

New records of polychaetes (Annelida: Polychaeta) from three locations of Oaxaca, Mexico

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ABSTRACT. Introduction: The knowledge of polychaetes from Oaxaca, Mexico, is represented by 41 families and 241 species, nevertheless, 148 species are considered questionable. The majority of taxonomic studies of polychaetes in Oaxaca have taken place on estuarine zones or commercial ports, sidelining other marine ecosystems. **Objective:** To identify the polychaeta-fauna from three different marine ecosystems in Oaxaca, Mexico. **Methods:** Specimens analyzed came from the Sección de poliquetos de la Colección Científica at the Laboratorio de Sistemática de Invertebrados Marinos, Universidad del Mar. The material deposited in the collection was collected between 2007-2017; additionally, new collect were realized in 2017. For each locality, the family and species richness were estimated using the accumulation function of linear dependence model. **Results:** One hundred lots and 273 specimens were revised. Seventy-one taxa, belonging to 47 genera and 21 families were identified, only twenty of these taxa are confirmed species (28 %). Chacahua Lagoon had the highest richness and relative abundance with 37 taxa and 149 specimens, Agua Blanca was identified 21 taxa and 92 specimens, and from San Agustín 19 taxa and 32 specimens. Sabellariidae had the highest relative abundance (58 specimens), while Phyllodocidae presented the highest species richness (12 species). **Conclusions:** This study adds 75 new records of taxa of polychaetes to the coast Oaxaca, which increase the knowledge in this animal group, now represented by 304 species, belonging to 154 genera and 42 families.

Key words: Agua Blanca, Chacahua Lagoon, checklist, San Agustín, marine worms, southern Mexican Pacific.

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The State of Oaxaca is considered among the top three of the states with highest biodiversity in Mexico (López-Pérez et al., 2012; Llorrente-Bousquets & Ocegueda, 2008); nevertheless, richness, distribution and conservation status of many species, including polychaetes, remain poorly known (López-Pérez et al., 2012). The knowledge of the Polychaeta from Oaxaca has been compiled by Bastida-Zavala et al. (2013); they made

an historical review of all the records of polychaetes from the coast of Oaxaca, from 1919 to 2011, listing 222 species, however, many of these records (at least 62.92 %) are questionable.

Nowadays, there are new records of polychaetes, and the polychaeta-fauna from Oaxaca is represented by 241 species (i.e. Tovar-Hernández & Carrera-Parra, 2011; Salazar-Vallejo, 2012; Bastida-Zavala et al.,

2013; Granja-Fernández, Hernández-Moreno & Bastida-Zavala, 2013; Salazar-Silva, 2013; Salazar-Silva & Carrera-Parra, 2014; Bastida-Zavala, Rodríguez Buelna, de León-González, Camacho-Cruz & Carmona, 2016; Cruz-Gómez & Bastida-Zavala, 2018). These records constitute only 1.6 % of the polychaetes known worldwide (~15 000 species) and 16.2 % of the polychaetes recorded for Mexican waters (1 500 species, *vide* Tovar-Hernández, Salazar-Silva, de León-González, Carrera-Parra & Salazar-Vallejo, 2014).

Even though, many of these works are monographic studies including many sites along the coast of Oaxaca, only seven include poorly studied locations, with varying ecosystems, such as: Chacahua Lagoon (coastal lagoon), Agua Blanca (intertidal rocky shore) and San Agustín (coral reef) (Hartman, 1944, 1950, 1961; Ruiz-Cancino, Carrera-Parra & Bastida-Zavala, 2011; Salazar-Vallejo, 2012; Bastida-Zavala et al., 2016; Cruz-Gómez & Bastida-Zavala, 2018). Furthermore, some of the studies of these locations have focused on three families only, Eunicidae (Ruiz-Cancino et al., 2011), Serpulidae (Bastida-Zavala et al., 2016) and Chrysopetalidae (Cruz-Gómez & Bastida-Zavala, 2018), giving a total of 20 species recorded. Thus, a study of the polychaetes in these locations is necessary to improve our knowledge of the group.

The aim of this study was to identify the polychaetes from three different marine ecosystems from Oaxaca, Mexico. A checklist of polychaetes species recorded from Chacahua Lagoon, Agua Blanca and San Agustín, is included.

MATERIALS AND METHODS

Specimens analyzed came from the Sección de poliquetos de la Colección Científica (OAX-CC-249-11) at the Laboratorio de Sistemática de Invertebrados Marinos (LABSIM), Universidad del Mar (Puerto Ángel, Oaxaca, Mexico). This material was collected between 2007-2017 from three locations in Oaxaca, Mexican Pacific. Chacahua Lagoon

(15°57'57" N - 97°40'38" W), a coastal lagoon belonging to Lagunas de Chacahua National Park; Agua Blanca (15°43'58" N - 96°48'50" W), an intertidal rocky shore; and San Agustín (15°41'09" N - 96°14'05" W), a bay with a wide area of coral reef.

Specimens were fixed in 10 % formalin solution and preserved in 70 % ethanol solution. In contrast, the material collected in 2017 (obtained through snorkeling in the intertidal zone to 3 m depth), was fixed and preserved in 96 % ethanol solution. The new specimens collected and all of the material examined was separated in glass vessels and labeled, and deposited in the Sección de poliquetos of LABSIM.

The identification of the polychaetes was made using the keys of de León-González et al. (2009); it was also corroborated with specialized literature for each family. The checklist is shown in alphabetical order.

Family and species richness by location was obtained using the accumulation function of linear dependence model (Moreno, 2001). The expected richness was estimated as the number of families or species, considering the sampling effort as number of sampling event for locality. The analyses were performed with EstimateS 9 (Colwell, 2013) and Statistica 8.0 (StatSoft, 2007) software.

To avoid an overestimation of the values of richness, damaged polychaetes, juveniles or specimens with a non-defined taxonomic status were removed prior to the analysis.

RESULTS

A total 100 lots and 271 specimens were revised. Seventy one taxa belonging to 47 genera and 21 families were recorded (Table 1). Among these records, 20 are confirmed species (28 %), 19 are close to nominal species due to present morphological peculiarities or type locality distant from Oaxaca (27 %), 14 have unclear systematic status since are incomplete, damaged or juvenile specimens (20 %), and 18 are possible new species (25 %) which will be formally described by the authors in upcoming

TABLE 1
Checklist of the polychaetes species and ecological features from three locations of Oaxaca coast, Mexico

Species	Agua Blanca (rocky shore)	Chachagua Lagoon (coast lagoon)	San Agustín (coral reef bay)	Depth (m)	Substrata	Record
Amphinomidae Savigny in Lamarck, 1818						
<i>Eurythoe</i> cf. <i>complanata</i> (Pallas, 1766) ★			● (1)	ND	coralline rocks	This study
<i>Notopygos ornata</i> Grube, 1856		● (1)		ND		This study
Capitellidae Grube, 1862						
Capitellidae sp.		● (1)		ND	rocks	This study
Chaetopteridae Audouin & Milne-Edwards, 1833						
<i>Spiochaetopterus</i> sp. ★		● (1)		0.5	sand	This study
Chrysopetalidae Ehlers, 1864						
<i>Bhavanina</i> cf. <i>goodeti</i> Webster, 1884		●		0.5	SABI	Cruz-Gómez & Bastida-Zavala (2018)
<i>Chrysopetalum elegantoides</i> Aguado, Capa & San Martín, 2003		●	●	intertidal/ 3.3–6.4	rocks/ <i>Pocillopora damicornis</i>	Cruz-Gómez & Bastida-Zavala (2018)
<i>C. occidentale</i> Johnson, 1897		● (5)	● (1)	0.5/ND	SABI and rocks/ coralline	Cruz-Gómez & Bastida- Zavala (2018); this study
<i>Chrysopetalum</i> sp. ★		● (1)	● (1)	ND	coralline rocks	This study
<i>Palaequor psamathe</i> Watson Russell, 1986				ND		Cruz-Gómez & Bastida- Zavala (2018); this study
<i>Palaeanotus bellis</i> (Johnson, 1897)		●		ND	ND	Cruz-Gómez & Bastida-Zavala (2018)
<i>Palaeanotus</i> sp. ★		● (1)	● (2)	ND/24	rocks/coralline and <i>Mayrakenna</i> sp.	This study
Cirratulidae Ryckholt, 1851						
<i>Cirratulus</i> cf. <i>cirratulus</i> (O.F. Müller, 1776) ★		● (1)		ND	sand	This study
<i>Cirratulus</i> cf. <i>megalus</i> Chamberlin, 1919 ★		● (1)		ND	dead coral	This study
Dorvilleidae Chamberlin, 1919						
<i>Dorvillea vittata</i> (Grube, 1856)			● (1)	ND	<i>P. damicornis</i>	This study
<i>Dorvillea</i> cf. <i>cerasina</i> (Ehlers, 1901)	● (1)		● (3)	ND/6.4	algae/ <i>P. damicornis</i> and dead coral	This study

TABLE 1 (Continued)

Species	Agua Blanca (rocky shore)	Chacahua Lagoon (coast lagoon)	San Agustín (coral reef bay)	Depth (m)	Substrata	Record
Eumicidae Berthold, 1827						
<i>Eumice chicensi</i> de León- González, Rivera & Romero, 2004	•	•		ND	ND	Ruiz-Cancino et al. (2011)
<i>E. vittatopsis</i> Fauchald, 1970	Q			ND	ND	Ruiz-Cancino et al. (2011)
<i>Eumice</i> sp. 1			• (1)	ND	dead coral	This study
<i>Eumice</i> sp. 2			• (2)	ND	dead coral	This study
<i>Lysidice</i> cf. <i>unicornis</i> (Grube, 1840)			• (2)	ND	dead coral	This study
<i>Marphysa</i> sp. Ruiz-Cancino et al., 2011			• (2)	ND	dead coral	This study
Flabelligeridae de Saint-Joseph, 1894				ND	coralline	This study
<i>Ptormis gracilis</i> Hartman, 1961		•		40-45	mud	Hartman (1961)
<i>Semiodera inflata</i> (Treadwell, 1914)			• (5)	ND	<i>Porites</i> sp.	This study
<i>Trophonitella bastidai</i> Salazar-Vallejo, 2012		•		40-45	mud	Salazar-Vallejo (2012)
Hesionidae Grube, 1850						
<i>Leocrates</i> sp. ★			• (1)	ND	rocks	This study
<i>Oxydromus minutus</i> (Hartmann-Schröder, 1959)		• (3)		ND	rocks	This study
Lumbrineridae Schmarda, 1861						
<i>Lumbrineris</i> cf. <i>inflata</i> Moore, 1911	• (1)			ND	<i>Padina</i> sp.	This study
Nephtyidae Grube, 1850						
<i>Nephtys caecoides</i> Hartman, 1938		Q		10-15	mud	Hartman (1950)
Nereididae Blainville, 1818						
<i>Ceratonereis</i> sp.	• (1)			intertidal	<i>Padina</i> sp.	This study
<i>Nereis</i> cf. <i>eugeniae</i> (Kinberg, 1866)	• (2)			ND	ND	This study
<i>N.</i> cf. <i>lamellosa</i> Ehlers, 1868	• (1)			ND	rocks	This study
<i>N.</i> (<i>Pelagica</i>) cf. <i>occidentalis</i> Hartman, 1945	• (1)			intertidal	<i>Padina</i> sp.	This study
<i>Nereis</i> sp.		• (1)		ND	rocks	This study
<i>Perinereis elenacatoi</i> Rioja, 1947	• (5)			intertidal	<i>Padina</i> sp.	This study
<i>Pseudonereis</i> cf. <i>gallapagensis</i> Kinberg, 1865 ★	• (1)			ND	algae	This study
Oeononidae Kinberg, 1865						
<i>Arabella</i> cf. <i>iricolor</i> (Montagu, 1804)	• (5)			ND	ND	This study
Onuphidae Kinberg, 1865						
<i>Onuphis nebulosa</i> Moore, 1911		Q		40-45	mud	Hartman (1994)

TABLE 1 (Continued)

Species	Agua Blanca (rocky shore)	Chacahua Lagoon (coast lagoon)	San Agustín (coral reef bay)	Depth (m)	Substrata	Record
<i>O. vestillaria</i> Moore, 1911		Q		40-45	mud	Hartman (1994)
<i>O. eremita</i> Audouin & Milne Edwards, 1833		Q		ND	coral	Hartman (1944)
Orbiniidae Hartman, 1942						
<i>Naineris cf. setosa</i> (Verril, 1900)		● (15)		ND	mangrove	This study
<i>Protoaricia</i> sp. ★		● (5)		ND	mangrove	This study
Phyllodoceidae Örsted, 1843						
<i>Eteone cf. californica</i> Hartman, 1936		● (1)		ND	rocks	This study
<i>Eteone</i> sp. ★		● (1)		ND	on wood, sifted	This study
<i>Eulalia gracilior</i> (Chamberlin, 1919)		● (2)		ND	ND	This study
<i>E. cf. magalaensis</i> Kimberg, 1866 ★		● (1)		ND	ND	This study
<i>E. cf. mexicana</i> Fauchald, 1972 ★		● (2)		ND	mangrove	This study
<i>Eulalia</i> sp. ★	● (4)	● (8)		intertidal	SAB/ on wood, sifted and inside of bivalve	This study
<i>Eumida cf. punctifera</i> (Grube, 1860)		● (2)		ND	ND	This study
<i>Phyllodoce cf. nicoyensis</i> Treadwell, 1928		● (1)		ND	ND	This study
<i>P. cf. schmardae</i> Day, 1963		● (1)		ND	ND	This study
<i>Phyllodoce</i> sp.			● (1)	ND	coralline	This study
<i>Pterocirrus</i> sp.		● (1)		ND	on wood, sifted	This study
Phyllodoceidae sp. epitocus stage			● (2)	ND	coralline	This study
Polynoidae Kimberg, 1856						
<i>Halosydna cf. olgae</i> Salazar-Silva, 2013	● (2)			ND	rock and algae	This study
<i>Halosydna</i> sp.		● (1)		ND	mangrove	This study
<i>Lepidonopsis barnichae</i> Salazar-Silva & Carrera-Parra, 2014		● (7)		ND	mangrove/ rocks	This study
<i>Lepidonotopodium cf. riftense</i> Pettibone, 1984			● (1)	5.8	<i>P. damicornis</i>	This study
Polynoinae sp.			● (2)	15.3	<i>Porites</i> sp.	This study
Sabellariidae Johnston, 1865						
<i>Idanthyrus eretus</i> Chamberlin, 1919	● (1)			0.4	rocks	This study
<i>Phragmatopoma</i> sp. 1 ★	● (43)			0.2	sand/rocks	This study
<i>Phragmatopoma</i> sp. 2 ★	● (13)			ND	sand	This study
<i>Sabellaria nanella</i> Chamberlin, 1919	● (1)			ND	<i>Phragmatopoma</i> sp.	This study

TABLE 1 (Continued)

Species	Agua Blanca (rocky shore)	Chacahua Lagoon (coast lagoon)	San Agustín (coral reef bay)	Depth (m)	Substrata	Record
Sabellidae Latreille, 1825						
<i>Acromegalomma</i> sp.	• (1)			ND	sand	This study
Serpulidae Rafinesque, 1815						
<i>Hydroides brachyacantha</i> Rioja, 1941	•	•	• (2)	intertidal/ ND/15.3	rocks/ND/ <i>Porites</i> sp.	Bastida-Zavala et al. (2016); this study
<i>H. crucigera</i> Mörch, 1863		•		intertidal	rocks	Bastida-Zavala et al. (2016)
<i>H. inermis</i> Monro, 1933	•			intertidal	rocks	Bastida-Zavala et al. (2016)
<i>H. ochotereana</i> Rioja, 1941		•		intertidal	rocks	Bastida-Zavala et al. (2016)
<i>H. panamensis</i> Bastida-Zavala & ten Hove, 2003	•			intertidal	rocks	Bastida-Zavala et al. (2016)
<i>Pomatostegus kroyeri</i> Mörch, 1863			•	5.8	<i>P. damicornis</i>	Bastida-Zavala et al. (2016)
<i>Spirobranchus</i> cf. <i>corniculatus</i> (Grube, 1862)		• (2)		1.5	rocks	This study
<i>S. incrassatus</i> Krøyer in Mörch, 1863		• (20)		1.5	rocks	This study
<i>S. minutus</i> (Rioja, 1941)	•			high tide	SABI	Bastida-Zavala et al. (2016)
Spionidae Grube, 1850						
<i>Dipolydora</i> cf. <i>socialis</i> (Schmarda, 1861)		• (7)		0.1	mangrove	This study
<i>Dipolydora</i> sp.		• (41)		ND	mangrove	This study
<i>Malacoceros</i> sp.		• (1)		0.1-0.2	mangrove	This study
<i>Marenzelleria</i> cf. <i>bastropi</i> Bick, 2005 ★		• (1)		ND	ND	This study
<i>Polydora heterochaeta</i> Rioja, 1939	• (1)	• (3)		intertidal	rocks	This study
<i>Pygospio</i> sp. ★				intertidal	rocks	This study
Syllidae Grube, 1850						
<i>Inermosyllis mexicana</i> (Góngora-Garza & de León-González, 1993)		• (2)		ND	mangrove/ rocks	This study
<i>Opisthosyllis arboricola</i> Hartmann-Schröder, 1959	• (2)			0-2	<i>Padina</i> sp./sand	This study
<i>O. cf. corallicola</i> Hartmann-Schröder, 1965		• (1)		intertidal	rocks	This study
<i>O. cf. longidentata</i> San Martín, 1991		• (1)		intertidal	rocks	This study
<i>Streptosyllis</i> sp. ★	• (1)			0-2	sand	This study
<i>Trypanodonta gemmipara</i> (Johnson, 1901)			• (1)	15.3	<i>Porites</i> sp.	This study
<i>Trypanosyllis</i> cf. <i>vittigera</i> Ehlers, 1887		• (2)		ND	sifted	This study

TABLE 1 (Continued)

Species	Agua Blanca (rocky shore)	Chacahua Lagoon (coast lagoon)	San Agustín (coral reef bay)	Depth (m)	Substrata	Record
<i>T. cf. zebra</i> (Grube, 1960)		● (1)		ND	rocks	This study
Terebellidae Johnston, 1846						
<i>Lanicola cf. guillermoi</i>	● (1)		● (1)	ND	rocks/ dead coral	This study
Capa & Hutchings, 2006						
Terebellinae sp.	● (4)	● (3)		ND	mangrove /SABI	This study
Species / specimens numbers	27/92	50/149	21/32			

Depth in m = meters, SABI = Sabellariidae aggregation, Q = questionable record, ND = no data. Symbols: ★ = possible new species, ● = record. The number of specimens is indicated between parentheses.

papers. One family (Chaetopteridae), 18 genera and 37 species are new records for the coast of Oaxaca. Twenty-six species are new records for the Mexican Pacific.

In general, Sabellaridae presented the highest abundance with 58 specimens (Fig. 1A, Fig. 2E-F), perhaps due to the fact that its members are gregarious polychaetes. Phyllodocidae was the richest family with 12 species, followed by Syllidae with eight, Nereididae with seven and Spionidae with six species.

As results for each site, Chacahua Lagoon had the highest richness and abundance with 37 taxa and 149 specimens. In Agua Blanca 21 taxa and 92 specimens were identified, and from San Agustín, 19 taxa and 32 specimens. Nereididae was the family with highest richness (six species) in Agua Blanca, whereas Sabellariidae presented the highest relative abundance (58 specimens) (Fig. 1A). In Chacahua Lagoon, Phyllodocidae was the richest family (10 species) and Spionidae had the highest abundance (53 specimens) (Fig. 1B). In San Agustín, Eunicidae had the highest richness and abundance (four species, seven specimens) (Fig. 1C). Lumbrineridae, Chaetopteridae, Capitellidae and Sabellidae had the lowest abundance in these locations, with only one specimen each one.

To avoid an overestimation of the values of the richness, the only specimens removed were Terebellinae sp. in Agua Blanca and Phyllodocidae sp. epitocus stage in San Agustín, since these could be duplicate data (*Lanicola cf. carus* and *Phyllodoce* sp., respectively). With the accumulation function, the expected richness was 14 families ($R = 0.999$, $R^2 = 99.998$ %, asymptote = 13.92, $b = 0.141$) and 44 species for Agua Blanca ($R = 1.000$, $R^2 = 100$ %, asymptote = 43.71, $b = 0.055$), 18 families ($R = 0.999$, $R^2 = 99.964$ %, asymptote = 17.93, $b = 0.239$) and 70 species for San Agustín ($R = 1.000$, $R^2 = 100$ %, asymptote = 70.32, $b = 0.073$), and 23 families ($R = 0.999$, $R^2 = 99.926$ %, asymptote = 22.71, $b = 0.085$) and 165 species for Chacahua Lagoon ($R = 1.000$, $R^2 = 100$ %, asymptote = 164.50, $b = 0.023$).

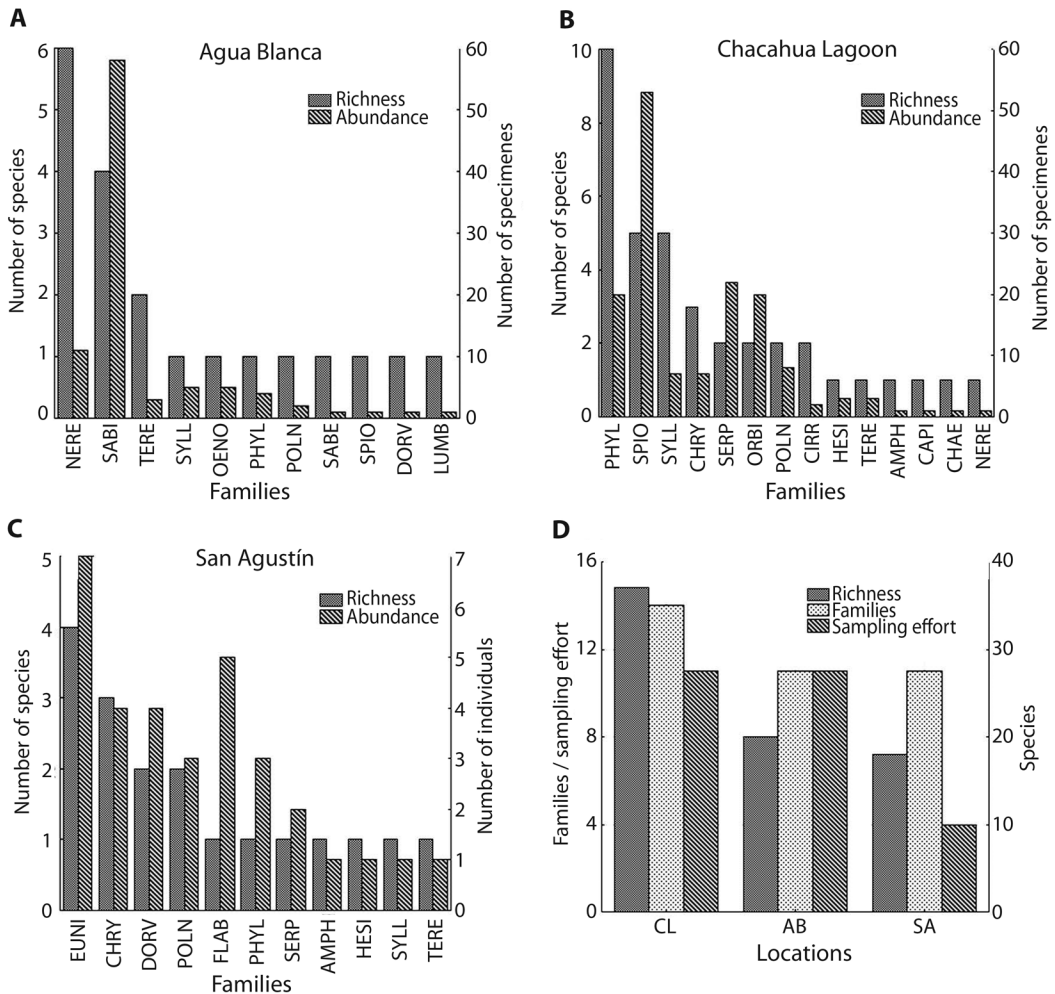


Fig. 1. Abundance and richness of polychaetes from (A) Agua Blanca; (B) Chacahua Lagoon; (C) San Agustín. (D) Comparison between locations. The short names of the Polychaeta families are following Salazar-Vallejo, de León-González & Saláices-Polanco (1988).

DISCUSSION

In the Mexican Pacific, some studies has incremented the polychaetes knowledge from particular ecosystems such as rocky and sandy zone in La Paz, Baja California Sur (Bastida-Zavala, 1993), coralline zone in Cabo Pulmo, Baja California Sur (Bastida-Zavala, 1995), buoys zone in Mazatlán, Sinaloa (Villalobos-Guerrero & Tovar-Hernández, 2014), and coralline and rocky zone in Huatulco-Puerto Angel, Oaxaca (Gómez, Mercado, Mitchell, & Salazar-Vallejo, 1997).

In Oaxaca, before this study, there were only 20 recorded species of polychaetes from Chacahua Lagoon, Agua Blanca, and San Agustín (Hartman, 1944, 1950, 1961; Ruiz-Cancino et al., 2011; Salazar-Vallejo, 2012; Cruz-Gómez & Bastida-Zavala, 2018). With this work, this has increased to 71 species, and 75 new records were added: 21 in Agua Blanca, 19 in San Agustín and 35 in Chacahua Lagoon.

Particularly, the study by Gómez et al. (1997) found the highest values of richness (36 species) in coralline zone of La Entrega, Oaxaca. In contrast, among the three locations

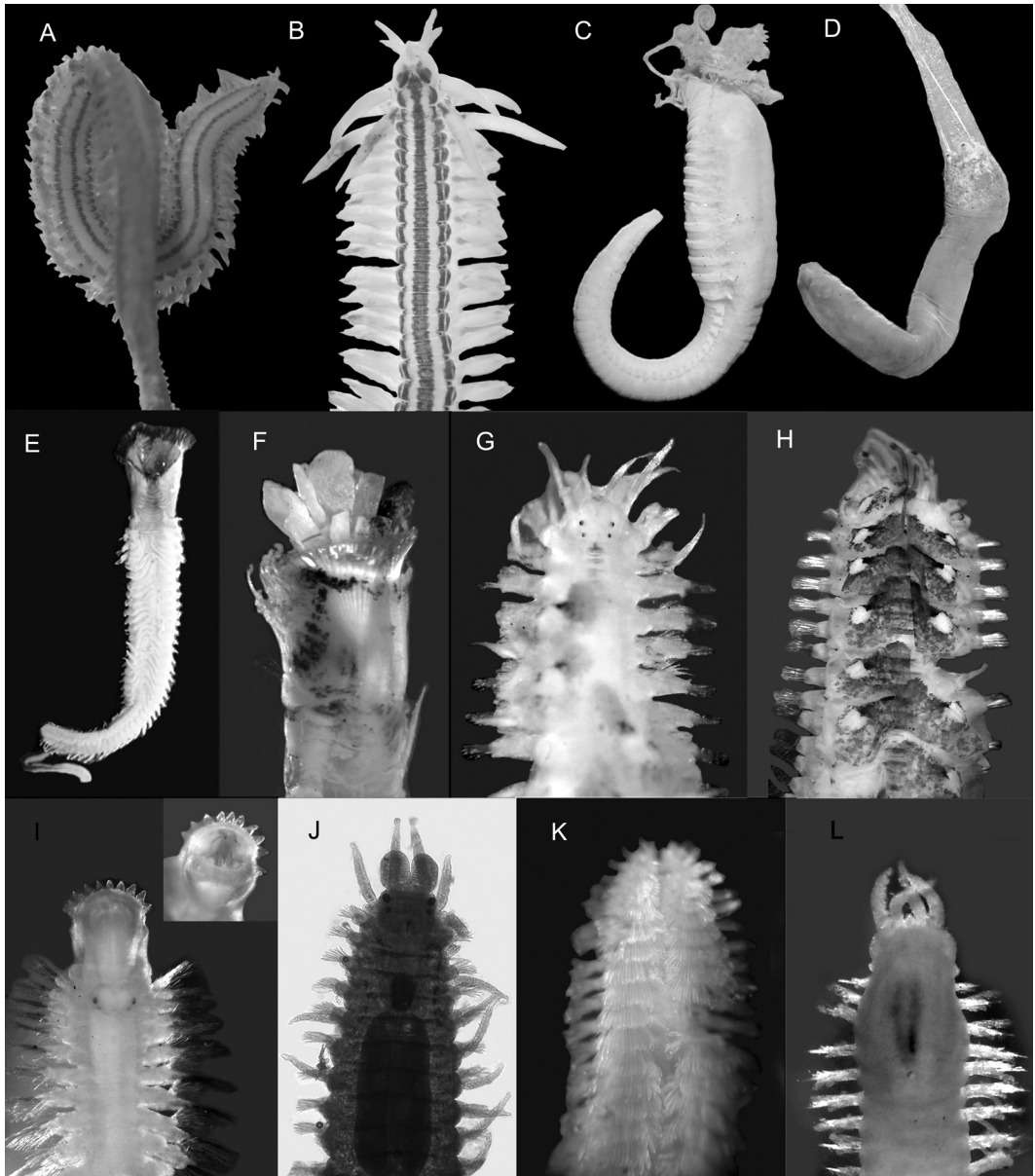


Fig. 2. Examples of the species identified (A) *Eulalia gracicolor* (B) *Eulalia* sp. (C) *Lanicola* cf. *guillermoi* (D) *Semiodera inflata* (E) *Idanthyrus cretus* (F) *Sabellaria nanella* (G) *Lepidonopsis barnichae* (H) *Halosydna* cf. *olgae* (I) *Lepidonotopodium* cf. *riftense* (J) *Streptosyllis* sp. (K) *Chrysopetalum occidentale* (L) *Dorvillea vittata*.

of study, the highest values of abundance (149 specimens) and richness (37 species) were found in Chacahua Lagoon; this might be due to the diversity of microhabitats studied in this locality: rocky zone, mangrove, sand and muddy zone. On the other hand, the coralline

zone of San Agustín showed the lowest abundance (32 specimens) and richness (19 species); however, this location also presented the lowest sampling effort (Fig. 1D).

The Polychaeta-fauna in Chacahua Lagoon, Agua Blanca and San Agustín only

match in 9 % of their composition, which are six families and eight taxa (*Chrysopetalum elegantoides*, *C. occidentale*, *Paleaonotus* sp., *Dorvillea* cf. *cerasina*, *Eunice chikasi*, *Eulalia* sp., *Hydroides brachyacantha*, and *Lanicola* cf. *guillermoi*). This indicates that these three locations present particular environmental conditions with different types of marine biota. On the other hand, the results of this work coincide with Gómez et al. (1997) in the presence of *C. occidentale*, *Idanthyrus cretus*, *H. brachyacantha*, *H. crucigera*, and *Spirobranchus incrassatus* in the Oaxaca coast. The results also coincides with Bastida-Zavala (1993) in the record of *Dorvillea vittata* and with Bastida-Zavala (1995) in the record of *Perinereis elenecaso*, but also these studies recorded many questionable species, to avoid questionable records here were referred this kind of species as *confer* (e.g. *Bhawania* cf. *godei*). The study by Villalobos-Guerrero and Tovar-Hernández (2014) coincides with our study in the presence of *Dorvillea vittata*, *Eunice* sp. 2, *Marphysa* sp., *Perinereis elenecaso* and *Eulalia gracicolor*.

Considering the results obtained, to date the Polychaeta-fauna from Oaxaca is represented by 304 species, belonging to 154 genera and 42 families. Comparatively, the Polychaeta from the coast of Oaxaca are better known than other states, such as Chiapas (five species) and Michoacán (57 species) (Bastida-Zavala & García-Madrigal, 1998; Bastida-Zavala & García-Madrigal, 2012; Bastida-Zavala & Guevara-Cruz, 2012); however, the species richness of polychaetes from Oaxaca still less known than other states as Sinaloa with 464 species recorded (Villalobos-Guerrero & Molina-Acevedo, 2014). The number of species and records of the polychaetes in the Mexican south Pacific could increase if intensify and explore new locations and other habitats (e.g. sandy beaches, deep reefs, submarine canyons, mixohaline lagoons).

Ethical statement: authors declare that they all agree with this publication and made significant contributions; that there is no

conflict of interest of any kind; and that we followed all pertinent ethical and legal procedures and requirements. All financial sources are fully and clearly stated in the acknowledgements section. A signed document has been filed in the journal archives.

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RESUMEN

Nuevos registros de poliquetos (Annelida: Polychaeta) de tres localidades de Oaxaca, México

Introducción: El conocimiento de poliquetos en Oaxaca, México, está representado por 41 familias y 241 especies, sin embargo, 148 especies son consideradas cuestionables. La mayoría de los estudios taxonómicos de poliquetos en Oaxaca se han enfocado en zonas estuarinas o puertos comerciales, dejando de lado otros ecosistemas marinos. **Objetivo:** Identificar la poliqueto-fauna de tres ecosistemas diferentes de Oaxaca. **Métodos:** Los especímenes analizados pertenecen a la Sección de poliquetos de la Colección Científica del Laboratorio de Sistemática de Invertebrados Marinos, Universidad del Mar. El material depositado en la colección fue colectado entre 2007-2017; adicionalmente, se realizaron nuevas colectas en 2017. Para cada localidad, la riqueza de especies y familias fue estimada utilizando la función de acumulación del modelo de dependencia lineal. **Resultados:** Se revisaron 100 lotes y 273 especímenes. Se identificaron 71 taxones, pertenecientes a 47 géneros y 21 familias, solo 20 de estos taxones corresponden a nombres específicos (28 %). La Laguna de Chacahua presentó la mayor riqueza y abundancia relativa con 37 taxones y 149 especímenes, en Agua Blanca se identificaron 21 taxones y 92 especímenes, y para San Agustín 19 taxones y 32 especímenes. La familia Sabelliidae tuvo la mayor abundancia relativa (58 especímenes), mientras que Phyllodocidae presentó la mayor riqueza de

especies (12 especies). **Conclusiones:** Con este estudio se añaden 75 nuevos registros de poliquetos para la costa de Oaxaca, incrementando el conocimiento de este grupo, ahora representado por 304 especies pertenecientes a 154 géneros y 42 familias.

Palabras clave: Agua Blanca, laguna de Chacahua, listado de especies, San Agustín, gusanos marinos, Pacífico sur de México.

REFERENCES

- Bastida-Zavala, J. R. (1993). Taxonomía y composición biogeográfica de los poliquetos (Annelida: Polychaeta) de la bahía de La Paz, B.C.S., México. *Revista de Investigación Científica*, 4(1), 11-39.
- Bastida-Zavala, J. R. (1995). Poliquetos (Annelida: Polychaeta) del arrecife coralino de Cabo Pulmo-Los Frailes, B.C.S., México. *Revista de Zoología*, 6, 9-29.
- Bastida-Zavala, J. R., & García-Madrigal, M. S. (1998). Lista de poliquetos (Annelida: Polychaeta) y braquiuros (Crustacea: Decápoda) registrados para la costa de Michoacán, México. *Quetzal*, 8, 21-25.
- Bastida-Zavala, J. R., & García-Madrigal, M. S. (2012). First record in the Tropical Eastern Pacific of the exotic species *Ficopomatus uschavoki* (Polychaeta, Serpulidae). *ZooKeys*, 238, 45-55.
- Bastida-Zavala, J. R., García-Madrigal, M. S., Rosas-Alquicira, E. F., López-Pérez, R. A., Benítez-Villalobos, F., Meraz-Hernando, J. F., ... Barrientos-Luján, N. A. (2013). Marine and coastal biodiversity of Oaxaca, Mexico. *Check List*, 9(2), 329-290.
- Bastida-Zavala, J. R., & Guevara-Cruz, C. (2012). Estado del conocimiento de los poliquetos (Annelida: Polychaeta) del Pacífico sur de México. In A. J. Sánchez, X. Chiappa-Carrara & R. Brito-Pérez (Eds.), *Recursos Acuáticos Costeros del Sureste* (pp. 335-355, Vol. 1). Mérida, Yucatán: Red para el Conocimiento de los Recursos Costeros de México Press.
- Bastida-Zavala, J. R., Rodríguez Buelna, A. S., de León-González, J. A., Camacho-Cruz, K. A., & Carmona, I. (2016). New records of sabellids and serpulids (Polychaeta: Sabellidae, Serpulidae) from the Tropical Eastern Pacific. *Zootaxa*, 484(3), 401-457.
- Colwell, R. K. (2013). *EstimateS: Statistical estimation of species richness and shared species from samples. Version 9. User's Guide ad application*. Retrieved from <http://purl.oclc.org/estimates>
- Cruz-Gómez, C., & Bastida-Zavala, J. R. (2018). Chrysopetalids (Phyllodocta: Chrysopetalidae) from the southern Mexican Pacific, including a new species. *Zootaxa*, 4521(1), 61-88.
- de León-González, J. A., Bastida-Zavala, J. R., Carrera-Parra, L. F., García-Garza, M. E., Peña-Rivera, A., Salazar-Vallejo, S. I., & Solís-Weiss, V. (2009). *Poliquetos (Annelida: Polychaeta) de México y América Tropical*. Nuevo León, México: Universidad Autónoma de Nuevo León.
- Granja-Fernández, R., Hernández-Moreno, P., & Bastida-Zavala, J. R. (2013). First record of the association between *Malmgriella* cf. *variegata* (Polychaeta, Polynoidae) and *Ophionereis annulata* (Echinodermata, Ophionereidae) in the Mexican Pacific. *Symbiosis*, 60, 85-90.
- Gómez, P., Mercado, J. A., Mitchell, L. M., & Salazar-Vallejo, S. I. (1997). Poliquetos de fondos duros (Polychaeta) de bahías de Huatulco y Puerto Ángel, Oaxaca, México. *Revista de Biología Tropical*, 45(3), 1067-1074.
- Hartman, O. (1944). Polychaetous annelids Part V. Eunicea. *Allan Hancock Pacific Expedition*, 10(1), 1-236.
- Hartman, O. (1950). Polychaetous annelids. Goniadidae, Glyceridae and Nephtyidae. *Allan Hancock Pacific Expedition*, 15(1), 1-181.
- Hartman, O. (1961). Polychaetous annelids from California. *Allan Hancock Pacific Expedition*, 25(1), 1-226.
- Llorente-Bousquets, J., & Ocegueda, S. (2008). *Estado del conocimiento de la biota, en Capital natural de México, vol. I: Conocimiento actual de la biodiversidad*. Ciudad de México, México: Conabio.
- López-Pérez, R. A., Bastida-Zavala, J. R., García-Madrigal, M. S., Barrientos-Luján, N. A., Torres-Huerta, A. M., Montoya-Márquez, J. A., ... Meráz-Hernando, J. F. (2012). ¿Cuánto sabemos de la diversidad de la fauna marina y costera de Oaxaca?. In A. J. Sánchez, X. Chiappa-Carrara & R. Brito-Pérez (Eds.), *Recursos Acuáticos Costeros del Sureste* (pp. 435-449, Vol. 1). Mérida, Yucatán: Red para el Conocimiento de los Recursos Costeros de México Press.
- Moreno, C. E. (2001). *Métodos para medir la biodiversidad* (Vol. 1). Zaragoza, España: M&T-Manuales y Tesis SEA.
- Ruiz-Cancino, G., Carrera-Parra, L. F., & Bastida-Zavala, J. R. (2011). Eunícidos (Polychaeta: Euniciidae) del Pacífico sur de México. *Ciencia y Mar*, 14(40), 27-60.
- Salazar-Silva, P. (2013). Revision of *Halosydna* Kinberg, (Annelida: Polychaeta: Polynoidae) from the Tropical Eastern Pacific and Grand Caribbean with descriptions of new species. *Journal of Natural History*, 47, 1177-1242.
- Salazar-Silva, P., & Carrera-Parra, L. F. (2014). Revision of *Lepidonopsis humilis* (Augener, 1922) and description *L. barnichae* sp. nov. (Annelida: Polychaeta:

- Polynoidae) based upon morphological and molecular characters. *Zootaxa*, 3790(4), 555-566.
- Salazar-Vallejo, S. I. (2012). Revision of *Trophoniella* Hartman, 1959 (Polychaeta, Flabelligeridae). *Zoosystema*, 34(3), 453-519.
- Salazar-Vallejo, S. I., de León-González, A., & Saláices-Polanco, H. (1988). *Poliquetos (Annelida: Polychaeta) de México*. La Paz, México: Libros Universitarios, UABCS.
- StatSoft, Inc. (2007). *STATISTICA (data analysis software system). Version 8.0*. Retrieved from <http://www.statsoft.com/Products/STATISTICA-Features>
- Tovar-Hernández, T., & Carrera-Parra, L. F. (2011). *Megalomma* Johansson, 1925 (Polychaeta: Sabellidae) from America and other world-wide localities, and phylogenetic relationships within the genus. *Zootaxa*, 2861, 1-71.
- Tovar-Hernández, M. A., Salazar-Silva, P., de León-González, J. A., Carrera-Parra, L. F., & Salazar-Vallejo, S. I. (2014). Biodiversity of Polychaeta (Annelida) in Mexico. *Revista Mexicana de Biodiversidad*, 85, 190-196.
- Villalobos-Guerrero, T. F., & Molina-Acevedo, I. C. (2014). Lista de especies y estado de conocimiento de los poliuetos (Annelida: Polychaeta) de Sinaloa, Golfo de California. *Boletín del Instituto Oceanográfico de Venezuela*, 53(1), 79-109.
- Villalobos-Guerrero, T. F., & Tovar-Hernández, M. A. (2014). Poliuetos errantes (Polychaeta: Errantia) esclerobiontes del puerto de Mazatlán, Sinaloa (México). *Boletín de Investigaciones Marinas y Costeras*, 43(1), 43-87.