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New records of Ophiuroidea (Echinodermata) from the coast of Chiapas, Mexico

Nuevos registros de Ophiuroidea (Echinodermata) de la costa de Chiapas, México

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ABSTRACT

Knowledge about ophiuroids from Chiapas, Mexico, is still limited; only *Diopederma daninana* was previously recorded in the state. In order to contribute to the knowledge of their diversity in the region, ophiuroids were collected in four localities of Puerto Chiapas, in different substrata and at different depths. Three species were identified: *Ophiothrix* (*Ophiothrix*) *spiculata*, *Ophiactis savignyi*, and *Ophiactis simplex*. *O. simplex* was the most abundant and well distributed. With these additions, we updated the checklist of ophiuroids from Chiapas to five species.

Key words: *Ophiactis*, *Ophiothrix*, Puerto Chiapas, southern Mexican Pacific.

RESUMEN

El conocimiento de los ofiuroideos de Chiapas, México es aún limitado; sólo *Diopederma daniana* estaba reportada para la zona. Con el objetivo de contribuir al conocimiento de la diversidad de ofiuroideos de la región, se llevaron a cabo recolectas en cuatro localidades de Puerto Chiapas, en diferentes sustratos y profundidades. Se identificaron en total tres especies: *Ophiothrix (Ophiothrix) spiculata*, *Ophiactis savignyi* y *Ophiactis simplex*. *Ophiactis simplex* fue la especie más ampliamente distribuida y más abundante. Con esta contribución, se amplía a cinco la lista de especies de ofiuroideos de Chiapas.

Palabras clave: *Ophiactis*, *Ophiothrix*, Puerto Chiapas, Pacífico sur mexicano

Chiapas is one of the states with the highest terrestrial biodiversity in Mexico (Llorente-Bousquets and Ocegueda, 2008), but still little is known about its marine biodiversity. There is consensus, however, that the marine biodiversity of Chiapas is underestimated due to its long, unexplored coast and because entire taxonomic groups remain unstudied (Aguilar-Sierra, 2011). Being the least studied state on Mexico's Pacific coast, there are few reports of marine taxa from Chiapas, most of which were published during the last decade (algae, Godínez-Ortega, 2013; crustaceans, García-Madrigal *et al*., 2012; polychaetes, Bastida-Zavala and Guevara-Cruz, 2012; mollusks, Sevilla-Hernández, 1995; fish, Penagos-García *et al*., 2011).

The study of echinoderms from Chiapas began in 1938 with the recording of the echinoid *Clypeaster europacificus* H.L. Clark, 1914 (Grant and Hertlein, 1938). During the 1940s, the number of studies in the area increased and, for the first time, the species *Luidia latiradiata* (Gray, 1871) (Caso, 1944) and *Mellita longifissa* (Michelin, 1858) were reported in the region (Rioja, 1944; Caso, 1946). Later, Caso (1978) recorded the presence of *Eucidaris thouarsii* (L. Agassiz and Desor, 1846) and *Mellita notabilis* H.L. Clark, 1947 (Caso, 1980) along the coast of Chiapas, and then Luke (1982) discussed the echinoid *Clypeaster rotundus* (A. Agassiz, 1863) in the area. Several years later, Honey-Escandón *et al*. (2008) published the most important work on echinoderms in Chiapas in terms of the recorded species. They reported the presence of *Astropyga pulvinata* (Lamarck, 1816), *Encope micropora* L. Agassiz, 1841, *Luidia tessellata* Lütken, 1859, *Astropecten armatus* Gray, 1840, *Astropecten regalis* Gray, 1840, *Diopederma daninana* (Verrill, 1867), *Heliaster microbrachius* Xantus, 1860, and *Trachythyone peruana* (Semper,

1868). Recently, Solís-Marín and Laguarda-Figueras (2013) provided a new recording of *Holothuria* (*Halodeima*) *kefersteini* (Selenka, 1867).

Thus, there are 15 species of echinoderms in Chiapas; the class Ophiuroidea is the least studied. To date, there are just two ophiuroid records from Chiapas: *D. daniana* collected at Puerto Madero (Honey-Escandón *et al*., 2008; Granja-Fernández and López-Pérez, 2012; Solís-Marín and Laguarda-Figueras, 2013; Granja-Fernández *et al*., 2015a, 2015b), and a fossil record of the family Ophiuridae, recovered from the San Juan Formation (Martín-Medrano and García-Barrera, 2006). In this article, we provide three new records of ophiuroids from the coast of Chiapas, contributing to the knowledge of the marine fauna of the region.

During May 2014, as part of a larger project regarding ophiuroid biodiversity along the Pacific coast of Mexico, we took samples at four localities in the vicinity of Puerto Chiapas, Chiapas, Mexico: Muelle Fiscal (14°42´22.12´´N; 92°24' 7.32"W), el Espigón Norte (14°42´6.12´´N; 92°24' 31.03"W), el Espigón Sur (14°42´2.85´´N; 92°24' 33.96"W), and Punta del Espigón (14°41´56.56´´N; 92°24' 41.24"W). Chiapas is located on the southern Mexican Pacific coast. Specifically, the area of Puerto Chiapas is bounded by the Suchiate River on the east and by Puerto Arista on the west. The region is part of the Gulf of Tehuantepec, characterized by a continental shelf with soft bottoms (Lara-Lara *et al*., 2008). The Gulf of Tehuantepec is affected by important meteorological phenomena, known locally as the "tehuanos", i.e., northern winds that occur during the dry season in the Gulf of Mexico (Tapia-García *et al*., 2007; Lara-Lara *et al*., 2008). These winds decrease the sea surface temperature, increase salinity, and change water circulation, bringing an upwelling that increases nutrients and primary production (González-Silvera *et al*., 2004; Tapia-García *et al*., 2007; Lara-Lara *et al*., 2008).

We carried out collections in different substrata (rock, sediment, sponges, algae, mollusks) at depths of 1.9 m to 5 m. We hand collected samples while scuba diving. The collected ophiuroids were anesthetized using cold temperatures (>10°C) in order to prevent autotomy. The specimens were fixed and preserved in 70 % ethanol. The specimens were identified using the works of Müller and Troschel (1842), Le Conte (1851), and Granja-Fernández *et al*. (2014). The valid names follow and were arranged systematically according to Smith *et al*. (1995) and Granja-Fernández *et al*. (2015a, 2015b).

A total of three species of ophiuroids were found: *Ophiothrix (Ophiothrix) spiculata* (Le Conte, 1851), *Ophiactis savignyi* (Müller and Troschel, 1842), and *Ophiactis simplex* (Le Conte, 1851), belonging to one order (Ophiurida), two families (Ophiactidae, Ophiothrichidae) and two genera (*Ophiactis*, *Ophiothrix*). Note that *O. simplex* was collected at all localities (except Muelle Fiscal) and was the most abundant, and was also found in a larger number of substrata (algae, sponge, rock, oyster reef). The localities el Espigón Norte and el Espigón Sur showed the highest number of species, but the former possessed the highest abundance of ophiuroids in the area under study. Rocks were the habitat with the highest number of ophiuroids, but the oyster reef showed the highest abundance of species.

Systematics:

Phylum Echinodermata Brugiére, 1791

Class Ophiuroidea Gray, 1840

Order Ophiurida Müller and Troschel, 1840

Family Ophiotrichidae Ljungman, 1867

***Ophiothrix (Ophiothrix) spiculata* (Le Conte, 1851)**

Muelle Fiscal (11 specimens, 5 m, sediment, 05/May/2014, 30 °C); el Espigón Sur (1 specimen, 3 m, rock, 05/May/2014, 30 °C).

Family Ophiactidae Matsumoto, 1915

***Ophiactis savignyi* (Müller and Troschel, 1842)**

El Espigón Norte (1 specimen, 1.9 m, rock, 06/May/2014, 29 °C).

***Ophiactis simplex* (Le Conte, 1851)**

El Espigón Sur (2 specimens, 2 m, sponge, 05/May/2014, 30 °C; 1 specimen, 3 m, sponge, 05/May/2014, 30 °C); el Espigón Norte (5 specimens, 2 m, sponge, 06/May/2014, 29 °C; 9 specimens, 1.9 m, sponge, 06/May/2014, 29 °C; 10 specimens, 2 m, algae, 06/May/2014, 29 °C; 29 specimens, 1.9 m, rock, 06/May/2014, 29 °C); Punta del Espigón (43 specimens, 3 m, oyster reef, 06/May/2014, 29 °C).

Previous studies along the coast of Chiapas discussed the presence of *D. daniana* (Honey-Escandón *et al*., 2008; Granja-Fernández and López-Pérez, 2012; Solís-Marín and Laguarda-Figueras, 2013; Granja-Fernández *et al*., 2015a, 2015b). Recently, Penagos-García *et al*. (2012) reported the presence of *O.* (*Ophiothrix*) *spiculata* in the Soconusco Region, Chiapas. The authors provided an illustration of the collected ophiuroid, but it turns out that the image does not correspond to the species *O.* (*Ophiothrix*) *spiculata*; instead, the specimen is a member of the family Ophiocomidae and the genus *Ophiocoma*, since its disk is covered by granulation and the arms and arm spines are stout (Granja-Fernández *et al*., 2014). The figure shows only the dorsal side of the specimen. However, there are some morphological characteristics suggesting that it corresponds to the species *Ophiocoma alexandri* Lyman, 1860: dorsal arm plates are oval hearth-shaped and wider than long; long arm spines (1.5-2 times the length of a dorsal arm plate), blunt, and more than four in number; dorsal arm plates with some plates banded (Lyman, 1860; Granja-Fernández *et al*., 2014).

Previously, only one report of a living ophiuroid was recorded in Chiapas (Granja-Fernández *et al*., 2015a, 2015b); nevertheless, considering the previous record of *D. daniana* (Honey-Escandón *et al*., 2008; Granja-Fernández and López-Pérez, 2012; Solís-Marín and Laguarda-Figueras, 2013; Granja-Fernández *et al*., 2015a, 2015b), the correct assignation of the species reported in Penagos-García *et al*. (2012), and the three new records of this study, the total number of ophiuroid species from Chiapas is five (*D. daniana, O. alexandri*, *O. savignyi*, *O. simplex*, *O.* (*Ophiothrix*) *spiculata*). According to these results, Chiapas is still considered along with Michoacán and Colima (nine and 14 species, respectively) (Granja-Fernández *et al*. 2016), among the least biodiverse on the Pacific coast of Mexico.

Notwithstanding the increase in the number of ophiuroid species recorded in Chiapas, Granja-Fernández and López-Pérez (2012) predicted that potentially 12 species of ophiuroids inhabit the area. According to the high water dynamic and turbidity (pers. obs., Granja-Fernández, 2014), as well as the extensive sandy coast of the studied area, we

expect to find suspension feeder species (i.e., Amphiuridae) in future studies. Moreover, once the numerous unsurveyed aquatic ecosystems in Chiapas (coastal lagoons, estuaries, mangroves, rocky shores, and sandy bottoms) are studied, it may turn out that the state has a high potential to contribute to ophiuroid diversity along the Mexican Pacific coast.

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