ABSTRACT

Little is known about the seaslugs in the Mexican coast of the Gulf of Mexico and almost all the species reported are either large or have a well-developed calcareous shell. Through specific sampling methods focused in opisthobranch fauna, in two lagoons and three coral reefs of the Campeche Bank, Yucatan Peninsula, we have recorded 51 species belonging to the clades Cephalaspidea, Aplysiomorpha, Sacoglossa, Eutenidiacea, and Cladobranchia. Of these, 30 species had not been previously reported for the Campeche Bank and 20 out of those are new records for the Atlantic coast of Mexico. The nudibranch Tambja cf. tenuilineata could be the first record for the east coast of the Atlantic Ocean. With this study, the actual number of opisthobranch fauna in the Campeche Bank are 84 species.

Key words: Opisthobranchs, Mexico, Biodiversity, Biogeography, Mollusks, Campeche bank, Yucatan.

RESUMEN (Opistobranquios del banco de Campeche, Península de Yucatán, México)

Se sabe poco sobre los opistobranquios de la costa mexicana del Golfo de México y la mayoría de las especies reportadas son especies con conchas grandes o bien desarrolladas. A través de muestreos dirigidos especificamente a la fauna de opistobranquios realizados en dos lagunas y en tres arrecifes del Banco de Campeche, península de Yucatán, se reportan 51 especies pertenecientes a los Clados Cephalaspidea, Aplysiomorpha, Sacoglossa, Eutenidiacea y Cladobranchia. De estos, 30 especies son nuevos registros para el Banco de Campeche y 20 de ellos son nuevos registros para la costa Atlántica de México. El nudibranchio Tambja cf. tenuilineata podría ser el primer registro de esta especie para la costa Este del océano Atlántico. Con las aportaciones del presente trabajo, se acumula un total de 84 especies de opistobranquios en el Banco de Campeche.

Palabras clave: Opistobranquios, México, Biodiversidad, Biogeografía, Mollusks, Banco de Campeche, Yucatán.
INTRODUCTION

There are between 5,000 to 6,000 described opisthobranch species (Wägele and Klussmann-Kolh, 2005). From the over 6,000 described opisthobranch species, the Atlantic coast of Mexico has, so far, 111 species of benthic opisthobranch reported (based on Rosenberg et al., 2007 and complete with references in table 1). However, the opisthobranch records from Mexico are scarce and confined to malacological or generalist faunistic studies where the opisthobranchs do not represent more than 2% of the taxonomical records (Zamora-Silva and Naranjo-García, 2008). This is due to an insignificant sampling effort focused exclusively on the opisthobranch fauna of the Atlantic coast of Mexico. To date, there are two studies exclusively dealing with the opisthobranch fauna, one in five reefs of Veracruz, in the central western part of the Atlantic coast of Mexico (Zamora-Silva and Ortigosa, 2012), and a recent report at the Alacran reef, in the Campeche Bank (Sanvicente-Añorve et al., 2012).

The Campeche Bank is a large area situated southwest of the Gulf of Mexico and northwest of the Yucatan Peninsula formed by dozens of small reefs rising from depths of 40-60 meters and some submerged banks such as Arcas, Triangulos and Arenas Cays, and the large Alacran reef National Marine Park (Spalding, 2004). This bank lies reasonably close to the Caribbean Sea and within the influence of the Yucatan Stream (Chávez and Hidalgo, 1998; Sheinbaum et al., 2002; Abascal et al., 2003), so it should share many species with the Caribbean fauna. By 2001, only 17 species of opisthobranchs (almost all of them with a conspicuous shell) were reported at different parts of the Campeche Bank (Rice and Kornicker, 1962, 1965; García-Cubas et al., 1999; Hicks et al., 2001). Thirty two species were recently added to the Campeche Bank inventory (Sanvicente-Añorve et al. 2012), summing up to 51 species known. In this work we report the results of the first campaigns devoted to the opisthobranch fauna of three coral reefs of the Campeche Bank and two lagoons of Yucatan coast.

MATERIAL AND METHODS

All specimens were collected in five localities between October 2006 and May 2008 (table 2, fig. 1). Surveys in the reefs were made using SCUBA equipment down to a depth of 20 m and shallow-water surveys were made with a snorkel or by foot. In both habitats, the sampling effort was focused on different kinds of substrata such as sand, mud, rocky walls and on diverse
slopes that are normally colonized by benthic organism where opisthobrachs are likely to be found such as sponges, hydrozoans, bryozoans, tunicates, algae, and turtle seagrass meadows (p.e. *Thalassia testudinum*). The undersides of regular-size boulders were also inspected, taking care to return all rocks to their original position (Nybakken, 1974). Collecting methods involved direct manual capture as well as indirect methods, such as the collection of substrate samples and by brushing part of the surface into a 1 mm mesh bag. Material collected by indirect methods was divided into several white trays containing salt water and left untouched until the decrease in the oxygen concentration forced the specimens to crawl up to the surface looking for areas richer in oxygen. All specimens were measured and described in vivo under a stereomicroscope. At least one specimen per species was photographed. Afterwards, specimens were put in the refrigerator or anesthetized with magnesium chloride or clove oil, and then preserved in 96% absolute ethanol. Some specimens were deposited at the Colección Nacional de Moluscos (CNMO) of the Instituto de Biología, UNAM. The phylogenetic classification follows Bouchet and Rocroi (2005) down to family level, with the exception of the family Chromodorididae, where we used Johnson and Gosliner (2012); Gosliner et al. (2008) for genera, and species are listed in chronological order by year of the description. Data for each species include: Scientific name; Examined material (Sisal (Sis); Madagascar (Mad); Serpiente (Ser); Yucalpeten (Ycl); La Bocana (Boc)); Date of sampling; Lenght in millimeters (maxim length as ML, and L for length of only one specimen); Type of substrate; Diagnosis (for identification to species level is indicated the publication and the pages that were used to identify the specimen; for unidentified species there is a brief description of the main features of the sampled material); Distribution (distribution information was taken from published records: localities of the west coast of the Atlantic ocean are listed in geographical order from north to south, west to east, and by country, first the continental countries and then the islands; for Mexico, we specified the states of the Atlantic coast of the country where each species record was found, also north to south order, following the author of the work. Abbreviations used for each state were: Tamaulipas, TAMS; Veracruz, VER; Tabasco, TAB; Campeche, CAMP; Yucatan, YUC; Quintana Roo, QROO. For species with wide geographical range, the distribution is not specified down country level.

RESULTS

From the total of 58 samples, 18 were collected in lagoons (nine in the Bocana, eight in Yucalpeten, and one in Celestun) and 40 in reefs (25 in Madagascar, 11 in Sisal, and four in Serpiente). A total of 51 species of opisthobranchs belonging to the Clades Cephalaspidea (10 species), Aplysiomorpha (6 species), Sacoglossa (13 species), Euteridiidae (13 species), and Cladobranchia (9 species) were observed. The most abundant families were Chromodorididae and Plakobranchidae with eight species each one, and Aplysiidae with six species. Of these, 30 species are new records for the Campeche Bank, and 20 are new records for the Atlantic coast of Mexico. Thirty six species were sampled in only one site, 23 in the reefs and 13 in the lagoons (table 2). Eighteen species were collected in the lagoons and 35 species were found in the reefs. Three species were also found in lagoons with similar environmental conditions (*Bulla occidentalis*, *Aplysia brasiliensis* and *Spurilla neapolitana*). Only two species were present at the three reefs (*Elysia patina* and *Hypselodoris picta*), and only five species (*Chelidonura beronia*, *C. hirundinina*, *C. cubana*, *Costiella ocellifera* and *Chromodoris cielchi*) were distributed in the reefs of Sisal and Madagascar. Madagascar and Serpiente reefs share three species (*Hypselodoris acrina*, *Mexichromis Kempfi*, and *Tambja cf. tenuilineata*). Only *Aplysia dactylomela* and *Dendrodoris Krebsii* were found at least in one reef and one lagoon. Since diagnosis was based on external characters and the geographical range reported in the literature, we preferred to keep *Tambja cf. tenuilineata* as uncertain species. Finally, external characteristics of eight species (*Haminoeoa sp*, *Ercolanita sp*, *Chromodoris sp*, *Doto sp*, *Okenia sp*, *Flabellina sp*, *Aeolidiella sp 1*, and *Aeolidiella sp 2*) were insufficient to identify the specimens down to the species level and might be undescribed species (for seven of them we only have one specimen of each). To our best knowledge, this is the first time that images of specimens with these characteristics are shown. A color photograph for these unidentifiable species is included (fig. 2). The species recorded through this study are presented in the following list:

**Clade Cephalaspidea**

Family Bullidae Gray, 1827

*Bulla occidentalis* Adams, 1850

Examined material: Boc: 25 specimens (10-06), ML 35 mm, on mud and over sea grass; 5 specimens (17-05-07), ML 30 mm, over mud and over sea grass (CNMO3015); 1,489 specimens (07-04-08), ML 15 mm, over mud; 225 specimens (09-04-08), ML 15 mm, over mud; Ycl: 35 specimens (06-05-08), ML 40 mm, over mud; 220 specimens (07-05-08), ML 40 mm, over sea grass (CNMO3040).

Diagnosis: *Malaquias* and Reid, 2007

Distribution: USA (North Carolina, Florida, Louisiana and Texas); Mexico: VER (Wiley et al., 1982; García-Cubas and Reguero, 1995; Pérez-Rodriguez, 1997; Thalassas, 29(1) · January 2013
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Zamora-Silva and Ortigosa, 2012), TAB (García-Cubas and Reguero, 1990), YUC (Sanvicente-Añorve et al., 2012), QROO (Á. Valdés, personal communication); Belize; Honduras; Costa Rica; Panama; Colombia; Venezuela; Brazil; Uruguay; Bermuda; Curaçao; Cuba; Jamaica; Puerto Rico; Virgin Islands; Bahamas; Guadeloupe; Martinique; Dominique; San Martin; St. Vincent and the Grenadines; Granada; Barbuda; Antigua; St. Lucia; Guadeloupe; Barbados (Valdés et al., 2006; Malaquias and Reid, 2007).

Remarks: The work of Malaquias and Reid (2007) proved that the species named as *Bulla striata* Bruguière, 1792 in the Atlantic coast of Mexico should be named as *B. occidentalis*. Due to this, most of the species were misidentified as *B. striata*.

Family Haminoeidae Pilsbry, 1895

*Haminoea elegans* (Gray, 1825)

Examined material: Boc: 2 specimens 16-02-07, ML 14 mm (CNMO3006); 19 specimens (17-05-07), ML 17 mm (CNMO2997); 8 specimens (07-04-08), ML 20 mm; 1 specimen (09-04-08), L 22 mm. All over mud.

Diagnosis: Valdés et al., 2006: 24

Distribution: USA (Florida and Texas); Mexico: VER (Chávez et al., 1970; Vicencio-de la Cruz and González-Gándara, 2006; Zamora-Silva and Ortigosa, 2012), YUC (Vokes and Vokes, 1983; Sanvicente-Añorve et al., 2012), QROO (Ekdale, 1974); Belize; Honduras; Costa Rica; Colombia; Venezuela; Brazil; Bermuda; Cuba; Jamaica; Puerto Rico; Virgin Islands; Martinique; St. Lucia; St. Vincent and the Grenadines; Curaçao; Bonaire; Granada; Trinidad and Tobago (Valdés et al., 2006).

*Haminoea antillarum* (d’Orbigny, 1841)

Examined material: Boc: 183 specimens (30-01-07), ML 20 mm, over mud; 17 specimens (01-02-07), ML 6-20 mm, over tree leaves we observed kidney shaped capsule eggs; 71 specimens (16-02-07), ML 20 mm, over mud; 45 specimens (17-05-07), ML 12 mm, over mud; 304 specimens (07-04-08), ML 15 mm, over mud (CNMO3044); 212 specimens (09-04-08), ML 16 mm, over mud.

Diagnosis: Valdés et al., 2006: 24

Distribution: USA (Florida and Texas); Mexico: VER (Moore, 1958; García-Cubas, 1971; Vicencio-de la Cruz and González-Gándara, 2006; Zamora-Silva and Ortigosa, 2012), YUC (Vokes and Vokes, 1983; Sanvicente-Añorve et al., 2012), QROO (Ekdale, 1974); Honduras; Panama; Colombia; Venezuela; Brazil;
Bermuda; Cuba; Cayman Islands; Jamaica; Puerto Rico; Virgin Islands; Guadelupe (Andrews, 1971; Valdés et al., 2006).

*Haminoea succinea* (Conrad, 1846)
Examined material: Ycl: 20 specimens (06-05-08), ML 16 mm, over mud (CNMO3041).
Diagnosis: Valdés et al., 2006: 26
Distribution: USA (Florida, Louisianan and Texas); Mexico: VER (García-Cubas, 1971; García-Cubas and Reguero, 1995; Vicencio-de la Cruz and González-Gándara, 2006; Zamora-Silva and Ortigosa, 2012), CAMP (Rice and Kornicker, 1962), YUC (Vokes et al., 1983), QROO (Cruz-Ábrego et al., 1994); Colombia; Venezuela; Bermuda; Puerto Rico; St. Martin; St. Bartolomé (Andrews, 1971; Valdés et al., 2006).

*Haminoea* sp (fig. 2)
Examined material: Mad: 3 specimens (20-06-07), L 6-8 mm.
Diagnosis: Elongate body, with short parapodia partially covering the shell. Brownish background, with numerous patch of lighter brown all over the body. Cylindrical, thin and translucent shell.
Distribution: Thus far, known only from Madagascar reef, Campeche Bank.
Remarks: This is the only species of this genus that was found in a reef. All the others were found in the Bocana lagoon. This species didn’t match the same coloration patterns, neither in the shell nor in the body, of the known species of this genus for this geographical area *Haminoea glabra* (Gray, 1825), *H. elegans*, *H. antillarum*, and *H. succinea* (Valdés et al., 2006; Rosenberg et al. 2007).

*Chelidonura hirundinina* (Quoy & Gaimard, 1833)
Examined material: Sis: 1 specimen (10-06), L 20 mm (CNMO3032); Mad: 1 specimen (28-08-07), L 18 mm (CNMO3034).
Diagnosis: Valdés et al., 2006: 38
Distribution: Indo-Pacific. Western Atlantic: USA (Florida); Mexico: YUC (Sanvicente-Añorve et al., 2012); Belize; Colombia; Bahamas; Cayman Islands; Jamaica; Puerto Rico; Guadeloupe; St. Vincent and the Grenadines; Curaçao; Grenada (Valdés et al., 2006).

*Chelidonura berolina* Er. Marcus & Ev. Marcus, 1970
Examined material: Sis: 1 specimen (10-06), L 10 mm.
Diagnosis: Valdés et al., 2006: 36.
Distribution: Amphiatlantic. Western Atlantic: Mexico: QROO (A. Valdés, personal communication); Belize; Honduras; Colombia; Cayman Islands; Cuba; Jamaica; Martinique; Puerto Rico; Bermuda (Valdés et al., 2006).

*Gastropteron chacmol* Gosliner, 1989
Examined material: Boc: 13 specimens (07-04-08), ML 6-7 mm, crawling over silt during nocturnal sampling (CNMO3043).
Diagnosis: Valdés et al., 2006: 16
Distribution: USA (Nova Scotia, New Brunswick, Maine, Massachusetts, Rhode Island, Connecticut, New Jersey, Maryland, Virginia, North Carolina, South Carolina, Georgia, Florida, Louisianan and Texas) (Valdés et al., 2006); Mexico: VER (Flores-Andolais et al., 1988; Reguero and García-Cubas, 1989; García-Cubas et al., 1990; García-Cubas et al., 1992; Reguero and García-Cubas, 1993; García-Cubas and Reguero, 1995), TAB (García-Cubas and Reguero, 1990), YUC (Rice and Kornicker, 1962), QROO (Cruz-Ábrego et al., 1994).
Remarks: This species had been reported to live in areas of sand and seagrass (Redfern, 2001).

Family Aplysiidae Lamarck, 1809
*Aplysia brasiliana* Rang, 1828
Examined material: Ycl: 3 specimens (31-01-07), ML 6 mm (juveniles) (CNMO3032); 1 specimen (09-05-07), L 120 mm, over green algae; 1 specimen (18-05-07), L 63 mm (juveniles) (Thalassa, 29(1) · January 2013 63).
110 mm, under rocks, 14 specimens found dead near the water channel; 2 specimens (07-05-08), ML 120 mm one under rock and the other, swimming; Boc: 7 specimens (07-04-08), ML 140 mm, over mud; 3 specimens (17-04-08), ML 120 mm, over sand.

Diagnosis: Valdés et al., 2006: 96

Distribution: Amphiatlantic. Western Atlantic: USA (New Jersey, Florida and Texas); Mexico: VER (Wiley et al., 1982; Vicencio-de la Cruz and González-Gándara, 2006; Zamora-Silva and Naranjo-García, 2008; Zamora-Silva and Ortigosa, 2012), CAMP (Zamora-Silva and Naranjo-García, 2008), YUC (Sanvicente-Añorve et al., 2012) Costa Rica; Colombia; Venezuela; Brazil; Bermuda; Aruba (Strenth and Blankenship, 1977; Valdés et al., 2006).

Remarks: We observed some recently dead specimens near the water channel of Yucalpeten lagoon, these seahares tend to get captured in the shrimp fishing nets, and they are thrown away to avoid further clogging of the nets.

**Aplysia dactylomela** Rang, 1828

Examined material: Boc: 2 specimens (30-01-07), ML 100 mm, over sand; Sis: 1 specimen (22-04-08) L 50 mm, over green algae.

Diagnosis: Valdés et al., 2006: 96

Distribution: Circumtropical. Western Atlantic: USA (Florida and Texas); Mexico: VER (Moore, 1958; Wiley et al., 1982; Quintana y Molina, 1991; García-Cubas et al., 1994; Vicencio-de la Cruz and González-Gándara, 2006; Zamora-Silva and Naranjo-García, 2008; Zamora-Silva and Ortigosa, 2012), CAMP (Zamora-Silva and Ortigosa, 2012); Belize; Costa Rica; Panama; Colombia; Venezuela; Brazil; Bermuda; Jamaica; Virgin Islands; Aruba; Curacao; Trinidad and Tobago (Andrews, 1971; Strenth and Blankenship, 1977; Valdés et al., 2006).

Remarks: All the specimens were found on mud during the low tide, near this area we saw green algae that they are supposed to feed on (Valdés et al., 2006).

**Bursatella leachii pleii** Rang, 1828

Examined material: Boc: 7 specimens (07-04-08), ML 40 mm (CNMO3039). All over mud.

Diagnosis: Valdés et al., 2006: 96

Distribution: Circumtropical. Western Atlantic: USA (North Carolina, Florida and Texas); Mexico: VER (Vicencio-de la Cruz and González-Gándara, 2006; Zamora-Silva and Ortigosa, 2012); CAMP (Zamora-Silva and Naranjo-García, 2008); Belize; Costa Rica; Panama; Colombia; Venezuela; Brazil; Bermuda; Jamaica; Virgin Islands; Aruba; Curaçao; Trinidad (Andrews, 1971; Strenth and Blankenship, 1977; Valdés et al., 2006).

Remarks: All the specimens were found on mud during the low tide, near this area we saw green algae that they are supposed to feed on (Valdés et al., 2006).

**Stylocheilus striatus** (Quoy & Gaimard, 1832)

Examined material: Boc: 2 specimens (17-04-08), L 35 and 40 mm, over mud (Recol. R. Mena)(CNMO3045).

Diagnosis: Valdés et al., 2006: 100

Distribution: Cosmopolitan. Western Atlantic: USA (Florida and Dry Tortugas); Mexico: VER (Zamora-Silva and Ortigosa, 2012); YUC (Sanvicente-Añorve et al., 2012) Belize; Colombia; Venezuela; Brazil; St. Lucia; St. Vincent and the Grenadines; Barbados; Aruba; Curacao; Bonaire; Granada; Trinidad and Tobago (Andrews, 1971; Strenth and Blankenship, 1977; Valdés et al., 2006).

Figure 3: Radula of some unidentified species. Chromodoris sp: A) marginal tooth (scale = 30 μm), B) lateral tooth (scale = 50 μm), C) central tooth (scale = 30 μm); D) Okenia sp radula (scale = 30 μm); E) Doto sp radula (scale = 30 μm).
Bermuda; Bahamas; Cayman Islands; Jamaica; Puerto Rico; Virgin Islands; Martinique; Barbados; St. Vincent and the Grenadines; Aruba; Curacao; Bonaire; Grenada (Valdés et al., 2006).

Phyllaplysia engeli Er. Marcus, 1955
Examined material: Ycl: 1 specimen (09-05-08), L 10 mm over Thalassia testudinum (CNMO3042).
Diagnosis: Valdés et al., 2006: 10
Distribution: USA (Florida); Mexico: YUC (Sanvicente-Añorve et al., 2012), QROO (Valdés et al., 2006); Costa Rica; Colombia; Brazil; Bahamas; Puerto Rico; Jamaica; St. Martin; Barbados; Curacao; (Valdés et al., 2006).
Remarks: The only specimen was found 50 km west of the Bocana during an extra expedition that was made on a Thalassia meadow as it is reported (Valdés et al., 2006). This is one of the two species reported to the Caribbean Sea.

Clade Sacoglossa
Family Oxynoidae Stoliczka, 1868
*Loibiger souberbii* P. Fischer, 1857
Examined material: Sis: 1 specimen (08-02-07), L 4 mm (CNMO3035).
Diagnosis: Valdés et al., 2006: 52
Distribution: USA (Florida); Mexico: YUC (Vokes and Vokes, 1983), QROO (Ekdale, 1974); Honduras; Costa Rica; Venezuela; Cayman Islands; Jamaica; Puerto Rico; Guadeloupe; Barbados; St. Vincent and the Grenadines; Curacao (Valdés et al., 2006).
Remarks: This species is usually found on algae of the genus *Caulerpa* (Redfern 2001; Valdés et al., 2006) but we could not specify the habitat because this species were found by an indirect method in a complex of different green algae.

Family Juliidae E. A. Smith, 1885
*Berthelinia caribbea* Edmunds, 1963
Examined material: Mad: 1 specimen (04-05-07), L 3 mm (CNMO3028); 2 specimens (07-05-07), ML 3 mm (CNMO3013); 1 specimen (02-05-08), L 3 mm.
Diagnosis: Valdés et al., 2006: 48
Distribution: USA (Florida); Mexico: QROO (Á. Valdés, personal communication); Belize; Costa Rica; Panama; Bahamas; Jamaica; Puerto Rico; Brazil (Valdés et al., 2006).
Remarks: This species is frequently associated with the green algae *Caulerpa verticillata* (Clark et al., 1990). We found it with a variety of green algae.

Family Placochromatidae Gray, 1840
*Elysia cf. cornigera*
Examined material: Ycl: 2 specimens (31-01-07), ML 4 mm (CNMO2995).
Diagnosis: Carmona et al., 2011 (With molecular analysis (16s and H3).
Distribution: USA (Florida); Bahamas; Cuba; Cayman Islands (Ortea et al., 1994; Valdés et al., 2006).
Remarks: *Elysia cornigera* (Nuttall, 1897) from the Pacific Ocean and *Elysia timida* (Risso, 1818) are valid species and sister to each other (Carmona et al., 2011).

*Elysia papillosa* Verrill, 1901
Examined material: Mad: 1 specimen (04-05-07), L 8 mm, over green algae.
Distribution: USA (Florida); Mexico: QROO (Á. Valdés, personal communication); Belize; Honduras; Costa Rica; Panama; Venezuela; Bermuda; Bahamas; Cayman Islands; Guadeloupe; St. Lucia; Martinique; Granada; Curacao; Trinidad and Tobago (Vors, 1994; Valdés et al., 2006).

*Elysia subornata* Verrill, 1901
Examined material: Ycl: 1 specimen (31-01-07), L 3 mm (CNMO2998), on Caulerpa sp, with egg ribbons over the algae.
Distribution: Valdés et al., 2006: 66
Distribution: USA (Florida); Mexico: VER (Vicencio-de la Cruz and González-Gándara, 2006); Zamora-Silva and Ortizoga, 2012), YUC (Sanvicente-Añorve et al., 2012), QROO (Valdés et al., 2006); Belize; Bermuda; Bahamas; Cayman Islands; Jamaica; Puerto Rico; Virgin Islands; Martinique; Aruba; Granada; Trinidad and Tobago (Valdés et al., 2006).
Remarks: Valdés et al. (2006) report that this slug feeds on the green algae *Penicillus dumetosus* and *Udotea flabelium* and Clark (1994) say that this species is associated with Caulerpa racemosa; we have found it on Caulerpa sp.

*Elysia canguzua* Er. Marcus, 1955
Examined material: Sis: 1 specimen (10-06), L 9 mm (CNMO3019).
Diagnosis: Valdés et al., 2006: 66
Distribution: Costa Rica; Brazil (Valdés et al., 2006).
Remarks: There are reports of *E. canguzua* feeding on green algae of the genus *Codium* (Valdés et al., 2006), but we did not identify the substrate were we found it.

*Elysia tuca* Ev. Marcus & Er. Marcus, 1967
Examined material: Sis: 1 specimen (10-06), L 9 mm (CNMO3019).
Diagnosis: Valdés et al., 2006: 66
Distribution: USA (Florida); Mexico: YUC (Sanvicente-Añorve et al., 2012), QROO (Valdés et al., 2006); Honduras; Costa Rica; Panama; Colombia; Brazil; Bermuda; Cayman Islands; Jamaica; Puerto Rico;
Virgin Islands; San Martin; St. Lucia; St. Vincent and the Grenadines; Barbados; Curaçao; Grenada (Valdés et al., 2006).

Remarks: It is reported that this species is usually found on the green algae *Halimeda*. We could not identify the substrate.

**Elysia patina** Ev. Marcus, 1980

Examined material: Sis: 1 specimen (27-04-07), L 10 mm; Mad: 1 specimen (07-05-07), L 8 mm, over *Halimeda* sp; 1 specimen (23-02-07), L 9 mm.

Diagnosis: Valdés et al., 2006: 72

Distribution: USA (Florida); Mexico: YUC (Sanvicente-Añorve et al., 2012), QROO (Valdés et al., 2006); Costa Rica; Bahamas; Martinique; St. Vincent and the Grenadines (Valdés et al., 2006).

Remarks: One specimen of this species was found in *Halimeda* sp, in contrast with reports of finding it on *Udotea* sp. (Valdés et al., 2006).

**Elysia zuleicae** Ortea & Espinosa, 2002

Examined material: Sis: 2 specimens (23-02-07), ML 18 mm, over green algae.

Diagnosis: Valdés et al., 2006: 70

Distribution: Costa Rica; Cuba; Jamaica (Valdés et al., 2006).

**Thuridilla mazda** Ortea & Espinosa, 2000

Examined material: Mad: 1 specimen (06-06-07), L 13 mm, over *Caulerpa* sp (CNMO3027).

Diagnosis: Valdés et al., 2006: 58

Distribution: Costa Rica; Bahamas; Cuba (Valdés et al., 2006). Portugal (Azores) (Malaquias et al., 2012)

Table 1:

Previous studies in the Atlantic Coast of Mexico not cited in Rosenberg et al. 2007.

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<thead>
<tr>
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<td>Atlantic</td>
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Family Limapontiidae Gray, 1847

**Ercolania** sp (fig. 2)

Examined material: Mad: 14 specimens (28-08-07), ML 2 mm, over ribbons of eggs attached to a coral (CNMO2968).

Diagnosis: light green body with dark green cerata all over the body except for the head. Small white dots through all the ceratas. Smooth rhinophores. Ceratas not so dense, leaving the dorsum clear.

Distribution: Thus far, known only from Madagascar reef, Campeche Bank.

Remarks: Here are four species of *Ercolania* in the Gulf of Mexico and the Caribbean Sea. The sampled material did not have a purple spot over the head as *E. viridis* A. Costa, 1866; nor the black points of *E. fuscata* (Gould, 1870); the ceratas are not so numerous as in *E. courulea* Trinchese, 1872, and was described for the Atlantic east so the distribution and identification must be reviewed; finally, Rosenberg *et al.* (2007) reported *E. fuscovittata* (Lance, 1962) as an introduced species in Florida from East Pacific. Such lack of characters can be due to the small size of the sampled specimens (1-2 mm). Species of these genera had been reported to be on *Caulerpa racemosa* (Clark *et al.*, 1990). However, the collected specimens were found over ribbons of eggs, as some species of limapontiids (Gosliner *et al.*, 2008).

**Costasiella ocellifera** (Simroth, 1895)

Material: Sis: 10 specimens (10-06), ML 8 mm (CNMO3020); 6 specimens (27-04-07), ML 6 mm (CNMO2993); 5 specimens (06-03-08), ML 4 mm; Mad: 3 specimens (11-06-07), ML 7 mm (CNMO3002); 4 specimens (11-04-08), ML 5 mm. All over the green
algae *Avrainvillea longicaulis*.

**Diagnosis:** Valdés *et al.*, 2006: 78

**Distribution:** USA (Florida); Mexico: YUC (Sanvicente-Añorve *et al.*, 2012), QROO (Á. Valdés, personal communication); Belize; Honduras; Costa Rica; Brazil; Bermuda; Bahamas; Cayman Islands; Puerto Rico; Jamaica; St. Martin; Martinique; St. Lucia; St. Vincent and the Grenadines; Granadas (Valdés *et al.*, 2006).

**Remarks:** Valdés *et al.* (2006) report that this species lives and feeds on the surface of *Avrainvillea longicaulis*. This alga was found randomly distributed in the studied area in low densities and all the specimens of this species were found there. Not all of the branches of the alga have this species of opisthobranch.

**Placida dendritica** (Alder & Hancock, 1843)

*Examined material:* Sis: 8 specimens (08-02-07), ML 3 mm (CNMO3018).

**Diagnosis:** Valdés *et al.*, 2006: 82

**Distribution:** Cosmopolitan. Western Atlantic: USA (North Carolina); Costa Rica; Jamaica; Curaçao (Valdés *et al.*, 2006).

**Clade Cryptobranchia**

**Family Dorididae Rafinesque, 1815**

**Doris bavenia** Er. Marcus, 1955

*Examined material:* Ycl: 2 specimens (10-06), ML 14 mm, over sponges (CNMO2965).

**Diagnosis:** Valdés *et al.*, 2006: 170

**Distribution:** USA (Florida); Mexico: YUC (Sanvicente-Añorve *et al.*, 2012); Honduras; Venezuela; Brazil; Aruba; Curaçao (Valdés *et al.*, 2006).

**Radular formula.** 30x30.0.30

**Family Chromodorididae Bergh, 1891**

**Chromodoris clenchi** (Russell, 1935)

*Examined material:* Sis: 1 specimen (10-06), L 6 mm, over sponges; Mad: 3 specimens (28-08-07), ML 15 mm (CNMO2992), on green algae; 2 specimens (30-08-07), ML 20 mm, over green algae (CNMO3003); 5 specimens (05-09-07), ML 22 mm, over green algae (CNMO3009).

**Diagnosis:** Valdés *et al.*, 2006: 148

**Distribution:** USA (Florida); Costa Rica; Panama; Colombia; Bermuda; Cayman Islands; Jamaica; St. Lucia; St. Vincent and the Grenadines; Curaçao (Valdés *et al.*, 2006).

**Chromodoris regalis** (Ortea, Caballer & Moro, 2001)

*Examined material:* Mad: 3 specimens (08-06-07), ML 10 mm, (Recol. Q. Hernández-Díaz); 3 specimens (20-06-07), ML 12 mm; 18 specimens (28-08-07), ML 22 mm; 8 specimens (05-09-07), ML 23 mm (CNMO3025). All over purple-reddish sponges.

**Diagnosis:** (Valdés *et al.*, 2006: 152)

**Distribution:** Costa Rica; Martinique; St. Vincent and the Grenadines (Valdés *et al.*, 2006).

**Radular formula:** 47x26-27.0.26-27

**Remarks:** All the sampled material was collected on sponges, in contrast with Valdes *et al.* (2006) that report finding it in rocky bottoms.

**Chromodoris sp** (fig. 2, 3)

*Examined material:* Sis: 1 specimen (02-03-07), L 12 mm.

**Diagnosis:** Yellow-white elongated and flat body with small brown spots randomly through all the dorsum. Big tubercles over the entire mantle. Large perfoliate tubercles. The gill is in the posterior part of the body.

**Distribution:** Thus far, known only from Sisal reef, Campeche Bank.

**Remarks:** Radular formula 33x42-43.0.42-43. This species didn’t match the orange, purple and red coloration patterns of *C. clenchi*, *C. binza* Er. Marcus & Er. Marcus, 1963, *C. ponga* Er. Marcus & Ev. Marcus, 1970; the reticulated dorsum of *C. neona* (Er. Marcus, 1955); the orange and white species as *C. grahami* Thompson, 1980, *C. regalis* (Ortea, Caballer & Moro, 2001), and the irregular spots of *Chromodoris* sp. image of Valdés *et al.* (2006)

**Hypselodoris picta** (Schultz, 1836)

*Examined material:* Sis: 8 specimens (10-06), ML 100-140 mm, over algae; 1 specimen (08-02-07), L 120 mm, over sand; 1 specimen (27-04-07), L 110 mm, over soft coral; 1 specimen (28-05-07), L 100 mm, over sponges (CNMO2989); Mad: 1 specimen (08-06-07), L 45 mm, over green algae; 2 specimens (11-06-07), ML 47 mm, over green algae (CNMO3001); 1 specimen (20-06-07), L 40 mm, over sand (CNMO3005); 1 specimen (27-08-07), L 30 mm, over sand (CNMO3008); 5 specimens (06-03-08), ML 100 mm, over green algae.

**Diagnosis:** Valdés *et al.*, 2006: 154

**Distribution:** Amphiatlantic. Western Atlantic: USA (Florida); Brazil (Valdés *et al.*, 2006).

**Remarks:** Due to its dark color and large size, it was found in many sites.

**Hypselodoris acriba** Ev. Marcus & Er. Marcus, 1967

*Examined material:* Mad: 4 specimens (07-05-07), ML 18-40 mm over green algae (CNMO3014); 1 specimen (06-06-07), L 34 mm, over coral (CNMO2990); 1 specimen, (08-06-07), L 22 mm, over green algae; 2 specimens (11-06-07), ML 25 mm, over green algae; 1 specimen (30-08-07), L 21 mm, over green algae (CNMO3004); 1 specimen (05-09-07), L 21 mm, over green algae; 1 specimen (11-04-08), L 40 mm, over orange sponge; 1 specimen (24-04-2008), L 40 mm, over green algae; Ser: 1 specimen (28-05-07), L 25 mm,
over green algae; 1 specimen (30-05-07), L 40 mm, over red algae. 
Diagnosis: Valdés et al., 2006: 160
Distribution: Mexico: QROO (Ortea et al., 1996); Costa Rica; Puerto Rico; San Martin; Guadeloupe; Santa Lucia (Valdés et al., 2006).

Hypselodoris ruthae Ev. Marcus & Hughes, 1974
Examined material: Mad: 1 specimen (28-08-07), L 13 mm, over green algae; 1 specimen (05-09-07), L 25 mm over green algae.
Diagnosis: Valdés et al., 2006: 156
Distribution: Mexico: QROO (Ortea et al., 1996; Valdés et al., 2006); Costa Rica; Venezuela; Bahamas; Cuba; Jamaica; Puerto Rico; Virgin Islands; San Martin; Antigua; Guadeloupe; Martinique; St. Lucia; Barbados; Aruba; Curaçao; Grenada (Valdés et al., 2006).

Felimare kempfi (Ev. Marcus, 1971)
Examined material: Ser: 1 specimen (28-05-07), L 14 mm, over sand; Mad: 3 specimens (27-08-07), ML 8 mm, over green algae (CNMO3007).
Diagnosis: Valdés et al., 2006: 166
Distribution: USA (Florida); Mexico: QROO (Valdés et al., 2006); Panama; Costa Rica; Brazil; Puerto Rico (Rios, 1994; Valdés et al., 2006).
Remarks: This species was found over green alga; nevertheless it has been reported on calcareous algae.

Felimare sisalensis Ortigosa & Valdés, 2012
Examined material: Mad: 3 specimens (05-09-07), L 12 mm (CNMO2981), L 11 mm (LACM3223), L12 mm (CNMO3037), all over green algae
Distribution: Thus far, known only from Madagascar reef, Campeche Bank.

Family Discodorididae Bergh, 1891
Jorunna spazzola (Er. Marcus, 1955)
Examined material: Boc: 1 specimen (30-01-07), L 15 mm, under rocks.
Diagnosis: Valdés et al., 2006: 184
Distribution: USA (Florida); Honduras; Brazil; Cuba; Barbados; Virgin Islands; Curaçao (Valdés et al., 2006).
Family Polyceridae Alder & Hancock, 1845

Tambja cf. tenelineata Miller & Haagh, 2005 (fig. 2, 3)
Examined material: Mad: 1 specimen (07-05-07), L 13 mm; 1 specimen (27-08-07), L 4 mm, over green algae;
Ser: 1 specimen, (30-05-07), L 2 mm.
Diagnosis: Miller and Haagh, 2005

Placida dendritica (Alder & Hancock, 1843)
Examined material: Sis: 8 specimens (08-02-07), ML 3 mm (CNMO3018).
Diagnosis: Valdés et al., 2006: 82
Distribution: Australia (New South Wales, Southern Queensland and Lord Howe Island); New Zealand (Miller and Haagh, 2005); Portugal (Azores) (Wirtz, 1998, as Tambja sp.).
Remarks: The known distribution of this species is very disjunctive; it was described in Australia, and it has been also recorded in the Azores Islands in the middle of the North-Atlantic Ocean. Here it is reported for first time for the western Atlantic. The coloration pattern of the specimens is the same as the original description. Nevertheless, molecular or taxonomical dissection will be necessary in order of confirm its identity.

Clade Cladobranchia
Falimy Dotidae Gay, 1853
Doto sp
Examined material: Mad: 1 specimen (06-06-07), L 11 mm (CNMO3033).
Diagnosis: Small elongated brownish green body. Rhinophoral sheaths with pulpitual shape, also brownish green. Smooth rhinophores. Tuberculate cerata arranged dorso-laterally on each side of the body, the anterior ceratas are smaller and with a simpler arrangement than the posterior ones. The base of the cerata is lighter brown through all the body. Irregular tubercles distributed through all the body (fig. 2). Radula with a single row. The reproductive system has one receptacle with an unknown function.

Radular formula: 79x1.0.1 (fig 3).
Distribution: Thus far, known only from Madagascar reef, Campeche Bank.
Remarks: This species didn’t match with the coloration patterns, or the shape and size of the ceratas of the 14 known species of this genus for this geographical area: the orange color of the ceratas of D. uva Er. Marcus 1955, D. wildeli Er. Marcus & Ev. Marcus, 1970, and D. divae Ev. Marcus & Er. Marcus, 1950, D. sabuli Ortea, 2001, and D. cabecar Ortea, 2001; the large apical tubercles and white spots on the dorsum of D. chica Ev. Marcus & Er. Marcus, 1960; and the white color, dense and large tubercles of D. varaderoensis Ortea, 2001. It’s important to notice that there are disagreements between the identity and description of some Caribbean species (Valdés et al., 2006).

Family Scyllaeidae Alder & Hancock, 1855

Scyllaea pelagica Linnaeus, 1758
Examined material: Sis: 1 specimen (23-02-07), L 8 mm (CNMO3021).
Distribution: Circumtropical. Western Atlantic: USA (Massachusetts, North Carolina, Georgia, Florida, Texas); Mexico: YUC (Sanvicente-Añorve et al., 2012); Costa Rica; Bermuda; Bahamas; Bonaire (Valdés et al., 2006).
Remarks: This species inhabits on floating Sargassum sp, here we found it by a brushing method over different species of algae.

Family Flabellinidae Bergh, 1881

Flabellina dushia (Ev. Marcus & Er. Marcus, 1963)
Examined material: Mad: 1 specimen (11-04-08), L 10 mm, over green algae.
Diagnosis: Valdés et al., 2006: 238
Distribution: USA (Florida); Bahamas; Jamaica; Martinique; Curaçao (Valdés et al., 2006).

Flabellina engeli Ev. Marcus & Er. Marcus, 1968
Examined material: Mad: 1 specimen (24-04-08), L 14 mm, over red-purple sponge.
Diagnosis: Valdés et al., 2006: 240
Distribution: USA (Florida); Costa Rica; Colombia; Cuba; Puerto Rico; Martinique; St. Lucia; Barbados; Curaçao; Grenada (Valdés et al., 2006).

Flabellina sp (fig. 9)
Examined material: Ycl: 2 specimens (28-02-07), ML 12 mm.
Diagnosis: White elongated body with a slightly more translucent foot than the rest of the body. With an opaque white dorsal line across the body, it is wider in the pericardial area. Oral tentacles the same color as the body and with translucent tips. The anterior corner of the foot is small, triangular, and of the same color as the foot. Smooth white rhinophores. Numerous and densely arranged cerata, without forming clusters, the digestive gland is orange with scattered opaque white spots. Distribution: Thus far, known only from Yucalpeten lagoon, Campeche Bank.
Remarks: The collected material could be attributed Flabellina verta (Er. Marcus, 1976) or Flabellina bandeli (Ev. Marcus, 1976); nevertheless, the diagnosis
### Table 3:
Opisthobranch species sampled in the Yucalpeten and the Bocana lagoons, and in Sisal, Madagascar, and Serpiente coral reefs (NR=New record).

<table>
<thead>
<tr>
<th>Family</th>
<th>Species</th>
<th>La Bocana</th>
<th>Yucalpeten</th>
<th>Sisal</th>
<th>Madagascar</th>
<th>Serpiente</th>
<th>NR for Yucatan State</th>
<th>NR from Atlantic coast of Mexico</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bullidae</td>
<td><em>Bulla occidentalis</em> Adams, 1850</td>
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<tr>
<td>Haminoeidae</td>
<td><em>Haminoea elegans</em> (Gray, 1825)</td>
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<td></td>
<td><em>Haminoea antillarum</em> (d'Orbigny 1841)</td>
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<td><em>Haminoea succinea</em> (Conrad, 1846)</td>
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<td></td>
<td><em>Haminoea sp</em></td>
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<tr>
<td>Aglajidae</td>
<td><em>Chelidonura hirundinina</em> (Quoy and Gaimard, 1833)</td>
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<tr>
<td></td>
<td><em>Chelidonura berolina</em> Er. Marcus and Ev. Marcus, 1970</td>
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<td></td>
<td><em>Chelidonura cubana</em> Ortea and Martínez, 1997</td>
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<tr>
<td>Cylchnidae</td>
<td><em>Acteocina canaliculata</em> (Say, 1826)</td>
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<tr>
<td>Gastroporidae</td>
<td><em>Gastropteron chacmol</em> Gosliner, 1989</td>
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<tr>
<td>Aplysiidae</td>
<td><em>Aplysia dactylomela</em> Rang, 1828</td>
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<td></td>
<td><em>Aplysia morio</em> (Verrill, 1901)</td>
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<td></td>
<td><em>Bursatella leachii pleii</em> Rang, 1828</td>
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<td></td>
<td><em>Stylocellus striatus</em> Ortea and Martínez, 1997</td>
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<tr>
<td>Limapontiidae</td>
<td><em>Ercolania sp</em></td>
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<td>Julidae</td>
<td><em>Berthelia caribbea</em> Edmunds, 1963</td>
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<tr>
<td>Discodorididae</td>
<td><em>Hypselodoris acutata</em> Ortea and Martínez, 1997</td>
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<tr>
<td>Polyceridae</td>
<td><em>Tambja cf. tenuilineata</em> Miller y Haagh, 2005</td>
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<tr>
<td>Dendrodorididae</td>
<td><em>Okenia sp</em></td>
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<td>Flabellinidae</td>
<td><em>Flabellina dushia</em> (Ev. Marcus y Er. Marcus, 1963)</td>
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<td><em>Flabellina engeli</em> (Ev. Marcus y Er. Marcus, 1968)</td>
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<tr>
<td>Aeolididae</td>
<td><em>Aeolidiella stephanieae</em> Valdés, 2005</td>
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<td><em>Aeolidiella sp 1</em></td>
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<td><em>Aeolidiella sp 2</em></td>
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<td></td>
<td><em>Spirillina neapolitana</em> (delle Chiaje, 1841)</td>
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of those species didn’t show concluding differences between each one and both match with our specimen.

Family Aeolidiidae Gray, 1827

Aeolidiella stephanieae Valdés, 2005
Examined material: Ycl: 1 specimen (28-02-07), L 9 mm (CNMO2996); 1 specimen (18-05-07), L 10 mm, both beneath rocks.
Diagnosis: Valdés et al., 2006: 274
Distribution: USA (Florida) (Valdés et al., 2006); Mexico: YUC (Sanvicente-Añorve et al., 2012).
Remarks: This species feeds on sea anemones (Valdés et al., 2006).

Aeolidiella sp 1 (fig. 2)
Examined material: Mad: 1 specimen (06-06-07), L 15 mm, over Padina sp.
Diagnosis: Opaque white elongated body with foot slightly wider than the rest of the body and translucent white. Oral tentacles orange and well developed. The anterior corner of the foot is small, triangular, and of the same color as the rest of the foot. Smooth orange rhinophores with no other sculpture. Numerous and densely arranged cerata, without forming groups, the digestive gland of brownish color with white tips.
Distribution: Thus far, known only from Madagascar reef, Campeche Bank.

Aeolidiella sp 2 (fig. 2)
Examined material: Mad: 1 specimen (05-09-07), L 14 mm, over green algae.
Diagnosis: Opaque white elongated body with a translucent white foot. White Oral tentacles, well developed with a translucent white base. Smooth opaque white rhinophores with no other sculpture, with a white translucent base. Numerous and densely arranged cerata, without forming groups, red digestive gland with white tips.
Distribution: Thus far, known only from Madagascar reef, Campeche Bank.
Remarks: The two species of Aeolidiella didn’t match the same coloration patterns of any of the known species of this genus for this geographical area A. indica Bergh, 1988, A. benteva (Er. Marcus, 1958), and A. stephanieae.

Spurilla neapolitana (delle Chiave, 1841)
Examined material: Boc: 1 specimen (30-01-07), L 12 mm, under rock; Ycl: 1 specimen (31-01-07), L 10 mm, under rock; 3 specimens. (28-02-07), ML 22 mm, over brown algae; 3 specimens (18-05-07), ML 18 mm, under rock.
Diagnosis: Valdés et al., 2006: 270
Distribution: Circumtropical. Western Atlantic: USA (Florida and Texas); Mexico: VER (Zamora-Silva and Ortigosa, 2012), YUC (Sanvicente-Añorve et al., 2012); Belize; Honduras; Costa Rica; Colombia; Venezuela; Brazil Bahamas; Bermuda; Virgin Islands; Jamaica; Puerto Rico; Barbados; St. Vincent and the Grenadines; Curaçao (Valdés et al., 2006).
Remarks: This species feeds on anemones of the genus Aiptasia (Valdés et al., 2006).

DISCUSSION

The information of the distribution of these species partially fills the information gap of this group of gastropods in the Campeche Bank, Yucatan Peninsula, a very interesting transition area between the Gulf of Mexico and the Caribbean Sea. The number of species registered during this survey is the result of the sampling effort focused exclusively in this group of mollusks. The number of species recorded here is higher than those found by Zamora Silva and Ortigosa (2012), and Sanvicente-Añorve et al. (2012), since the habitats studied here include two different areas (lagoons and reefs), and also due to the use of SCUBA equipment. The indirect methods were the best to find small, cryptic and shell-less species, as it can be confirmed in Table 4. The methods used in the present study prevented damage to the fragile body structures of the shell-less species, enabling the observation of complete and intact morphological characteristics. To date, almost all the opisthobranch species reported for the Atlantic coast of Mexico were those having a well-developed calcareous shell such as J. punctostriatus, B. occidentalis, and A. canaliculata those with large size such as A. dactylomela and A. brasiliana (Zamora-Silva and Ortigosa, 2012), and only the study of Sanvicente-Añorve et al. (2012) reported cryptic and small species. The shell seaslugs are well preserved in sand and mud samples, and
the larger ones could be easily observed, leaving the cryptic species undiscovered. Nevertheless, there are still places that were not sampled, such as live coral, sand beaches or mangroves swamps, and therefore, the number of species could increase in the future. Out of the 51 species of seaslugs reported in this study, six species have no shell and 17 species were 16 mm or less of total length in the adult stage. This could be the first record of T. cf. tenuilineata for the east coast of the Atlantic Ocean; it has been reported only in the Azores Islands (Wirtz, 1998) and in Australia (Miller and Haagh, 2005). Sisal village has an small harbor, almost confined to fishermen of the village, due to this, T. cf. tenuilineata could be introduced by ships that arrived to the Progreso Harbor (eastern of the study sites). The present checklist includes 23 species of seaslugs that are new records for the Mexican Atlantic coast (including Gulf of Mexico and Caribbean Sea). Compared with Sanvicente-Añorve et al. (2012), only 17 species were shared between studies suggesting possible differences between the reefs. Nonetheless, efforts must be made to improve the knowledge of the seaslug fauna of the Campeche bank.

In this study the clade Sacoglossa has the highest specific richness, followed by Eutenediacea, Cephalaspidea, Aeolidina, Anaspidea, and Cladobranchia. The Eutenediacea+ Cladobranchia group (Nudibranchia) were the most diverse with almost the half of the records, as happens with other studies at the Campeche Bank (Sanvicente-Añorve et al., 2012), Caribbean Sea (Bertsch, 2009), Colombia (Ardila et al., 2007), and Brazil (Bertsch, 2009) (Table 5). The diversity of the other clades differed between the areas. In this study, Notaspidea species were not found, as in Sanvicente-Añorve et al. (2012), although the group is reported in the warm Atlantic waters of Colombia and Brazil (Valdés et al., 2006; Ardila et al. 2007; Bertsch 2009).

From the entire species recorded, seven have a widespread distribution (A. dactylomela, B. leachii pleii, S. striatus, L. souverbii, P. dendritica, S. pelagica, and S. neapolitana), and two are recorded for the Atlantic and Pacific coasts of Mexico (C. hirundinina, and L. souverbii).

Out of the 111 species of opisthobranch reported for the Atlantic Mexican coast, 37 were reported for the Gulf of Mexico, 36 for the Mexican Caribbean, and 20 of the records do not specified the locality (Valdés et al., 2006). With the contribution of the present study, the actual number of opisthobranch fauna in the Campeche Bank increases to 84 species, representing a 64% increment of the biodiversity knowledge on the region’s species richness of this particular taxa. As expected, due to the spatial distribution of the sampling stations we found opisthobranch species that had already been reported in the Caribbean and in the Gulf of Mexico, as it happens with other species of invertebrates that share species between regions (González et al., 1991; Gutiérrez et al., 1993; Jordán-Dahlgren, 2002).

From the 18 total species found in the lagoons, only three species were shared between both lagoons (B. occidentalis, A. brasili ana, and S. neapolitana), each one of different clades (Cephalaspidea, Aplysiomorpha, and Cladobranchia). Similarly, from the 35 species total found in the three reefs, only two (E. patina and H. picta) are shared between them from two different clades (Sacoglossa and Eutenidiacea). This could be due to the great diversity of the feeding resources inside the group (Nybakk en, 1974; McDonald and Nybakken, 1991, 1997, 1999) and despite some similar habitats between each reef and between lagoons; there are differences in the feeding resources. The nudibranch D. krebsii is reported as common in the Caribbean (Valdés et al., 2006) but we only found it in seven out of the 57 sampled sites; and Elysia crispta Möch, 1863, distributed in Veracruz reefs (Zamora-Silva and Ortigosa, 2012), at Alacranes reef (Sanvicente-Añorve et al. 2012), and at Mexican Caribbean (Á. Valdés, personal communication) was not recorder in this study.

According to Johnson and Gosliner (2012), all the Atlantic species of the Chromodoris genera have to be named as Felimida Marcus, 1971, and the species from the eastern Pacific, Atlantic, and Mediterranean known as Hypeplodoris, and the eastern Pacific and Atlantic Mexichromis are part of Felimare clade, but due to the lack of molecular analysis in this study, we conserved the traditional names. The species of traditionally Mexichromis in this study are named as Felimare according to Johnson and Gosliner (2012) and Ortigosa and Valdés (2012).

As the objective of the present study was to update the opisthobranch fauna inventory of the Campeche Bank, Yucatan Peninsula, the lack of a quantitative sampling effort (using transects or quadrants), did not compromised the results, and indeed, the use of direct sampling using different collection techniques increased the rare and cryptic species numbers.

The adequate knowledge of the biodiversity of a specific area is critical for the establishment or management of conservation areas. Very large areas of the Mexican Atlantic coast remain unexplored for opisthobranchs fauna and these represent not only great...
challenges to increase our knowledge of this particular taxa in the region, but it also poses difficult logistic obstacles. Areas such as the Veracruz reefs at the western-central part of the Gulf of Mexico, the many cays of the Campeche Bank, the Mesoamerican Reef in the Caribbean sea, and a diverse system of coastal lagoons creates great opportunities for future opisthobranch fauna surveys and to increase the group species richness in the region.

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