Hyperiid Amphipods (Crustacea: Peracarida) in Mexican Waters of the Pacific Ocean[1]

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Abstract: Information on regional diversity of hyperiid amphipods of the eastern Pacific Ocean is still largely incomplete. Recent surveys of hyperiid fauna from the Mexican Pacific motivated a revision of extant faunistic accounts. This revised list includes all records from Mexican waters of the eastern Pacific (MP) from Baja California to the southern border with Central America. A total of 150 species belonging to 19 families and 48 genera of the Hyperiidea was included in this account; seven are new records in the MP. Up to 31 nominal species were excluded from previous listings. Overall, the epipelagic infraorder Physocephalata is highly diverse in the MP (119 species); Physosomata, containing deep-living forms, are less diverse (31 species). The northern part of the MP (including the gulf and off the Baja California peninsula) harbors the highest number of species/records, whereas nearly half of the species are known from the central areas and six from the southernmost sector of the MP. This pattern reflects current knowledge of the group in these areas and also geographic differences in the sampling/research efforts, but it is not a diversity gradient. Species richness of the MP is comparable with that known from other Pacific subregions. The epipelagic hyperiid fauna of the tropical MP remains relatively unknown and should be studied further to reveal regional patterns of diversity. The deep-living hyperiid community of the tropical eastern Pacific harbors a diversity that is deserving of further study.

Hyperiid amphipods represent one of the most abundant and diverse groups of crustaceans in the pelagic realm; this taxon contains more than 250 species, many of them with a wide geographic distribution (Vinogradov et al. 1996, Vinogradov 1999). Most of these forms are known to be symbiotically associated with different groups of gelatinous zooplankton (Laval 1980).

There are large oceanic and neritic areas in which the diversity of this group remains practically unknown, and the local faunal composition is only extrapolated from that known in adjacent areas (Gasca 2007). In other regions, such as the eastern Pacific, most of the available information is based on isolated works developed over the decades, some of them including Mexican Pacific waters. Despite the amount of data from these sources, some of these checklists have not been critical, and unrevised records are repeated from previous works, particularly in Mexican waters. Many of these records are outdated or invalid. There have been no recent efforts to produce an updated, critical checklist of the hyperiid amphipods from oceanic and coastal areas of the Mexican Pacific.

The regional works in which reference is made to the hyperiid amphipods of Mexican waters of the Pacific Ocean (MP) fall into two categories: (1) those in which original records/observations are presented by the authors, and (2) those in which records are tak-

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en from previous works or accounts, without comments or additions. Among the works in the first category, the oldest ones are those by Streets (1878), who recorded *Rhabdosoma whitei* Bate, 1862, and Shoemaker (1925), who recorded nine species collected during a cruise of the *Albatross* in the Gulf of California; he described three new species. Later, Hurley (1956) provided records of 34 hyperiids from Californian waters including 19 species found in Mexican waters (17° 50′ N), and Bowman (1960) recorded *Themisto pacifica* (Stebbing, 1888) off Baja California. Bowman (1973) studied the different genera of the Hyperiidae from the eastern Pacific, covering also waters off Baja California. Brusca (1981) published a commented key to the hyperiids of the North American coastal waters that included distributional observations of many species and records from the MP. The monographic account by Siegel-Causey (1982) was focused on the hyperiid fauna of the Gulf of California, where he recorded 118 species. Lavaniegos and Ohman (1999) studied the hyperiids of the California Current subregion and did not include data from Mexican waters; however, Ohman and Lavaniegos (2002) included records from southern California and Baja California. Shih and Hendrycks (2003) studied the genus *Vibilia* from an extensive area of the eastern tropical Pacific, including Mexican waters. Gasca and Haddock (2004) provided new records of symbiotic associations of hyperiid species from the gulf, and Gasca (2005) described a new deep-living species of *Hyperoche*. More recently, Gasca and Franco-Gordo (2008) surveyed the hyperiid fauna from Banderas Bay, a coastal system in the Mexican tropical Pacific.

Among the contributions of the second category, the work by Escobar-Briones et al. (2002) is included. The list comprised all the amphipods (benthic and pelagic) recorded in Mexican waters. However, records were not assigned to a region; these were summarized into a single generalized account. Hence, the information about the records from the MP is unavailable. Escobar-Briones and Winfield (2003) provided a list of the amphipods from the Mexican Pacific, including an account of the hyperiids. Later, Brusca and Hendrickx (2005) published a list of the peracarid crustaceans with a section about the hyperiids from the Gulf of California. Brinton et al. (1986) analyzed the distribution of some hyperiids in the gulf based on data by Siegel-Causey (1982). The species recorded in the work by Brusca (1967) off California were probably included in the general accounts from Mexican waters; however, the survey is limited to non-Mexican waters of the Californian region. Based on records from the literature and on original data, a new list is presented herein. It is also recognized that local and regional surveys of the diversity and/or biogeography of the group must be anchored on reliable taxonomic lists.

MATERIALS AND METHODS

The list of species presented here was obtained from analysis of the extant literature about the hyperiid amphipods from Mexican waters of the Pacific Ocean; records from adjacent areas were not included except for data from sampling sites located within the MP or from immediate adjacent zones. Original and new observations/data from tropical waters off the coasts of Jalisco and Nayarit (Gasca and Franco-Gordo 2008) and personal observations based on samples collected off the coasts of Jalisco and Colima (1995–1997) were also included in this account. Records were sorted considering three sectors of the MP: the Gulf of California, Baja California, and the central and southern areas of the MP (Figure 1).

The taxonomic arrangement used in this account followed different sources, depending on the family: Vinogradov et al. (1996) was used as the basic work for the identification or classification of several genera. The nomenclature and criteria proposed by Harbison and Madin (1976) were followed in reference to species of *Lycaea*. The work by Shih (1991) was used to identify and arrange the species of *Phronima*. For the superfamilies Vibilioidea, Lycaepsoidea, Phronimoidea, and Archaeoscinoidea, the recent works by Zei-

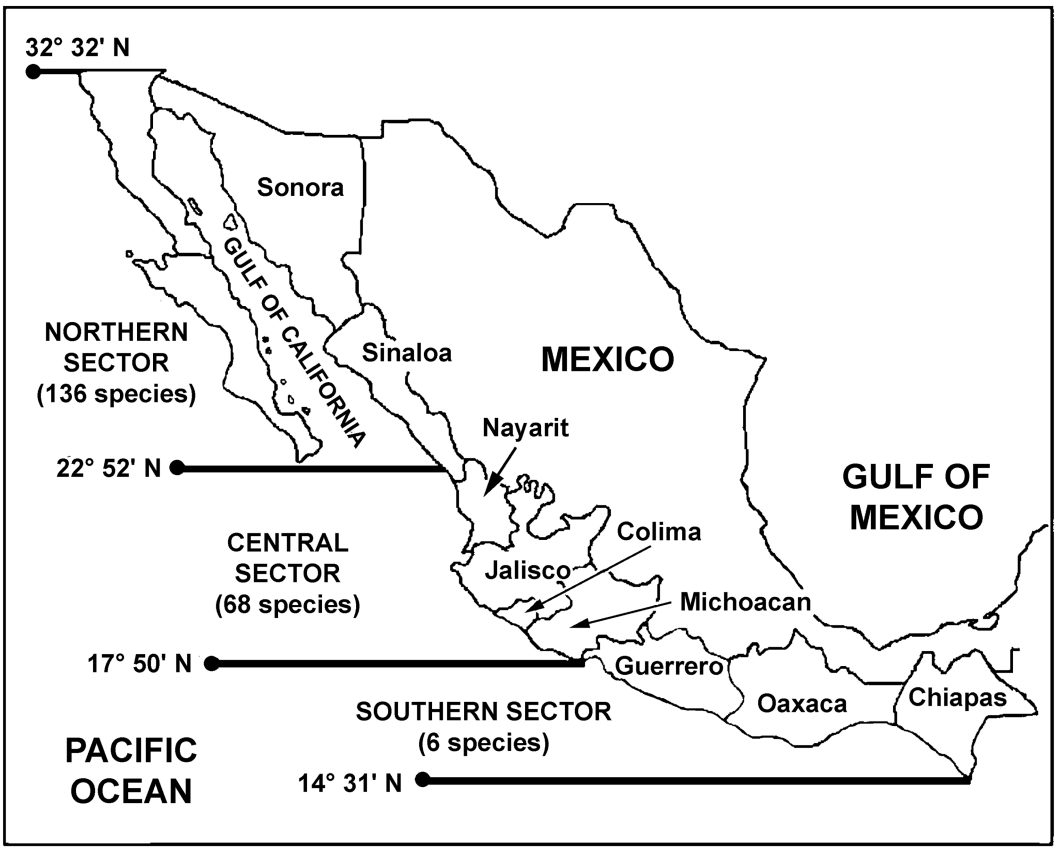

FIGURE 1. Latitudinal sectors of the Mexican waters of the Pacific Ocean showing the states of the Mexican Pacific coast and the number of species of Hyperiidae recorded from each sector.

dler (2003*a*, 2004*a*,*b*, 2006) were used. Also, Zeidler (1999) was followed for species of *Oxycephalus*, and Zeidler (2003*b*) in reference to the Cystisomatidae.

The synonymies of each species contained in this checklist were revised here, most based on Shih and Cheng (1995) and Vinogradov et al. (1996). Some species mentioned in other lists under a different name were included in this account with the new, accepted name. Some of the species collected in this survey have not been hitherto recorded in the Mexican Pacific; voucher specimens of these species were deposited in the collection of zooplankton held at El Colegio de la Frontera Sur, Chetumal, Mexico (ECO-CHZ).

RESULTS

The checklist presented herein contains a total of 150 species of hyperiid amphipods confirmed from Mexican waters. This figure includes representatives of the two infraorders of the Hyperiidea, the Physosomata and the Physocephalata. The former group is represented by 31 species, the latter by 119. Overall, the list includes 19 families and 48 genera. At the genus level the most diverse families were Oxycephalidae (7), Lestrigonidae (5), and Platyscelidae (5). The most speciose family in the MP was the Scinidae (22), followed by Lestrigonidae (15), Vibiliidae (14), and Platyscelidae (13) (Table 1).

TABLE 1

Updated Checklist of the Hyperiid Amphipods from the Mexican Waters of the Pacific Ocean

Taxa	Records from the Gulf of California[a]	Records from the Pacific Coast[a]
Order Amphipoda		
Suborder Hyperiidea		
Infraorder Physosomata Pirlot, 1929		
Superfamily Lanceoloidea Bovallius, 1887		
Family Lanceolidae Bovallius, 1887		
Lanceola loveni Bovallius, 1885	SC82[1], BH05	EBW03
Lanceola sayana Bovallius, 1885	SC82, BH05	EBW03
Lanceola pacifica Stebbing, 1888	SC82, BH05	EBW03
Lanceola loveni loveni Bovallius, 1882		Hu56[2]
Lanceola loveni grossipes Shoemaker, 1945		EBW03
Scypholanceola aestiva (Stebbing, 1988)	SC82, BH05	OL02, EBW03
Scypholanceola agassizi Woltereck, 1909	SC82, BH05	EBW03
Superfamily Scinoidea Stebbing, 1888		
Family Mimonectidae Bovallius, 1885		
Mimonectes gaussi (Woltereck, 1904)	SC82	EBW03
Mimonectes diomedeae (Woltereck, 1909)	BH05	EBW03
Family Scinidae Prestandrea, 1833		
Scina crassicornis (Fabricius, 1775)	SC82, BH05	EBW03
Scina curvidactyla Chevreux, 1914		EBW03
Scina incerta Chevreux, 1900		EBW03
Scina langhansi Wagler, 1926	SC82, BH05,	EBW03
Scina borealis (G. O. Sars, 1882)	SC82, Bri86, BH05	Hu56, OL02, EBW03
Scina spinosa Vosseler, 1901	SC82, BH05	EBW03
Scina stebbingi Chevreux, 1919	SC82, BH05	EBW03
Scina marginata (Bovallius, 1885)	SC82, BH05	EBW03, PO
Scina submarginata Tattersall, 1906	SC82, BH05	EBW03
Scina rattrayi rattrayi Stebbing, 1895	BH05	EBW03
Scina rattrayi keilhacki Uaeler, 1926	SC82	EBW03
Scina wolterecki Wagler, 1926	SC82, BH05	EBW03
Scina tullbergi (Bovallius, 1885)		Hu56, OL02, EBW03
Scina similis Stebbing, 1895	SC82, BH05	EBW03
Scina nana Wagler, 1926	SC82, BH05	EBW03
Scina setigera Wagler, 1926	SC82?, BH05	EBW03
Scina excisa Wagler, 1926	SC82, BH05	EBW03
Scina damasi Pirlot, 1929	SC82, BH05	EBW03
Scina latifrons Wagler, 1926	SC82, BH05	EBW03
Scina pusilla Chevreux, 1919	SC82, BH05	EBW03
Scina inermis Chevreux, 1919		EBW03
Acanthoscina acanthodes (Stebbing, 1895)	SC82, BH05	EBW03
Infraorder Physocephalata Bowman & Gruner, 1973		
Superfamily Vibilioidea Bowman & Gruner, 1973		
Family Vibiliidae Dana, 1852		
Vibilia borealis Bate & Westwood, 1868		EBW03, PO
Vibilia gibbosa Bovallius, 1887		Hu56, OL02, EBW03
Vibilia robusta Bovallius, 1887		Bru81, EBW03
Vibilia viatrix Bovallius, 1887	Sho25[3], SC82, BH05	Hu56, EBW03
Vibilia armata Bovallius, 1887	SC82, Bri86, BH05	Hu56, OL02, EBW03, SH03, PO
Vibilia pyripes Bovallius, 1887		Bru81, SH03, EBW03

TABLE 1 (continued)

Taxa	Records from the Gulf of California[a]	Records from the Pacific Coast[a]
Vibilia propinqua Stebbing, 1888	SC82, SH03, BH05	Bru81, OL02, EBW03, SH03, PO
Vibilia australis Stebbing, 1888	SC82[4], GH04[4]	Bru81[5], OL02, EBW03[5], SH03
Vibilia antarctica Stebbing, 1888	SC82, BH05	EBW03
Vibilia cultripes Vosseler, 1901	SC82, BH05	Bru81, EBW03, SH03
Vibilia stebbingi Behning & Woltereck, 1912	SC82, BH05	Bru81, OL02, SH03, EBW03
Vibilia chuni Behning & Woltereck, 1912	SC82, BH05	Bru81, OL02, EBW03, SH03, PO
Vibilia wolterecki Behning, 1939	SH03	
Vibilia longicarpus Behning, 1913		SH03, PO
Family Paraphronimidae Bovallius, 1887		
Paraphronima gracilis Claus, 1879	SC82, BH05	Bru81, OL02, EBW03, PO
Paraphronima crassipes Claus, 1879	SC82, BH05	OL02, EBW03
Superfamily Cystisomatoidea Zeidler, 2003		
Family Cystisomatidae Willemöes-Suhm, 1875		
Cystisoma fabricii Stebbing, 1888	SC82, BH05	Hu56, EBW03
Superfamily Phronimoidea Bowman & Gruner, 1973		
Family Phronimidae Dana, 1852		
Phronima sedentaria (Forsskål, 1775)	SC82, BH05	Hu56, Bru81, OL02, EBW03
Phronima atlantica Guérin-Méneville, 1836	SC82, Bri86, BH05	Bru81, EBW03, PO
Phronima solitaria Guérin-Méneville, 1836	SC82, BH05	EBW03
Phronima stebbingi Vosseler, 1901		OL02, EBW03
Phronima curvipes Vosseler, 1901	SC82, Bri86, BH05	EBW03
Phronima colletti Bovallius, 1887		Hu56, EBW03
Phronima pacifica Streets, 1877	SC82, BH05	OL02, EBW03
Phronima bucephala Giles, 1887		OL02, EBW03, GFG08, PO
Phronima bowmani Shih, 1991	SC82[6], Bri86[6], BH05	Bru81[6], EBW03, PO
Phronima dunbari Shih, 1991	SC82[7], Bri86[7], BH05	Bru81[7], EBW03, PO
Phronimella elongata (Claus, 1862)	SC82, Bri86, BH05	EBW03, PO
Family Phrosinidae Dana, 1852		
Phrosina semilunata Risso, 1822	SC82, Bri86, BH05	Hu56, OL02, EBW03, PO
Anchylomera blossevillei Milne-Edwards, 1830	Sho25, SC82, BH05	Hu56, Bru81, EBW03, PO
Primno macropa Guérin-Méneville, 1836		EBW03
Primno brevidens Bowman, 1978	SC82, Bri86, BH05	Bow78, Bru81, OL02, EBW03
Primno latreillei Stebbing, 1888		Bow78, Bru81, OL02, EBW03, GFG08
Family Hyperiidae Dana, 1852		
Hyperia medusarum (Müller, 1776)		Bow73[8], OL02, EBW03
Hyperia galba (Montagu, 1815)		EBW03[9]
Hyperia spinigera Bovallius, 1889		Bow73, Bru81
Hyperia leptura Bowman, 1973	SC82, BH05	Bow73, EBW03

TABLE 1 (continued)

Taxa	Records from the Gulf of California[a]	Records from the Pacific Coast[a]
Themisto pacifica (Stebbing, 1888)		Bru81[10], OL02, EBW03, Bow60
Hyperoche medusarum (Kröyer, 1838)	SC82, BH05	Bru81, OL02, EBW03
Hyperoche martinezii (Müller, 1864)	SC82, BH05	OL02, EBW03
Hyperoche picta Bovallius, 1889		GFG08
Hyperoche mediterranea Senna, 1908		Bru81, OL02, EBW03
Hyperoche shihi Gasca, 2005	GH04[11], G05	
Family Lestrigonidae Zeidler, 2004		
Lestrigonus bengalensis Giles, 1887	SC82, BH05	Bow73, EBW03, GFG08, PO
Lestrigonus schizogeneios (Stebbing, 1888)	SC82, Bri86, BH05	Hu56[12], Bow73, Bru81, OL02, EBW03, GFG08, PO
Lestrigonus crucipes (Bovallius, 1889)		Bow73, PO
Lestrigonus latissimus (Bovallius, 1889)		Bow73, PO
Lestrigonus macrophthalmus (Vosseler, 1901)	SC82, BH05	Bow73, LO99, EBW03, PO
Lestrigonus schoemakeri Bowman, 1973	SC82, Bri86, BH05	Bow73, Bru81, OL02, EBW03, PO
Phronimopsis spinifera Claus, 1879	SC82, Bri86, BH05	OL02, EBW03, PO
Themistella fusca (Dana, 1852)	SC82, Bri86, BH05	Bow73, EBW03, PO
Hyperioides longipes Chevreux, 1900	SC82, Bri86, BH05	Hu56, Bow73, Bru81, OL02, EBW03
Hyperioides sibaginis (Stebbing, 1888)	SC82, Bri86, BH05	Bow73, EBW03, GFG08, PO
Hyperietta luzoni (Stebbing, 1888)	SC82, BH05	Bow73, Bru81, EBW03, PO
Hyperietta vosseleri (Stebbing, 1904)	SC82, Bri86, BH05	Bow73, Bru81, EBW03, PO
Hyperietta stebbingi Bowman, 1973	SC82, Bri86, BH05	Bow73, Bru81, EBW03
Hyperietta stephenseni Bowman, 1973	SC82, BH05	Bow73, EBW03, PO
Hyperietta parviceps Bowman, 1973		Bow73, Bru81, OL02, EBW03
Family Iulopidae Zeidler, 2004		
Iulopis mirabilis Bovallius, 1887		Bru81, EBW03
Family Dairellidae Bovalllius, 1887		
Dairella californica (Bovallius, 1885)	SC82[13], BH05[13]	Bru81, OL02, EBW03[13], PO
Superfamily Lycaepsoidea Bowman & Gruner, 1973		
Family Lycaepsoidae Chevreux, 1913		
Lycaeopsis themistoides Claus, 1879	SC82, Bri86, BH05	OL02, EBW03, GFG08, PO
Lycaeopsis zamboangae (Stebbing, 1888)	SC82[14], Bri86[14], BH05	Hu56, EBW03, GFG08, PO
Superfamily Platysceloidea Bate, 1862		
Family Pronoidae Claus, 1879		
Eupronoe maculata Claus, 1879	SC82, Bri86, BH05	EBW03
Eupronoe minuta Claus, 1879	SC82[15], BH05	Hu56, OL02, EBW03
Eupronoe armata Claus, 1879	SC82, Bri86, BH05	EBW03, PO

TABLE 1 (continued)

Taxa	Records from the Gulf of California[a]	Records from the Pacific Coast[a]
Pronoe capito Guérin-Méneville, 1836	SC82, BH05	EBW03
Parapronoe crustulum Claus, 1879	SC82[16], BH05	EBW03
Parapronoe parva Claus, 1879	Sc82[17], Sho25[18], BH05[19]	Hu56[17], Bru81[17], OL02, EBW03[19], GFG08, PO
Parapronoe campbelli Stebbing, 1888	SC82, BH05	EBW03
Paralycaea gracilis Claus, 1879	SC82[20], BH05	Hu56, OL02, EBW03, GFG08, PO
Paralycaea hoylei Stebbing, 1888	SC82, Bri86	EBW03, PO
Family Anapronoidae Bowman & Gruner, 1973		
Family Lycaeidae Claus, 1879		
Lycaea pulex Marion, 1874	BH05	OL02, EBW03, GFG08, PO
Lycaea pauli Stebbing, 1888		EBW03
Lycaea nasuta Claus, 1879	SC82, BH05	EBW03
Lycaea serrata Claus, 1879	SC82, Bri86, BH05	EBW03, PO
Lycaea pachypoda (Claus, 1879)	SC82[21], BH05	OL02, EBW03, PO
Lycaea vincentii Stebbing, 1888		GFG08, PO
Lycaea bajensis Shoemaker, 1925	Sho25, SC82	EBW03, PO
Lycaea bovalloides Stephensen, 1925	SC82, Bri86	EBW03, PO
Lycaea bovalli Chevreux, 1900		PO
Simorhynchotus antennarius (Claus, 1871)	SC82, Bri86, BH05	Bru81, OL02, EBW03, GFG08, PO
Family Tryphanidae Bovallius, 1887		
Tryphana malmi Boeck, 1870		Bru81, OL02, EBW03
Family Brachyscelidae Stephensen, 1923		
Brachyscelus crusculum Bate, 1861	Sho25, SC82[22], Bri86, GH04, BH05	Bru81, EBW03, GFG08, PO
Brachyscelus globiceps (Claus, 1879)	SC82, Bri86, BH05	EBW03, PO
Brachyscelus rapax (Claus, 1879)	BH05	EBW03
Brachyscelus rapacoides Stephensen, 1925	SC82	EBW03, PO
Euthamneus rostratus (Bovallius, 1887)	SC82[23], Bri86[23], GH04, BH05	EBW03, PO
Family Oxycephalidae Bate, 1861		
Oxycephalus piscator Milne-Edwards, 1830	SC82, Bri86, BH05	EBW03
Oxycephalus clausi Bovallius, 1887	SC82, Bri86, GH04, BH05	OL02, EBW03, GFG08, PO
Oxycephalus latirostris Claus, 1889		EBW03
Streetsia challengeri Stebbing, 1888	SC82, BH05	Bru81, OL02, EBW03
Streetsia steenstrupi (Bovallius, 1887)	SC82, BH05	Bru81, EBW03
Streetsia porcella (Claus, 1879)		Bru81, EBW03, PO
Streetsia mindanaonis Stebbing, 1888	SC82, BH05	Bru81, EBW03, PO
Leptocotis tenuirostris (Claus, 1871)	SC82, BH05	EBW03, PO
Calamorhynchus pellucidus Streets, 1878	SC82, BH05	EBW03
Glossocephalus milneedwardsi Bovallius, 1887	SC82, BH05	Bru81, EBW03, GFG08, PO
Cranocephalus scleroticus (Streets, 1878)	SC82, BH05	Bru81, EBW03, PO
Rhabdosoma armatum (Milne-Edwards, 1840)	SC82, BH05	EBW03
Rhabdosoma whitei Bate, 1862	SC82, Bri86, BH05	S1878, EBW03, GFG08, PO
Rhabdosoma brevicaudatum Stebbing, 1888	SC82, BH05	EBW03
Rhabdosoma minor Fage, 1954	SC82, BH05	EBW03, PO

TABLE 1 (continued)

Taxa	Records from the Gulf of California[a]	Records from the Pacific Coast[a]
Family Platyscelidae Bate, 1862		
Platyscelus ovoides (Risso, 1816)		EBW03
Platyscelus serratulus Stebbing, 1888	Sho25[24], SC82, Bri86, BH05	Hu56, EBW03, PO
Platyscelus crustulatus (Claus, 1879)		PO
Hemityphis tenuimanus Claus, 1879	SC82[25], Bri86[26], BH05[25]	EBW03[25,27]
Paratyphis maculatus Claus, 1879	SC82, BH05	EBW03
Paratyphis parvus Claus, 1887		PO
Paratyphis spinosus Spandl, 1924	SC82, BH05	EBW03
Tetrathyrus forcipatus Claus, 1879	Sho25[28], SC82, BH05	Bru81, EBW03, GFG08, PO
Tetrathyrus arafurae Stebbing, 1888	SC82, BH05	EBW03
Amphithyrus bispinosus Claus, 1879	SC82, Bri86, BH05	EBW03, GFG08, PO
Amphithyrus similis Claus, 1879	SC82, BH05	EBW03
Amphithyrus muratus Volkov, 1982		PO
Amphithyrus sculpturatus Claus, 1879	Sho25[29], SC82[29], Bri86, BH05	EBW03, PO
Family Parascelidae Claus, 1879		
Schizoscelus ornatus Claus, 1879	SC82, BH05	EBW03
Thyropus sphaeroma (Claus, 1879)	SC82, BH05	EBW03, PO
Thyropus similis (Stephensen, 1925)	SC82	
Parascelus edwardsi Claus, 1879	Sho25[30], SC82[31], Bri86[32], GH04[33], BH05[34]	Hu56[33], Bru81[31], OL02, EBW03[32], GFG08, PO

[a] Abbreviations of the works included in this analysis: Bow60, Bowman (1960); Bow73, Bowman (1973); Bow78, Bowman (1978); Bri86, Brinton et al. (1986); Bru81, Brusca (1981); BH05, Brusca and Hendrickx (2005); EBW03, Escobar-Briones and Winfield (2003); GH04, Gasca and Haddock (2004); G05, Gasca (2005); GFG08, Gasca and Franco-Gordo (2008); Hu56, Hurley (1956); OL02, Ohman and Lavaniegos (2002); PO, pers. obs.; SC82, Siegel-Causey (1982); SH03, Shih and Hendrycks (2003); Sho25, Shoemaker (1925); S1878, Streets (1878).

Notes: 1, Probably *L. loveni loveni*; 2, as *Lanceola aestiva* Stebbing, 1888 (see Vinogradov et al. [1996]); 3, as *Vibilia californica* Holmes, 1908 (see Zeidler [2003*a*]); 4, as *Vibilia wolterecki* Behning, 1939 (see Zeidler [2003*a*]); 5, also as *Vibilia wolterecki* Behning, 1939 (see Zeidler [2003*a*]); 6, as *Phronima bucephala* Giles, 1877 (see Shih [1991]); 7, as *Phronima stebbingi* Vosseler, 1901 (see Shih [1991]); 8, as the *hystrix* form by Bovallius, 1889; 9, arctic-boreal form, regional records are doubtful (see Vinogradov et al. [1996]); 10, as *Parathemisto pacifica* Stebbing, 1888 (see Zeidler [2004*b*]); 11, as *Hyperoche medusarum* (Kröyer, 1838) (see Gasca [2005]); 12, as *Hyperia bengalensis* (Giles) (see Brusca [1981]); 13, as *D. californica* Bovallius, 1887 and *D. latissima* Bovallius, 1887 (see Zeidler [2004*b*]); 14, also as *Lycaeopsis neglecta* Pirlot, 1929 and *L. pauli* Stebbing, 1888 (see Zeidler [2004*a*]; 15, also as *Eupronoe pacifica* Stebbing, 1888 (see Vinogradov et al. [1996]); 16, also as *Parapronoe clausioides* Stebbing, 1888 (see Vinogradov et al. [1996]); 17, as *Sympronoe parva* Stebbing, 1888 (see Vinogradov et al. [1996]); 18, as *Sympronoe anomala* Shoemaker, 1925 (see Vinogradov et al. [1996]); 19, as *Parapronoe parva parva* Claus, 1879 and *Parapronoe parva septenarticulata* (Stephensen, 1925) (see Zeidler [1998]); 20, also as *Paralycaea newtoniana* Bovallius, 1887 (see Harbison et al. [1977]); 21, as *Pseudolycaea pachypoda* Claus, 1879 (see Vinogradov et al. [1996]); 22, also as *B. acuticaudatus* Stebbing, 1888 (see Vinogradov et al. [1996]); 23, as *Thamneus platyrrynchus* Stebbing, 1888 (see Vinogradov et al. [1996]); 24, as *P. dubius* Shoemaker, 1925 (see Vinogradov et al. [1996]); 25, as *Tetrathyrus pulchellus* Barnard, 1930 and as *Hemityphys rapax* (Milne-Edwards, 1930) (see Zeidler [1996]); 26, as *Tetrathyrus pulchellus* Barnard, 1930 (see Zeidler [1996]); 27, as *Hemiscelus diplochelatus* Stewart, 1913 (see Zeidler [1998]); 28, as *T. sanctijosephi* Shoemaker, 1925 (see Vinogradov et al. [1996]); 29, as *A. orientalis* Stebbing (see Vinogradov et al. [1996]); 30, as *P. zebu* Stebbing (see Zeidler [1998]); 31, as *Thyrophus edwardsi* (Claus, 1879) and *T. thyphoides* (Claus, 1879) (see Zeidler [1998]); 32, as *T. edwardsi* (Claus, 1879) (see Zeidler [1998]); 33, as *P. thyphoides* Claus, 1879 (see Zeidler [1998]); 34, also as *P. thyphoides* Claus, 1879 (see Zeidler [1998]).

Up to seven species have not been included in previous accounts of the Mexican Pacific, including the most recent one by Brusca and Hendrickx (2005) (Table 1). Two of these species, *Lycaea vincentii* (ECO-CHZ 03042) and *Hyperoche picta* (ECO-CHZ 03542), have been recorded previously but from adjacent waters of the Pacific and were recorded off the coasts of the Mexican state of Jalisco (Gasca and Franco-Gordo 2008; pers. obs.). The record of *Vibilia borealis* (ECO-CHZ 03126) is regarded as new in the MP although

the species was mentioned by Escobar-Briones and Winfield (2003), but there is no evidence of the source supporting this record. The remaining four species, *Lycaea bovalli* (ECO-CHZ 03148), *Platyscelus crustulatus* (ECO-CHZ 03545), *Paratyphis parvus* (ECO-CHZ 03099), and *Amphythyrus muratus* (ECO-CHZ 03110), are new records in the Mexican waters of the Pacific (pers. obs).

Based on the available data, the Gulf of California harbors the highest number of species (114) recorded in Mexican waters of the Pacific, whereas the northern sector of the Pacific coast (north from 22° 52′ N) off Baja California has fewer species (87); the central sector of the Mexican tropical Pacific zone is known to harbor 68 species. There are only six records of hyperiids from the southernmost areas of the Mexican tropical Pacific, off the coasts of Guerrero, Oaxaca, and Chiapas (Figure 1).

A comparative analysis of the records within the area showed that up to 75 species are found in both the Gulf of California and off the Baja California coast. There are 30 species that have been recorded from the gulf only, and another group includes 30 species that have been found only on the Pacific coast north from 17° 50′ N. The gulf and the tropical sectors of the Mexican Pacific coast share eight species only; five species have been reported exclusively from the tropical Pacific area.

Taxonomic Remarks

The current taxonomy of the Hyperiidea is highly dynamic, and several changes have taken place as a result of recent revision works in different families (i.e., Zeidler 2003*a*,*b*, 2004*a*,*b*, 2006). Many of the oldest regional names/records have been changed; for instance, only three (*Anchylomera blossevillei*, *Lycaea bajensis*, and *Brachyscelus crusculum*) of the nine nominal species mentioned by Shoemaker (1925) retained the name originally used by the author (Table 1). The analysis of the records in the MP and the synonymies of the species indicate that up to 31 species recorded in the literature examined (Table 1) are invalid names and thus were excluded from the updated account but were included with their corrected names. Some of the invalid names were retained in several contributions and even in the most recent accounts (i.e., Brusca 1981, Siegel-Causey 1982, Escobar-Briones and Winfield 2003, Brusca and Hendrickx 2005). Overall, the number of invalid names represents 21% of the previous, unrevised lists.

There are some interesting records that are commented upon in more detail here. One of these is *Lycaea bajensis*, originally described from the Gulf of California by Shoemaker (1925); it was soon synonymized to *L. pulex* by Hurley (1956) and Vinogradov et al. (1996) and successively included as such in the regional listings (Hurley 1956, Brusca and Hendrickx 2005). However, from the taxonomic revision of the genus by Harbison and Madin (1976), it was considered as a separate, valid species. It has been recorded in the area only twice after its description (Siegel-Causey 1982, Gasca and Franco-Gordo 2008) but was reported from other geographical areas including Australian waters (Zeidler 1998) and the Sargasso Sea (Gasca 2007). Local records of *L. pulex* in the region could refer to either of three morphologically similar species, *L. pulex*, *L. bajenis*, and *L. vincentii;* hence, individual records should be checked (Gasca and Franco-Gordo 2008). Other species with taxonomic complexities are *Parascelus edwardsi* and *Hemityphis tenuimanus*, in reference to which several other different names have been used in the literature (see Table 1).

In the checklist by Escobar-Briones and Winfield (2003), some genera and species (*Vibilia armata*, *V. australis*, *Phronima curvipes*, *P. dunbari*) are misplaced in families to which they do not belong (i.e., Synopyiidae, Lanceolidae, and Phronimidae). They also included a record of *Oxycephalus pellucidus* Streets, 1878; however, this binomen has not been assigned to any known species. Another oxycephalid, *Calamorhynchotus pellucidus* Streets, 1878, is currently valid and was included as such by Escobar-Briones and Winfield (2003).

All the entries of species whose taxonomic status or name have changed are referred to

footnotes in Table 1. Some of the records included are from literature sources only, and the original ones are not explicitly stated (see Table 1); hence, these particular records are not confirmed for the MP (i.e., *Mimonectes diomedae*, *Vibilia borealis*, and *Lanceola loveni grossipes*) and thus should be reexamined.

DISCUSSION

The most diverse infraorder in this account, the Physocephalata, is represented in the MP by a diverse array of 119 species; these are mostly epipelagic forms, whereas the order Physosomata, predominantly deep-living, is represented by 31 species only. This difference is attributed to the emphasis given to sampling the upper layers (0–200 m) in the region, which have been surveyed intensely in most instances; relatively less attention has been given to the meso- and bathypelagic zooplankton fauna. Only a few surveys have reached these layers (i.e., Hurley 1956, Gasca and Haddock 2004). Currently, the deep-living Physosomata represent approximately 38% of the known species of the order Hyperiidea. In this checklist they accounted for 21% of the species recorded in the MP, and more than half of these are from the Gulf of California, where the deep-living hyperiid fauna is better known. The diversity of this group in the region could have been underestimated as a result of the sampling methods used. Future research in the area should emphasize the subsurface layers; these efforts should yield many new records of the hyperiid fauna, particularly in the tropical Pacific.

The latitudinal distribution of the number of species recorded in the MP is asymmetrical when comparing the different sectors. The gulf area, together with the Pacific coast off Baja California, harbors the highest number of species records (136 species). This is not related to a latitudinal diversity gradient but is clearly a result of the greater sampling effort in the California Current and the Gulf of California. Despite this general trend in the California subregions, surveys on the hyperiids are relatively scarce but enough to make a sharp difference with respect to the adjacent tropical areas of the MP. The central part of the MP, south of the Gulf of California from 22° 52′ N, had a noticeable decrease in the number of species of hyperiids recorded (68 species); the hyperiid fauna of this area remained almost completely unknown for many decades after the four species recorded by Hurley (1956) (*V. armata*, *V. viatrix*, *A. blossevillei*, and *Parapronoe parva*) off the coasts of Michoacán (17° 50′ N) and *Vibilia cultripes* from off the coast of Colima (16° 53′ N) (Shih and Hendrycks 2003). Most of the records presented herein from this central sector resulted from recent surveys in shelf and oceanic areas off the states of Jalisco and Nayarit (Gasca and Franco-Gordo 2008) and personal observations from samples obtained off Jalisco and Colima. Clearly, the least-known hyperiid fauna in the Mexican waters of the Pacific is that of the lowest latitudes, south from 17° 50′ N, off the coasts of three Mexican states, to the border with Guatemala (14° 31′ N); there are only six records from this area, all of the genus *Vibilia* (Shih and Hendrycks 2003).

The species recorded as the most abundant in the Gulf of California are *Lestrigonus bengalensis*, *Primno brevidens*, *L. shoemakeri*, *Vibilia armata*, and *Thyropus edwardsi* (Siegel-Causey 1982). In the California Current zone off Baja California, the group of most abundant species is somewhat different, with *P. brevidens*, *Paraphronima gracilis*, *V. armata*, *Phronimopsis spinifera*, *Phronima sedentaria*, *L. schizogeneios*, and *L. shoemakeri* being among the most abundant (Lavaniegos and Ohman 1999). In the tropical part of the Mexican Pacific the group of dominant species is also different: *L. bengalensis* and *Hyperioides sibaginis* (Gasca and Franco-Gordo 2008). Similar variations at a subregional scale were detected by Vinogradov (1991) from the Southern Pacific Gyre. According to Vinogradov (1999), any part of the Pacific Ocean harbors a distinct group of species that includes *Phronima atlantica*, *Phronimella elongata*, *Phrosina semilunata*, a species of *Primno*, *Scina crassicornis*, *Anchylomera blossevillei*, *Hemityphis tenuimanus*, *Vibilia armata*, and a species of *Brachyscelus* (Vinogradov 1999). A closer analysis of the regional hyperiid composition shows that each subregion has a distinct array of species

and confirms the need of studying the local faunas in more detail to complete the regional profile of diversity patterns in the group.

The number of species recorded from the Mexican waters of the eastern Pacific indicates that this area is now among the best studied in the region; approximately 68% of the known species from the Pacific Ocean (Vinogradov et al. 1996) occur in the MP. The 68 species recorded from the tropical areas of the MP represent nearly 40% of the species known from the tropical Pacific (Vinogradov 1991) and show a high affinity with those of other tropical areas of the Pacific; nearly 95% of the species recorded from the South Pacific Gyre, also a fully tropical system (Vinogradov 1991), have been recorded in the MP.

Overall, species richness from the MP is comparable with that known from other subregions of the Pacific Ocean, including the Southern Gyre (Vinogradov 1991: 119 species) and the North Pacific Gyre (Shulenberger 1977: 83 species). The number of species from the tropical areas is still low when compared with accounts from other tropical areas of the Mexican seas; for instance, ca. 100 species have been recorded in the Gulf of Mexico (LeCroy et al. 2008) and 62 from the western Caribbean Sea (Gasca and Shih 2001, 2003, Gasca and Suárez-Morales 2004). The hyperiid fauna of these large, unstudied areas of the southern MP are likely to yield important information to reveal the latitudinal patterns of diversity along the eastern Pacific.

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