following abbreviations are used: TL: total length; ML: mantle length; MW: mantle width; HL: head length; HW: head width; AL: arm length 1 to 4R/L; FL: fin length; FW: fin width; TnL: tentacle length; CL: tentacle club length; CS: count of carpal suckers on the tentacle club; MH: count of manus hooks on the tentacle club; TPS: count of terminal pad suckers on the tentacle club.

### Systematics

Family: Onychoteuthidae Gray, 1847

Genus: *Onychoteuthis* Lichtenstein, 1818

Type species: *Onychoteuthis aequimanus* Gabb, 1868

Material examined: *Onychoteuthis "banksii"* (2 specimens) 70, 98 mm ML (off Valparaiso, southeastern Pacific, 300-400 m depth) MNHNCL 300016. Collected by N. Bahamonde, August 10, 1960. *Onychoteuthis "banksii"* 70 mm ML (near Eastern Island, caught at surface) MNHNCL 300005. Collected by L. DiSalvo, February 1986.

Comparative material examined: *Onychoteuthis aequimanus* (3 specimens) 78, 87 and 100 mm ML (Tasman Sea, 37°S, 167°E) NMNZ 160477. Collected in 1960. *Onychoteuthis aequimanus* mantle damaged (Kermadec Islands, 27°50.8'S, 178°50.2'E, 20 m depth) NMNZ 074466. Collected June 18, 1976. *Onychoteuthis aequimanus* 150 mm ML (23°17.2'S, 173°1.5'E) NMNZ 181412. Collected in May 2005. *Onychoteuthis* cf. *aequimanus* 91 mm ML (40.51°S, 178.2°E, 100 m depth) NIWA 32754. Collected in February 1998.

Description. Small squids (ML 70-106 mm), arms medium length (29-57% ML) (Fig. 1). Head with 9-10 nucal folds (Fig. 2). Fins rhombic, length about half of mantle length (52-59% ML). Gladius visible along anterior mantle zone. Arms with two sucker rows; tentacle club length 22-34% ML, with 21-22 large hooks, 8 carpal suckers, and 14-16 terminal pad suckers (Fig. 1, Table 1).

Genus: *Onykia* Lesueur, 1821

Subgenus: *Onykia (Moroteuthopsis)* Pfeffer, 1908

Type species: *Onykia (Moroteuthopsis) ingens* (Smith, 1881)

Material examined: "*Moroteuthis*" *ingens* (3 specimens) 93, 87, 90 mm ML (southern Chile, 55°29'S, 70°03'W, 350-357 m depth) MNHNCL 5747. Collected



**Figure 1.** *Onychoteuthis aequimanus* MNHNCL 1954-2. a) Complete specimen, ML 106 mm, b) Club, 29 mm.



**Figure 2.** Detail of head, eye and nucal folds of *Onychoteuthis aequimanus* MNHNCL 1954-2. Complete specimen, ML 106 mm.

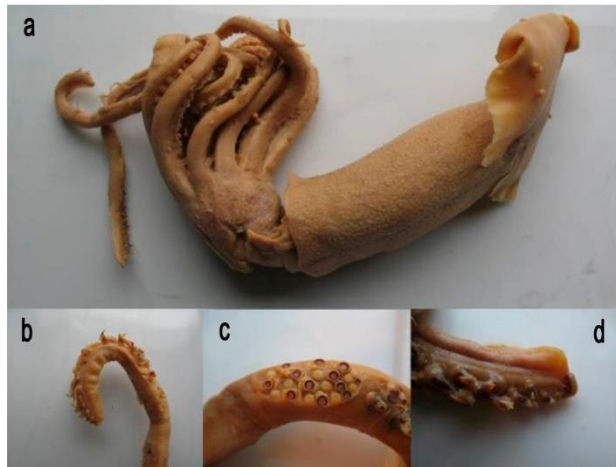
by S. Avilés & P. Ojeda, December 3, 1977. "*Moroteuthis*" *ingens* 380 mm ML (southern Chile, 52°06'S, 75°47'W) MNHNCL 5805. Collected November 22, 1977.

Comparative material examined: *Onykia ingens* 178 mm ML (Campbell Plateau, 52°26'S, 170°31'E, 480-482 m depth) NMNZ 074116. Collected January 18, 1977. *Onykia ingens* 115 mm ML (Bounty Plateau, 47°40.68'S, 178°0.72'E, 840 m depth) NMNZ 118344. Collected December 9, 1990. *Onykia ingens* 170 mm ML (43.06°S, 175.64°E, 460 m depth) NIWA32754. Collected October 7, 1996.

Description. Large squids (ML 87-380 mm) (Fig. 3). Mantle muscular, rugose, with small, fleshy, irregular

**Table 1.** Measurements (mm) and counts of onychoteuthid squids. For abbreviations see text. \*Incomplete or damaged.

	MNHCL 1954-1	MNHCL 1954-2	MNHCL 1947	MNHCL 5747-1	MNHCL 5747-2	MNHCL 5747-3	MNHCL 5805	MNHCL 1950	MNHCL 841
	<i>Onychoteuthis aequimanus</i>	<i>Onychoteuthis aequimanus</i>	<i>Onychoteuthis aequimanus</i>	<i>Onykia ingens</i>	<i>Onykia ingens</i>	<i>Onykia ingens</i>	<i>Onykia ingens</i>	<i>Onykia robsoni</i>	<i>Kondakovia nigmatullini</i>
ML	98	106	70	93	87	90	380	380	62
MW	20	23	23	24	24	24	130	95	15
HL	15	21	23	19	25	23	75	56	20
HW	19	21	17	21	21	21	80	45	10
FL	53	63	37	43	50	51	190	210	18
FW	62	71	47	65	68	67	240	185	35
Arms I	29L/30R	31L/33R	25L/30R	60R/60L	65R/60L	55R/61L	155R*/204L	212R/125L*	40R/35L*
Arms II	38L/37R	39L/42R	40L/39R	80R/75L	65R/85L	81R/81L	314R/305L	234R/246L	54R/45L
Arms III	35L/38R	47L/38R*	40L/42R	75R/65L	85R/75L	72R/75L	276R/280L	240R/224L	40R/42L
Arms IV	35L/35R	38L/35R*	35L/36R	80R/80L	70R/70L	75R/79L	316R/311L	285R/281L	43R/44L
TnL	55	105	80R/75L	115R/--	130R/125L	156R/145L	582R/520L	830R/826L	81R/70L
CL	22R	29R	24R/23L	27R/--	27R/27L	32R/30L	120R/105L	118R/145L	19R/--
CS	8R	8R	8R/8L	12R/--	12R/12L	12R/12L	12R/12L	10R/9L	12R/12L
MH	22R	21R	22R/22L	28R/--	26R/28L	25R/26L	27R/26L	25R/27L	26R/27L
TPS	14R	16R	4R/4L	17R/--	16R/13L	14R/16L	16R/16L	12R/13L	12R/21L



**Figure 3.** *Onykia ingens* MNHNCL 5747. a) Complete specimen, ML 93 mm, b) Club, 27 mm, c) carpal suckers, d) manus suckers.



**Figure 4.** Detail of mantle warts of *Onykia ingens* MNHNCL 5747. Complete specimen, ML 93 mm.

'warts' over all surfaces (Fig. 4). Arms long with two sucker rows (61-97% ML). Fins broad, smooth, rhombic, length about half of mantle length (46-57% ML); tentacle club narrow (Fig. 5), length 29-35% ML, with 25-28 large hooks, 12 carpal suckers, and 13-17 terminal pad suckers (Fig. 2, Table 1).

Genus: *Onykia* Lesueur, 1821

Subgenus: *Onykia (Onykia)* Lesueur, 1821

Type species: *Onykia (Onykia) robsoni* (Adam, 1962)

Material examined: "*Moroteuthis*" *robsoni* 380 mm ML (off Los Vilos, central Chile, 32°S, 450 m depth) MNHNCL 1950.

Comparative material examined: *Onykia robsoni* 265 mm ML (42.83°S, 177.2°E, 809 m depth) NIWA 32750. Collected July 21, 1995.

Description. Large squid (380 mm ML) (Fig. 6). Mantle fleshy, spindle-shaped, narrow cone over posterior (Fig. 6). Dorsal and ventral surfaces of mantle studded with, well-separated, blister-like warts (Fig. 7). Fin length



**Figure 5.** Detail of tentacle club of *Onykia ingens* MNHNCL 5747. Complete specimen, ML 93 mm.



**Figure 6.** *Onykia robsoni* MNHNCL 1950. a) Complete specimen, ML 380 mm, b) Club 118 mm.

about half of mantle length (55% ML). Arms long with two sucker rows (55-75% ML); tentacle club length 38% ML, with 25-27 large hooks, 9-19 carpal suckers, and 12-13 terminal pad suckers (Fig. 6, Table 1).

Genus: *Kondakovia* Filippova, 1972

Type species: *Kondakovia longimana*

*Kondakovia nigmatullini* Laptikhovskiy, Arkhipkin & Bolstad, 2008

Material examined: *Kondakovia "longimana"* 62 mm ML (44°44'S, 68°20'W) MNHNCL 841. Collected April 24, 1984.

Description. Small squid (62 mm ML), arms long with two sucker rows (64-87% ML). Fin broadly rhombic and short (29% ML); tentacle club length 30% ML, with 27 large hooks, 12 carpal suckers, two complete series of marginal suckers and 12-21 terminal pad suckers (Fig. 8, Table 1). Mantle head and arms with reticulated skin sculpture (Fig. 8).





**Figure 7.** Detail of mantle warts of *Onykia robsoni* MNHNCL 1950. Complete specimen, ML 380 mm.

In the southeastern Pacific Ocean (SEP), onychoteuthid squids are poorly represented in regional and international collections, and holdings represent only four species. We reported the presence of four species based on museum collections and an examination of the literature. The genera *Onykia* and *Kondakovia* in the SEP are distributed in cold waters of the southern Ocean down to 30°S, while *Onychoteuthis* is common in warmer oceanic waters from 30°N to 30°S (Ibáñez *et al.*, 2009; Bolstad, 2010).

Previous reports of *O. banksii* in Peru and Chile (Thore, 1959; Cardoso, 1991; Rocha, 1997; Paredes *et al.*, 1999; Vega *et al.*, 2001; Ibáñez *et al.*, 2009; Vega, 2009) probably correspond to *O. aequimanus*. Specimens of this species from ML 100–350 mm are common in stomach contents of swordfish (*Xiphias gladius*) in oceanic waters off Chile between 32°S–8°S and 80°W–5°W (Ibáñez *et al.*, 2004; Castillo *et al.*, 2007). The three specimens of *O. aequimanus* from MNHNCL represents a new distribution record for this species.

Squids identified as “*Moroteuthis*” from MNHNCL belong to the genus *Onykia*. *Onykia ingens* inhabits the continental shelf of Chile, from 42°S southward in cold waters of Antarctic origin deeper than 300 m (Ibáñez *et al.*, 2009). Alexeyev (1994) found one juvenile specimen of *O. ingens* at 39°04’S, 93°50’W. This species has been reported in stomach contents of Patagonian toothfish (*Dissostichus eleginoides*) from the continental slope (>500 m) of southern Chile (43°S) (Murillo *et al.*, 2008). *Onykia robsoni*, in Chile, is distributed in more northern waters than *O. ingens*, from 32°S southward. In addition, Alexeyev (1994) found several juvenile specimens of *O. robsoni* between 35° and 0°S.



**Figure 8.** *Kondakovia nigmatullini* MNHNCL 841. a) Dorsal view, ML 62 mm, b) ventral view.

*Kondakovia longimana* has been reported from stomach contents of hoki (*Macruronus novaezealandiae*) and southern hake (*Merluccius australis*) in southern Chile (52°S, 76°W) at 300 m depth (Rocha *et al.*, 1991). This squid has also been reported from stomach contents of Patagonian toothfish (*D. eleginoides*) from the continental slope (>500 m) of southern Chile (43°S) (Murillo *et al.*, 2008). The only museum specimen (MNHNCL 841) of *K. longimana* examined herein corresponds to a juvenile of *K. nigmatullini*. It is likely that all records in Chile of *K. longimana* from stomach contents, for example, correspond to a *K. nigmatullini*. This specimen represents a new distribution record for this species in addition to type material (holotype and paratype) collected near to Falkland Islands (Laptikhovskiy *et al.*, 2008).

Rocha (1997) included *Filippovia knipovitchi* (Filippova, 1972) in Chilean waters based on the Southern Ocean distribution reported by Fisher & Hureau (1988), but we did not find this species represented in the present material.

We don’t found any Onychoteuthid squid from Chile or Peru in the collections of NIWA, NMNZ, SSUC, MZUC and SBNH, only in MNHNCL. Onychoteuthid squids from the southeastern Pacific Ocean have been poorly studied and it is likely that more species from another genera such as *Notonykia* and *Filippovia* are also present in these waters. During the development of this work we found three specimens of *Notonykia* sp. (identified by K. Bolstad) at 280 km off central Chile (34.09°S, 75.08°W).

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