NEW RECORDS OF *Drechselia danae* (JOUBIN, 1931) (CEPHALOPODA: CRANCHIIDAE) OFF THE PACIFIC COAST OF MEXICO

Nuevos registros de *Drechselia danae* (Joubin, 1931) (Cephalopoda: Cranchiidae) en el Pacífico mexicano

RESUMEN. Se registra la presencia de tres especímenes adultos del calamar cristal *Drechselia danae* recolectados en tres localidades del Océano Pacífico mexicano. Las características taxonómicas básicas para su identificación incluyeron la forma general del cuerpo, arreglo, tipo y número de tubérculos cartilaginosos en el manto y el número y posición de los fotóforos oculares, entre otras. La presencia de estos adultos confirma su amplia distribución en el Océano Pacífico mexicano.

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Glass or crystal squids (Family Cranchiidae) are distinguished from other cephalopods by their translucent appearance that gives them their common name (Voss, 1980; Voss *et al*., 1992).

The family includes 13 genera and 60 species (Voss *et al*., 1992) that are distributed from the Antarctic region with *Mesonychoteuthis hamiltoni* Robson, 1925 (supporting an important fishery) (Roper *et al*., 1995) to the subtropical and tropical regions in both hemispheres, where the species *Cranchia scabra*, *Leachia dislocata* Young, 1972, *Leachia pacifica* (Issel, 1908), *Liocranchia reinhardti* (Steenstrup, 1856), and *Helicocranchia pfefferi* Massy, 1907 are distributed (Okutani, 1995; Roper *et al*., 1995). Adults of these five species have been recorded in Mexican waters (Young, 1972; Okutani, 1980; Okutani, 1995) as well as their paralarvae (Okutani & McGowan, 1969; Young, 1972; Voss *et al*., 1992; Granados-Amores, 2008). These and other species of the family occur mainly in meso-pelagic and bathypelagic zones (down to 2000 m deep) during their adulthood, making daily vertical migrations (Roper & Young, 1975; Boyle & Rodhouse, 2005). Paralarvae and juveniles are found in the first 200 m of the water column, but they can reach deeper waters as they grow larger and begin to show short vertical movements (Voss *et al*., 1992). Because of their deep distribution and oceanic habitat, adult specimens of cranchiid squids rarely have been captured along with other commercially important squids that are caught in shallow waters. Although the East Pacific distribution for the species in Voss *et al*. (1992) is recorded as ~14º S and 23º N, west to ~145º W, no specimen records to document a Mexican distribution were indicated. However, their paralarvae can be collected in routine sampling, particularly in plankton tows that include the first 200 m of the water column. In this paper, we report the presence of the cranchiid squid *Drechselia danae* Joubin, 1931, in the Mexican portion of the Pacific Ocean through the record of three adult specimens collected in three different localities.

One of the specimens was collected casually during a field trip in a "panga", while the other two were captured during two oceanographic surveys. The collections were made off Tuxpan, Nayarit (21° 56.7' N, 107°43.7' W) in November 2004 (TUX); in Bahía de La Paz, B.C.S. (24° 31.6' N, 110° 35.9' W) in June 2007 (BAPAZ); and within the Gulf of Tehuantepec in front of Puerto Ángel, Oaxaca (15° 34.8' N, 96° 2.5' W) in July 2007 (TEHUA) (Fig. 1). The first specimen was captured during an oblique tow with a 2.49 m^2 mouth width net (335 µm mesh, at 9:30 hr) from 200 m depth to the surface. The second specimen was collected from the surface with a dip net (500 µm mesh, at 13:45 hr). The third specimen was

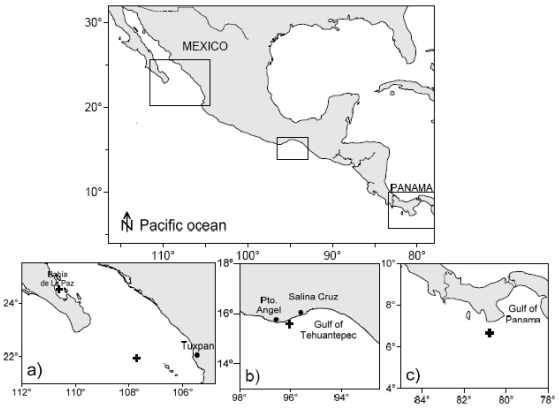

Figure 1. Collection localities of the *Drechselia danae* specimens in Mexico: a) off Tuxpan, Nayarit and in Bahía de La Paz, BCS, b) Gulf of Tehuantepec, off Puerto Angel, Oaxaca., and c) Type locality: Gulf of Panama, Panama.

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detached alive from a conductivity-temperature device (CTD) deployed at 500 m in depth. The specimen from Bahía de La Paz was fixed with 10% formaline, while the other two were placed in 96% ethanol, and stored at the Departamento de Plancton y Ecología Marina, Centro Interdisciplinario de Ciencias Marinas, Instituto Politécnico Nacional, La Paz, BCS, Mexico (Cat. No. COCEP-01, COCEP-02 and COCEP-03, respectively). All specimens were finally preserved in 96% ethanol. Specimens were identified following Voss (1980), Voss *et al*. (1992), and Okutani (1995), and were compared with the original specimens and descriptions of *Drechselia danae* made by Joubin (1931) (type locality: Station 1206-II, 06º 40' N, 80º 47' W, Depth: 2,680 m, 14-January-1922, Panama, Pacific Ocean).

The BAPAZ and TEHUA specimens were two mature males (146 mm and 135 mm of mantle length (ML), respectively), and the TUX specimen was a mature female (78 mm ML) (Fig. 2). The three specimens showed straight cartilaginous strips with 10 large multifid tubercles shaped as large rounded crowns, originated from the ventral margin of the mantle towards the posterior region at each fusion of the mantle with the funnel. All specimens showed 21 ocular photophores, 8 internal of the same size, 5 middle (the first and the last larger than the central three), and 8 external smaller, sub-equal photophores (Fig. 3). Although Voss *et al*. (1992) established that the ocular photophore pattern and the detail of the rows of cartilaginous tubercles are the main characters used for identifying species of *Leachia*, other morphological characters described for *Drechselia danae* by Joubin (1931) were also observed, such as the presence of a large central tooth in the ring of the middle suckers of arm III (larger in males than in females), the shape of the tentacles, and the hectocotolized arm in the males. These were also compared

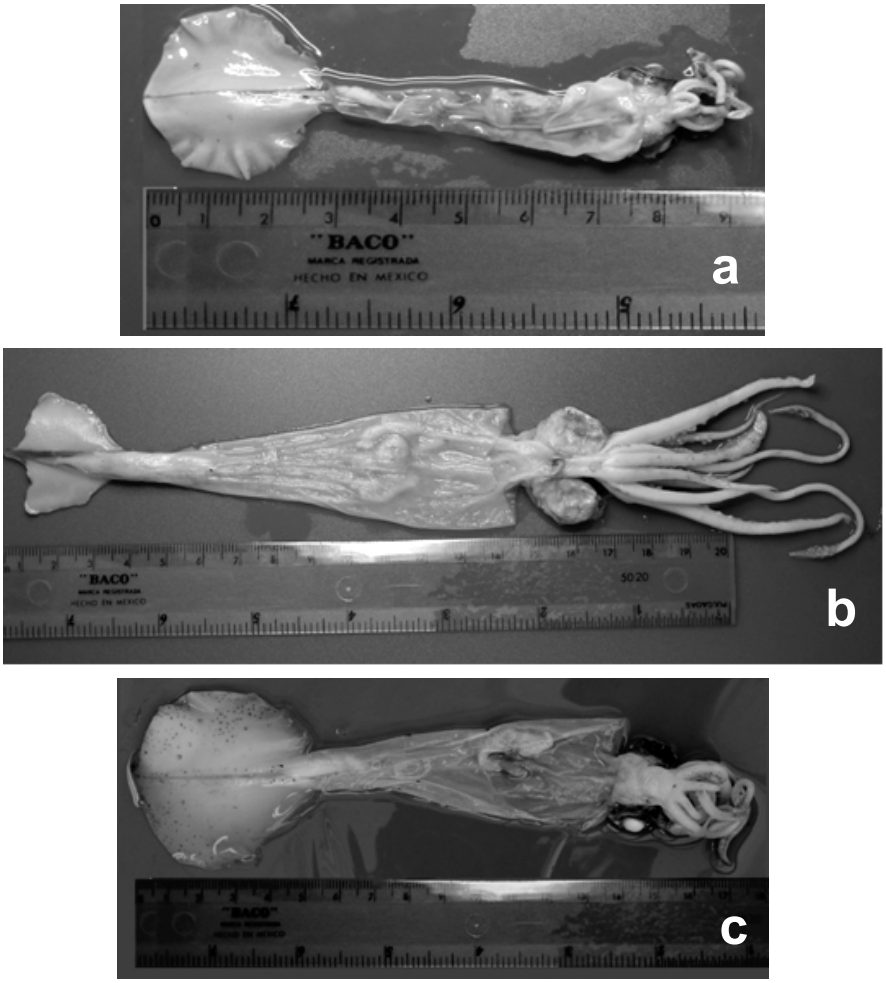

Figure 2. *Drechselia danae*: Specimens collected off Mexico. a) Nayarit, off Tuxpan (TUX); b) Baja California Sur, in Bahia de La Paz (BAPAZ); and C) Oaxaca, off Puerto Ángel, Gulf of Tehuantepec (TEHUA)

with the original description of *Leachia dislocata* (Young, 1972). The above comparison allowed their identification as members of the species *Drechselia danae* former *Leachia danae*, differentiating them from other two similar species from the genus *Leachia* (*L. dislocata* and *L. pacifica*), which are also distributed in the Mexican Pacific Ocean (Young, 1972; Okutani, 1985; Voss *et al*., 1992). These two last species differ from *D. danae* in having less ocular photophores, in the multifid tubercles shaped as a transversal diadem, and in the displacement towards the center of the mantle of the second cartilaginous tubercle of each row, which appears at around 15 mm of ML (Voss *et al*., 1992; Okutani, 1995) (Fig. 3). The similarities between these three species caused that *D. danae* (originally described by Joubin in 1931) to be included until recently as a species of *Leachia* (*L. danae*) after a revision of the family by Voss (1980). Nevertheless, their actual valid taxonomic status established by the Integrated Taxonomic Information System ITIS (http://www.itis .gov) is *Drechselia danae*, according to its original description. This implies a synonymy between *D. danae* and *L. danae* in recent publications.

The presence of the larger adult specimen (BAPAZ) of *D. danae* in the surface may have two explanations. One relates to the fact that most of the cephalopods lose physiological and motile ability for maintaining themselves in deeper water at the beginning of sexual maturity when a degradation process starts. This eventually leads to the death of the organism (Boyle & Rodhouse, 2005).The fact that the BAPAZ specimen was collected from the surface, and its poor condition prior to fixation, confirm this process. The recording of beaks from *L. dislocata* and *L. pacifica* in the stomach content of short-term diving birds (Boyle & Rodhouse, 2005) suggest that this degradation phenomenon can also occur in *D. danae*, thus the explanation of its presence in the surface.

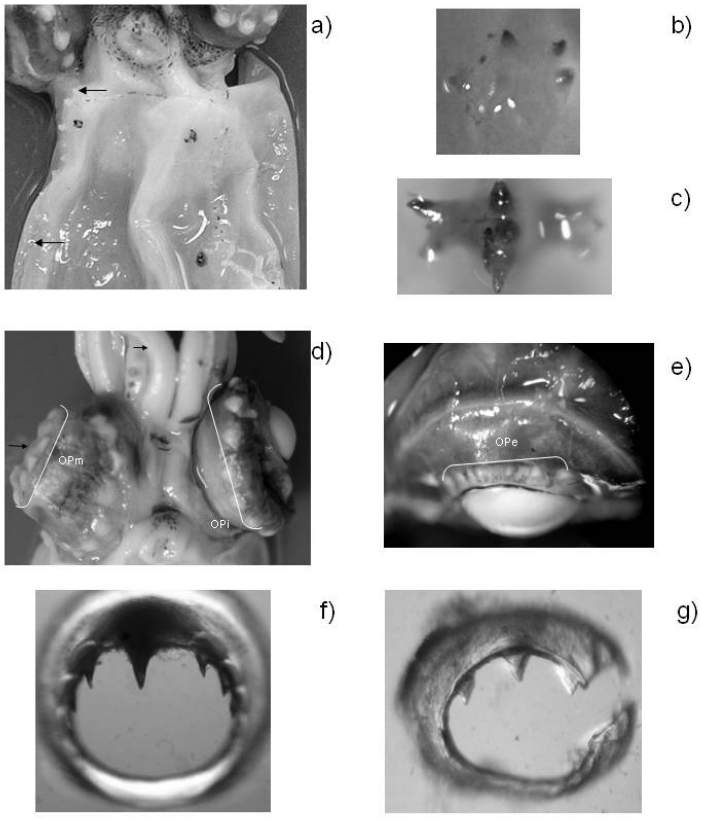

Figure 3.- Primary morphological characteristics for identification of the specimens of *Drechselia danae* collected in Mexican Pacific waters: a) straight cartilaginous strips with multifid tubercles round, b) characteristic tubercle of the species (TUX, ML= 78.0 mm), c) multifid tubercle transversely elongated (diadem shape) of *Leachia dislocata* (ML= 69.8 mm, after Granados-Amores, 2008) d) inner ocular photophores (OPi) and middle (OPm), e) outer ocular photophores (OPe), f) sucker ring on middle arm III (males, BAPAZ and TEHUA), and g) same ring sucker on female (TUX).

On the other hand, the presence of a specimen at the surface may be related to daily vertical migrations recorded in different species of cranchiid and in other squid species, which determines their distribution in the upper layers of the water column at night and generally up till dawn (Clarke, 1966; Boyle & Rodhouse, 2005). This could also explain the capture of the TUX specimen (in better shape than the BAPAZ specimen), may be influenced by such daily movements because the specimen was captured early in the morning (9:50 hr) at 0 to 200 m in depth. In this case, the use of a net with a diameter three times larger than the conventional plankton net (Neuston, CalCOFI or bongo with 60 cm in diameter) in which avoidance tends to be less, could be the key factor for the capture of the TUX specimen.There are no reports of captured adult specimens of this species with conventional nets (McGowan, 1967; Okutani & McGowan, 1969; Alejo-Plata, 2002).

The capture of the third specimen, was exceptional. It was firmly attached to the protective structure of the CTD deployed to a depth of 500 m. Although the TEHUA specimen may have collided with the CTD or vice versa, it is also possible that the squid have tried to seize it. Kubodera *et al*. (2007) reported (using filmed evidence) that attack frequency of the mesopelagic squid *Taningia danae* Joubin, 1931 over structures carrying bait, lights, cameras, or cables was 64.3 %, while the attack frequency on offered prey at the same time was only 35.7 %. These authors explain that the brightness and blue color of the instrument could attract the squid or appear as a potential rival. The highly inquisitive and predatory behavior of cephalopods may explain the capture of the TEHUA specimen alive on the CTD.

In May 2003 a large cranchiid squid was collected in near Punta Arena de la Ventana, in Bahía de La Paz, BCS, Mexico. Although the photograph of this apparently adult squid posted on the web (http://www.mexfish.com/lapz/lapz/af030609/af030609.htm) resembles *D. danae*, a preserved specimen of this animal could not be located in an extensive search through collections of different research institutions in Baja California. Thus we were not able to confirm the identification because a specimen was not available to examine and compare with the three specimens reported in this study.

This first record of *D. danae* adults from Bahía de La Paz in the Gulf of California to the Gulf of Tehuantepec (15° to 27° 13' N) confirms their broad distribution in the Mexican portion of the Pacific Ocean.

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