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New geographic records of Harpacticoida (Crustacea: Copepoda) from the Persian Gulf and the Gulf of Oman, Iran

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Abstract
The meiobenthic harpacticoids of the Persian Gulf and the Gulf of Oman has been almost unknown. During October 2014 to September 2016, interstitial and phytal harpacticoids were collected from tide pools in 30 different localities along the Iranian coast of the Persian Gulf and the Gulf of Oman. The new information on the distribution of 26 species and 12 families is provided, here. The most species-rich family was Laophontidae with seven species, followed by Miraciidae with four species. In this paper, all the species were considered new records for the area. Furthermore, the first checklist of meiobenthic Harpacticoids is provided.

Key words: *Harpacticoida, Meiobenthics, New records, Persian Gulf, Gulf of Oman, Iran.*

INTRODUCTION

Developing information on the biodiversity of copepods in the Persian Gulf and the Gulf of Oman will help to explore changes in the distribution of marine biota of the area. However, there are few published works and taxonomic data that specifically devoted to this taxon in Iranian waters. Of the few studies on Copepods, mostly restricted on zooplankton and meiofauna communities, and also recording parasite copepods (Farhadian & Pouladi, 2014; Taheri-Dezfouli *et al*., 2016; Hedayati *et al*., 2017; Sepahvand *et al*., 2016; Sepahvand *et al*., 2019). The first study concerned with the marine zooplanktons of the Persian Gulf and the Gulf of Oman, which included marine harpacticoids as well, was performed by Al-Yamani (2011). In this work, four harpacticoid species were reported from the marine zooplankton community of Kuwait waters. Later, the marine harpacticoids were recorded from Iranian waters by Peygan *et al*. (2014). Harpacticoids are as yet unknown from meiofauna and have rarely been reported from planktonic habitat in general. In this study, a preliminary investigation along the Iranian coasts of the Persian Gulf and the Gulf of Oman was performed for documentation of the diversity of meiobenthic harpacticoids. The first contribution concerned with the taxonomy and diversity of meiobenthic copepods of Iran was performed by Nazari *et al*. (2018a, 2018b), three new species and one new record belong to the order Canuelloida Khodami *et al*. 2017 were identified and described from littoral zone of the Persian Gulf and the

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Gulf of Oman. Here, in this contribution, 26 new records of harpacticoids along the Iranian southern coastline are recorded, including the point locality for each species.

MATERIAL AND METHODS

Meiobenthic harpacticoids, reported in this study, were collected from October 2014 to September 2017, from both sediments and seaweeds (Table 1; Fig. 1). Samples were carried out from the littoral zone during low tide using a 60 cc syringe. Sediments were sieved by using sieve with 200 µm and 38 µm mesh size. Macroalga was collected by plastic bag to investigate harpacticoids colonizers. After sorting from sediments and alga, collected specimens were preserved in 96% alcohol for taxonomic investigations. Identifications were aided using a Leica microscope equipped with Differential Interference Contrast (DIC) at 1000 ×magnification and identification keys (Huys *et al*., 1996; Boxshall & Halsey, 2004; Wells, 2007; Lang, 1948). Moreover, one male and one female of each species were chosen for CLSM photos. Specimens were stained in a mixture of 1:1 Acid Fuchsin and Congo Red overnight (Michels & Büntzow, 2010). Photos were taken by Confocal Laser Scanning Microscope Leica TCS SP5 equipped with a Leica DM500 B. Abbreviations used in the text: EXP, exopod; ENP, endopod; P1-P4, first to fourth swimming legs.

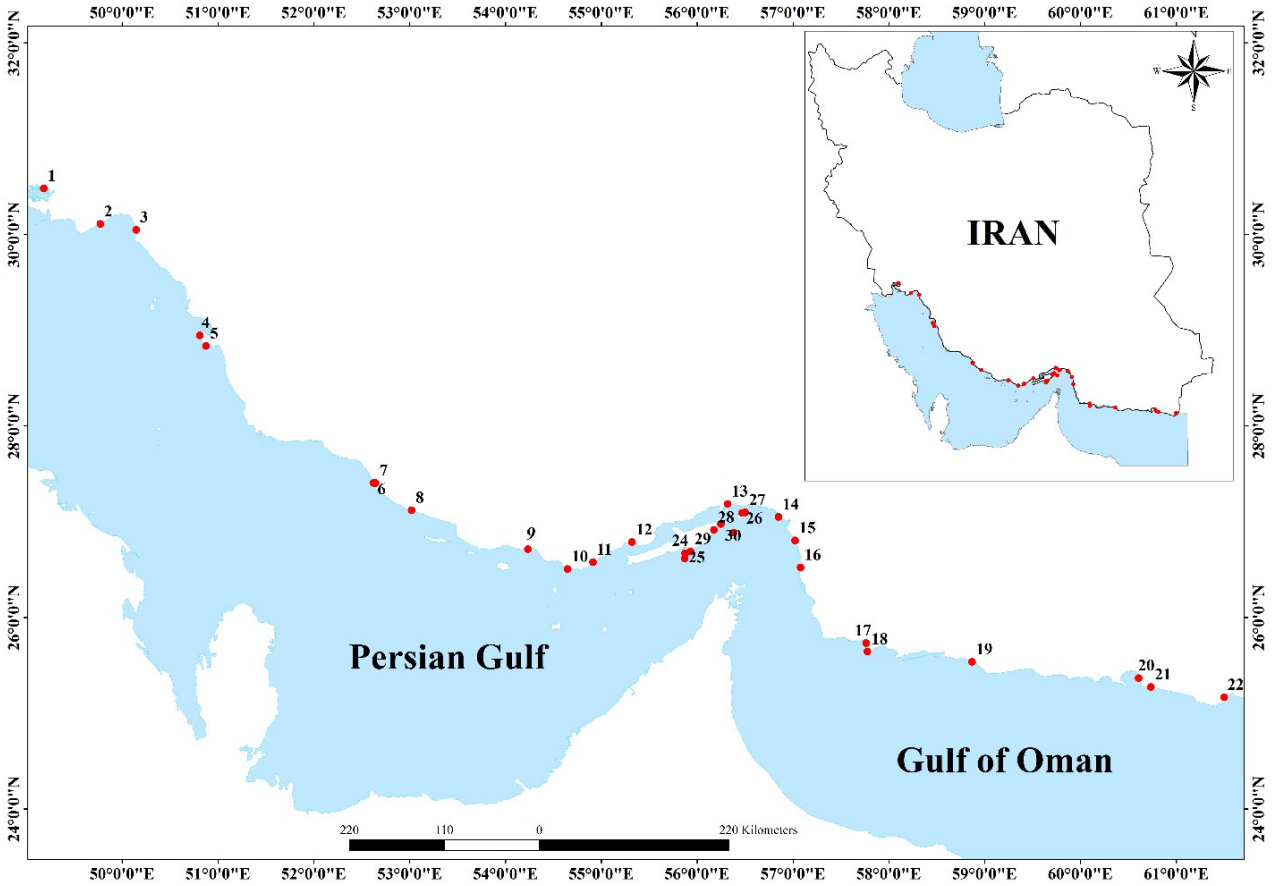

FIGURE 1. Map of sampling sites of the species records in the Persian Gulf and Gulf of Oman.

TABLE 1. Coordinates of the sampling sites and date of sampling.

Map Code	Locality	Longitude	Latitude	Date
1	Mahshahr	30°28'45.17"N	49°11'2.05"E	May 2016
2	Hendijan	30° 6'31.81"N	49°46'20.48"E	May 2016
3	Dylam	30° 2'52.51"N	50° 8'43.97"E	May 2016
4	Bushehr	28°56'44.25"N	50°48'36.86"	May 2016
5	Halileh	28°50'4.18"N	50°52'32.47"E	May 2016
6	Nayband Bay	27°24'6.66"N	52°37'27.22"E	April 2016
7	North Haleh	27°24'6.12"N	52°38'41.16"E	April 2016
8	Parsian	27° 7'9.05"N	53° 1'15.41"E	April 2016
9	Moqam	27° 40' 01"N	52 ° 19' 54"E	April 2016
10	Bostaneh	26°30'17.16"N	54°38'55.75"E	April 2016
11	Bandar Lengeh	26°34'31.99"N	54°54'52.56"E	April 2016
12	Berke Soflin	26°47'11.79"N	55°19'18.20"E	April 2016
13	Bandar Abbas	27°10'59.01"N	56°19'10.19"E	September 2016 December 2014
14	Kolahi	27° 2'54.88"N	56°51'0.21"E	October 2015
15	Koohestak	26°48'12.10"N	57° 1'22.33"E	October 2015 March 2016
16	Sirik	26°31'18.94"N	57° 4'49.91"E	October 2015
17	Old Jask	25°43'48.16"N	57°45'48.99"E	March 2016
18	Jask	25°38'28.01"N	57°46'40.29"E	October 2015
19	Gvanak	25°32'6.35"N	58°52'11.69"E	October 2015
20	Tis	25°21'52.25"N	60°36'29.90"	October 2015
21	Ramin	25°16'19.94"N	60°44'7.72"E	October 2015
22	Gowatr	25° 9'55.92"N	61°30'6.59"E	October 2015
23	Larak Island	26°53'7.57"N	56°22'57.47"E	April 2015
24	Hangam Island	26°40'12.22"N	55°52'30.33"E	April 2016
25	Hangam Island	26°36'49.11"N	55°52'14.63"E	April 2016
26	Hormoz Island	27° 3'45.66"N	56°30'5.12"E	February 2015
27	Hormoz Island	27° 5'24.97"N	56°28'11.54"E	February 2015
28	Qeshm Island	26°54'47.96"N	56°10'36.29"E	December 2015
29	Qeshm Island	26°41'14.07"N	55°55'55.45"E	December 2015
30	Qeshm Island	26°58'30.42"N	56°14'57.51"E	October 2014

RESULTS

In total, 2748 adult harpacticoids from 26 localities were examined in this study and 26 species belonging to 12 families were identified. The studied taxa are listed here:

Order HARPACTICOIDA Sars, 1903
Family Ameiridae Monard, 1927
***Ameira* cf. *parvula* (Claus, 1866) (Figs. 2 A-D)**
Type. *Canthocamptus parvula* C. Claus 1866, *Schr Ges. Beford. Ges. Naturw. Marburg*. Supplement 9: 1-34.
Distribution of the species. Cosmopolitan. Reported from Germany (Claus, 1866; Pesta, 1932; Kunz, 1935; Lang, 1948); Isle of Man (Moore, 1976); Carolina Island (Vervoort, 1964); North Sea Islands (Mielke, 1975); Andaman and Nicobar Islands (Wells & Rao, 1987); Bulgaria (Apostolov &

Marinov, 1988); Sea of Marmara (Noodt, 1955a; Karaytuğ & Sak, 2006); Mediterranean Sea (Karaytuğ & Sak, 2006; Alper *et al*., 2010); Korea (Chang, 2007).
Distribution in Iran. Bushehr, Nayband Gulf, North Haleh, Parsian, Bostaneh, Bandar Lengeh, Berke Soflin, Koohestak, Old Jask, Jask, Tis, Larak, Hengam, Hormoz, Qeshm. New to the Persian Gulf and the Gulf of Oman (Fig. 1).

Family Dactylopusiidae Lang, 1936
***Dactylopusia tisboides* Claus, 1863 (Figs. 2 E-H)**
Type. *Dactylopus tisboides* C. Claus 1863. *Die freilebenden Copepoden*, pp. 127, t. 16, fig. 24-28. Leipzing.
Distribution of the species. Cosmopolitan species. Mediterranean Sea (Claus, 1863); Nicobar Islands (Sewell, 1940); Sea of Marmara (Noodt, 1955a); Caroline Islands (Vervoort, 1964); Norway (Sars, 1903); British Isles (Brady, 1910); Port Taufiq, Kabret (Gurney, 1927a); Banyuls-Sur-Mer, France (Monard, 1928); Bermuda (Willey, 1935); Australia (Nicholls, 1942); Argentina (Pallares, 1968); Red Sea (Nicholls, 1944); Bulgaria (Apostolov, 1973); Mediterranean Sea (Pulta *et al*., 2009; Alper *et al*., 2010).
Distribution in Iran. Kangan, North Haleh, Parsian, Moqam, Bostaneh, Larak, Hormoz, Qeshm.
New to the Persian Gulf and the Gulf of Oman (Fig. 1).

***Diarthrodes cystoecus* Fahrenbach, 1954 (Figs. 2 I-L)**
Type. *Diarthrodes cystoecus* W. H. Fahrenbach, 1954, *J, Wash*. *Acad. Sci*., 44; 326.
Distribution of the species. North America (Fahrenbach, 1954, 1962); Tierra del Fuego (Pallares, 1977); Maldive Islands (Sewell, 1940); Madras (Krishnaswamy, 1957); Andaman and Nicobar Islands (Wells & Rao, 1987).
Distribution in Iran. Bushehr, Nayband Gulf, Parsian, Bostaneh, Bandar Lengeh, Berke Soflin, Larak, Hengam, Hormoz, Qeshm. New to the Persian Gulf and the Gulf of Oman (Fig. 1).

***Paradactylopodia brevicornis* (Claus, 1866) (Fig. 3 A-D)**
Type. *Dactylopus brevicornis* C. Claus, 1866. *Schr. Ges.* Beford. *Ges. Naturw. Marburg*, suppl. 1:29.
Distribution of the species. Germany (Claus, 1866); Bermuda (Willey, 1935); Nicobar Islands (Sewell, 1940); Sea of Marmara (Noodt, 1995a); Canary Islands (Noodt, 1955b); Karelian coast of White Sea (Chislenko, 1967); Argentina (Pallares, 1975); Andaman and Nicobar Islands (Wells & Rao, 1987); Florida (Walters, 1991); Mediterranean Sea (Pulat *et al*., 2009).
Distribution in Iran. Bostaneh, Bandar Lengeh, Berke Soflin, Bandar Abbas, Koohestak, Old Jask, Jask, Tis, Larak, Hengam, Hormoz, Qeshm. New to the Persian Gulf and the Gulf of Oman (Fig. 1).

Family Harpacticidae Dana, 1846
***Harpacticus ponticus* Marcus, 1967 (Figs. 3 E-H)**
Type. *Harpacticus ponticus* A. Marcus, 1967. *Trav*. *Mus. Hist. nat. Gr. Antipa*, 7: 29-38, figs. 1-4.
Distribution of the species. Black Sea (Marcus 1967).
Distribution in Iran. Mahshahr, Hendijan, Bushehr, Nayband Gulf, North Haleh, Parsian, Moqam, Berke Soflin, Bandar Abbas, Kolahi, Sirik, Old Jask, Jask, Larak, Hormoz, Hengam, Qeshm. New to the Persian Gulf and the Gulf of Oman (Fig. 1).

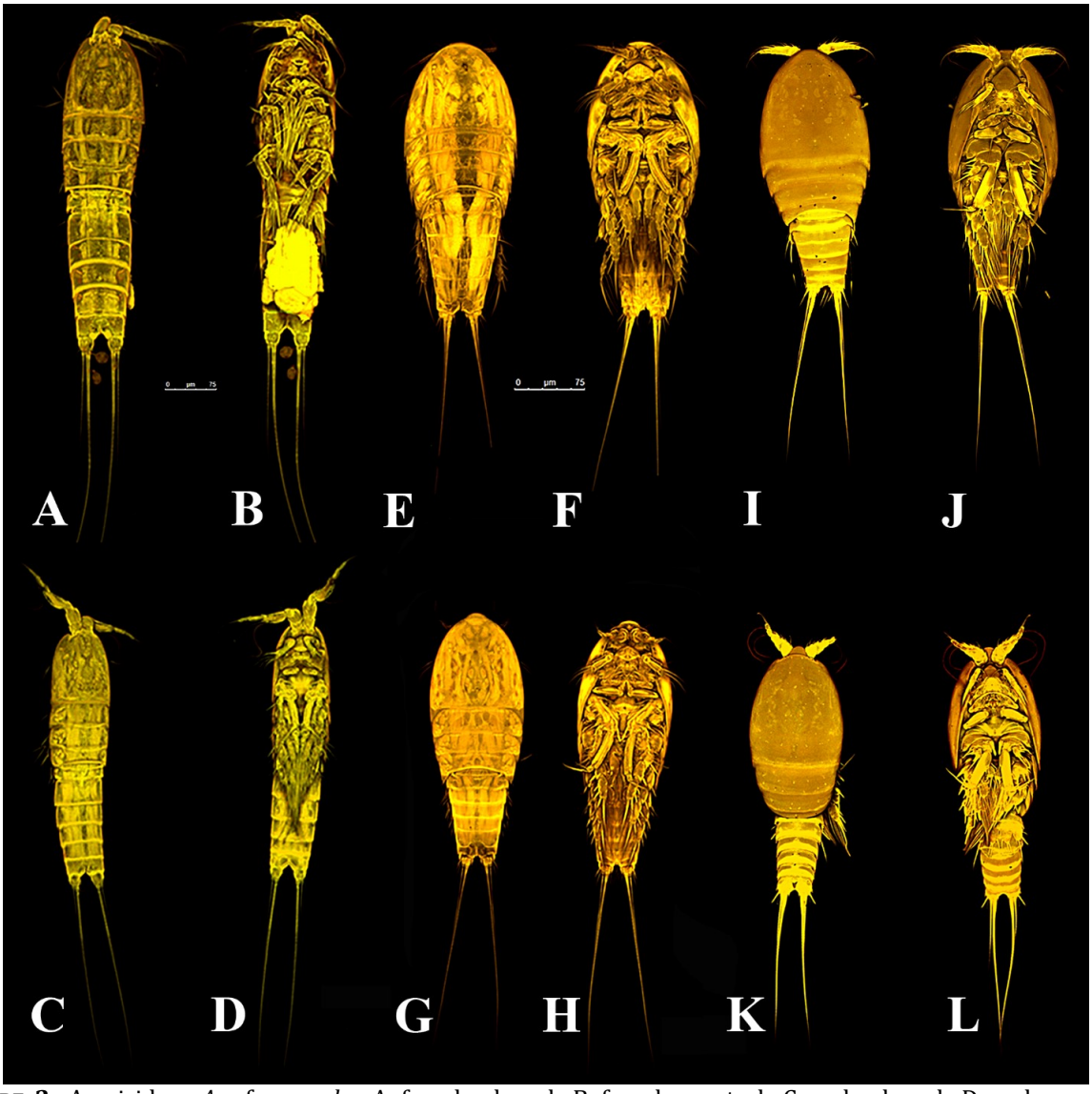

FIGURE 2. Ameiridae: *A.* cf. *parvula*: A female dorsal, B female ventral, C male dorsal, D male ventral, Dactylopusiidae: *D. tisboides*: E female dorsal, F female ventral, G male dorsal, H male ventral, Dactylopusiidae: *D. cystoecus*: I female dorsal, J female ventral, K male dorsal, L male ventral. Scale: 75 µm.

Family Laophontidae Scott T., 1904

***Laophonte confusa* Decho & Fleeger, 1986 (Figs. 3 I-L)**

Type. *Laophonte confusa* A. W. Decho & J. W. Fleeger, 1986. *Am. Microsc. Soc*. 105(1): 31-37.

Distribution of the species. Florida Keys (Decho & Fleeger 1986); Gulf of Mexico (Suárez-Morales *et al*. 2009).

Distribution in Iran. Nayband Gulf, North Haleh, Parsian, Moqam, Berke Soflin, Bandar Abbas, Old Jask, Qeshm. New to the Persian Gulf and the Gulf of Oman (Fig. 1).

FIGURE 3. Dactylopusiidae: *P. brevicornis*: A female dorsal, B female ventral, C male dorsal, D male ventral. Scale: 75 µm.; Harpacticoidae: *H. ponticus*: E female dorsal, F female ventral, G male dorsal, H male ventral. Scale: 100 µm; Laophontidae: *L. confosa*: I female dorsal, J female ventral, K male dorsal, L male ventral, Scale: 75.

***Laophonte cornuta* Philippi, 1840 (Figs. 4 A-D)**
Type. *Laophonte cornuta* A. Philipi, 1840. *Arch. Naturgesch.* 5: 195.
Distribution of the species. Cosmopolitan. Recorded from Maldive Archipelago (Sewell, 1933); Red Sea (Nicholls, 1944; Noodt, 1964); Dillon Beach of California (Lang, 1965); Japan (Ito, 1968); Andaman and Nicobar Islands (Wells & Rao, 1987); Belgium (Muller, 2004); China (Liu & Liu, 2008); Gulf of Mexico (Suárez-Morales *et al*., 2009); New Zealand (Webber *et al*., 2010); Mediterranean Sea (Pulat *et al*., 2009).
Distribution in Iran. Bushehr, Nayband Gulf, North Haleh, Parsian, Bostaneh, Berke Selfin, Tis, Gowatr, Larak, Hengam, Hormoz, Qeshm. New to the Persian Gulf and the Gulf of Oman (Fig. 1).

***Lipomelum heteromelum* Fiers, 1986 (Fig. 4 E-H)**
Type. *Lipomelum heteromelum* F. Fiers, 1986, *Bijd. Dierk.* 56(1).132-164.
Distribution of the species. West Indian Islands, Venezuela, Bahamas and Netherlands Antilles (Fiers 1986).
Distribution in Iran. North Haleh. New to the Persian Gulf and the Gulf of Oman (Fig. 1).

***Paralaophonte brevirostris* (Claus, 1863) (Figs. 4 I-L)**
Type. *Cleta brevirostris* C, Claus, 1863. *Die Freilebenden Copepodn mit Besonderer Berucksichtigung der Fauna Deutschlands, der Nordsee und des Mittelmeers:* 124.
Distribution of the species. North Sea (Claus, 1863); Chesapeake Bay (Yeatman, 1970); England (Hamond, 1972); Norway (Sars, 1908); Nicobar Islands (Sewell, 1940); Andaman and Nicobar Islands (Wells & Rao, 1987); Mediterranean (Karaytuğ & Sak 2006; Pulat *et al*., 2009), Black Sea (Kaymak *et al*., 2012).
Distribution in Iran. Bushehr, Halileh, Kangan, Nayband Gulf, North Haleh, Parsian, Moqam, Bostaneh, Bandar Lengeh, Berke Soflin, Bandar Abbas, Kolahi, Koohestak, Old Jask, Jask, Gvanak, Tis, Gowatr, Larak, Hormoz, Hengam, Qeshm. New to the Persian Gulf and the Gulf of Oman (Fig. 1).

***Paralaophonte echinata* Fiers, 1986 (Figs. 5 A-D)**
Type. *Paralaophonte echinata* F. Fiers, 1986, *Bijd. Dierk.* 56(1).132-164.
Distribution of the species. West Indian Islands, Venezuela, Bahamas and Netherlands Antilles (Fiers 1986).
Distribution in Iran. North Haleh, Parsian, Berke Soflin, Bandar Abbas, Old Jask, Ramin. New to the Persian Gulf and the Gulf of Oman (Fig. 1).

***Quinquelaophonte Koreana* Lee, 2003 (Figs. 5 E-H)**
Type. *Quinquelaophonte Koreana* W. Lee, 2003. *Zool. Science.* 20: 657-668.
Distribution of the species. Korea (Lee, 2003)
Distribution in Iran. Ramin, Gowatr. New to the Persian Gulf and the Gulf of Oman (Fig. 1).

***Quinquelaophonte* cf. *quinquespinosa* (Sewell, 1924) (Figs. 5 I-L)**
Type. *Laophonte quinquespinosa* R. B. S. Sewell, 1924. *Men. Indian Mus*., 5: 832.
Distribution of the species. Chilka Lake (Sewell, 1924); Suez canal (Gurney, 1927b); Bermuda (Willey, 1932); Angola (Candeias, 1959); Marseille (Hamond, 1973a); Aldabra (Wells & Meckenzi, 1973); Sirbonian Lagoon (Por, 1973); West Indian Islands, Venezuela, Bahamas and Netherlands Antilles (Fiers,

FIGURE 4. Laophontidae: *L. cornuta*: A female dorsal, B female ventral, C male dorsal, D male ventral; Scale: 100µm. *L. heteromelum*.: E female dorsal, F female ventral, G male dorsal, H male ventral; *P. brevirostris*: I female dorsal, J female ventral, K male dorsal, L male ventral. Scale: 75 µm.

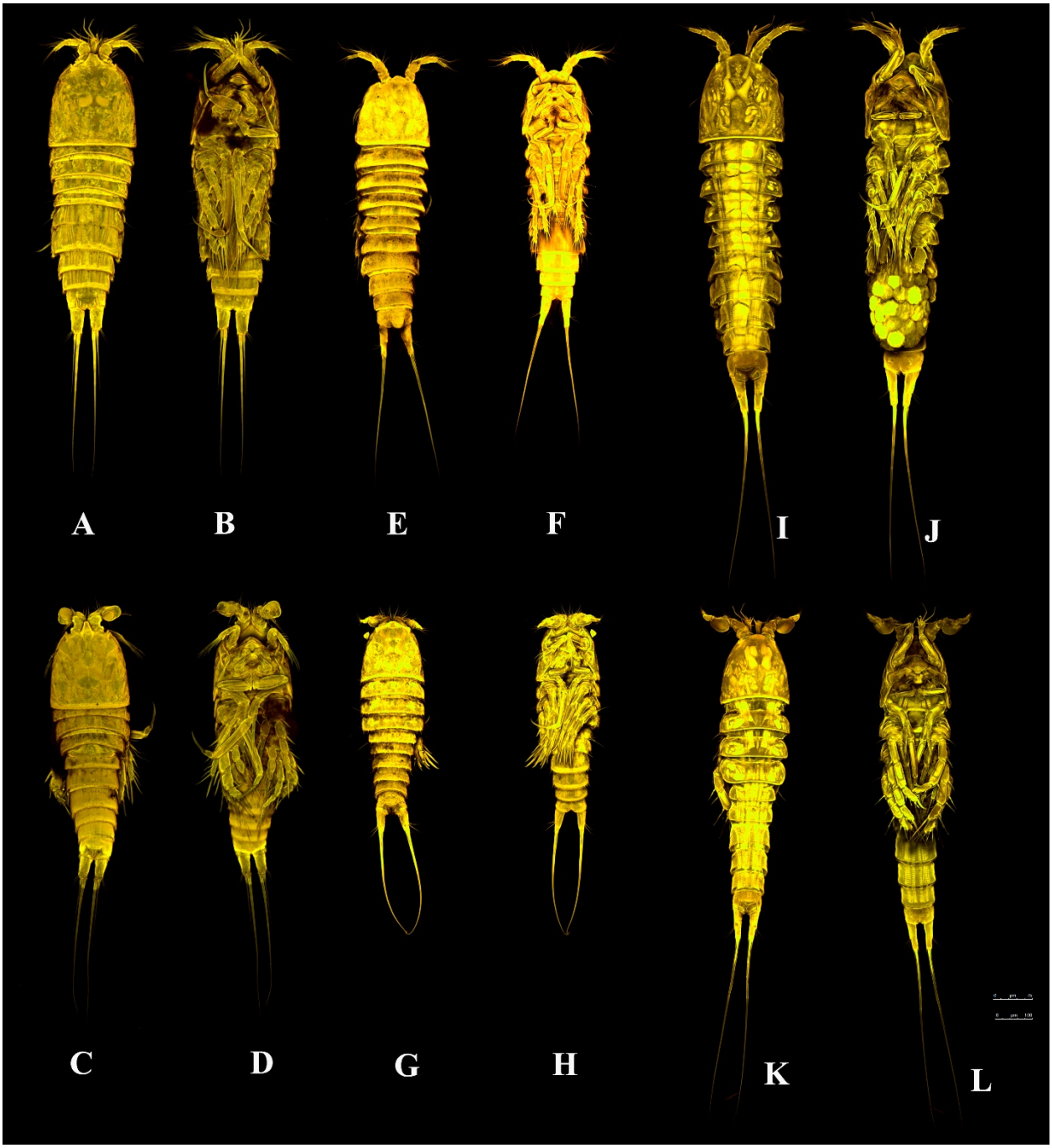

FIGURE 5. Laophontidae: *P. echinata*: A female dorsal, B female ventral, C male dorsal, D male ventral. Scale: 75 µm. *Q. koreana*: E female dorsal, F female ventral, G male dorsal, H male ventral; *Q.* cf. *quinquespinosa*: I female dorsal, J female ventral, K male dorsal, L male ventral. Scale: 100 µm.

1986); Andaman and Nicobar Islands (Wells & Rao, 1987); Sulavesi (Mielke, 1997); Mexico (Gomez & Morales-Serna, 2013).

Distribution in Iran. Mahshahr, Hendijan, Kolahi. New to the Persian Gulf and the Gulf of Oman (Fig. 1).

Family Louriniidae Monard, 1927

***Lourinia armata* (Claus, 1866) (Figs. 6 A-D)**

Type. *Jurinia armata* C. Claus, 1866. *Schr. Ges. Beford ges. Naturw. Marburg,* Supplement. 1:30.

Distribution of the species. France, Nice (Claus, 1866); Andaman and Nicobar Islands (Wells & Rao, 1987); Korea (Yoo & Lee, 1993); Mediterranean (Alper *et al*., 2010).

Distribution in Iran. North Haleh, Nayband Gulf, Parsian, Moqam, Bandar Lengeh, Berke Soflin, Jask, Larak, Hengam, Hormoz, Qeshm. New to the Persian Gulf and the Gulf of Oman (Fig. 1).

Family Miraciidae Dana, 1846

***Amphiascopsis* cf. *southgeorgiensis* Lang, 1936 (Figs. 6 E-H)**

Type. *Amphiascopsis southgeorgiensis* K. Lang, 1936. *Further. Zool. Results. Swed. Antarctic. Exped.* 3(3): 1-68.

Distribution of the species. South Georgia Island (Lang, 1936); New Zealand (Hicks, 1971).

Distribution in Iran. North Haleh, Nayband Gulf, Parsian. New to the Persian Gulf and the Gulf of Oman (Fig. 1).

Subfamily Diosaccinae Sars M., 1906

***Metamphiascopsis hirsutus bermudae* Willey, 1930 (Figs. 6 I-L)**

Type. *Amphiascus hirsutus bermudae* Willey, 1930. *Rep. Govt. Ceylon Pearl Cyster Fish, Gulf Mannar*. 1: 269.

Distribution of the species. Ceylone (Thompson & A. Scott, 1903); Banyuls (Monard, 1928); Bermuda (Willey 1932, 1935); Jamaica (Yeatman, 1976); Nicobar Islands (Sewell, 1940); Caroline Islands (Vervoort, 1964); Andaman and Nicobar Islands (Wells & Rao, 1987); Mediterranean (Sönmez *et al*., 2014).

Distribution in Iran. Bushehr, North Haleh, Nayband Gulf, Parsian, Bandar Abbas, Gowatr, Larak, Hengam, Hormoz, Qeshm. New to the Persian Gulf and the Gulf of Oman (Fig. 1).

***Paramphiascella sirbonica* Por, 1973 (Figs. 7 A-D)**

Type. *Paramphiascella sirbonica* F. D. Por, 1973. *Cahiers de Biologie Marine* 14(1): 89-107

Distribution of the species. Sirbonian Lagoon (Por 1973); Gulf of Mexico (Suárez-Morales *et al*. 2009).

Distribution in Iran. Hendijan, Bushehr, Halileh, North Haleh, Nayband Gulf, Parsian, Berke Soflin, Bandar Abbas, Old Jask, Larak, Hengam, Hormoz, Qeshm. New to the Persian Gulf and the Gulf of Oman (Fig. 1).

***Robertsonia propinqua* Scott T., 1894 (Figs. 7 E-H)**

Type. *Robertsonia propinqua* T. Scott, 1894. *Trans. Linn. Sco. Lond. Sec.* 2, 6 (Zool.): 99.

Distribution of the species. Gulf of Guinea (T. Scott, 1894); Chilka Lake (Sewell, 1924); Angola (Candeias, 1959); Argentina (Pallares, 1970); Australia (Hamond, 1973b); Adriatic Sea (Marinov & Apostolov, 1981); Andaman and Nicobar Islands (Wells & Rao, 1987).

Distribution in Iran. Bushehr, North Haleh, Nayband Gulf, Parsian, Bostaneh, Berke Soflin, Bandar Abbas, Old Jask, Kolahi, Koohestak, Sirik, Gowatr, Larak, Hengam, Hormoz, Qeshm. New to the Persian Gulf and the Gulf of Oman (Fig. 1).

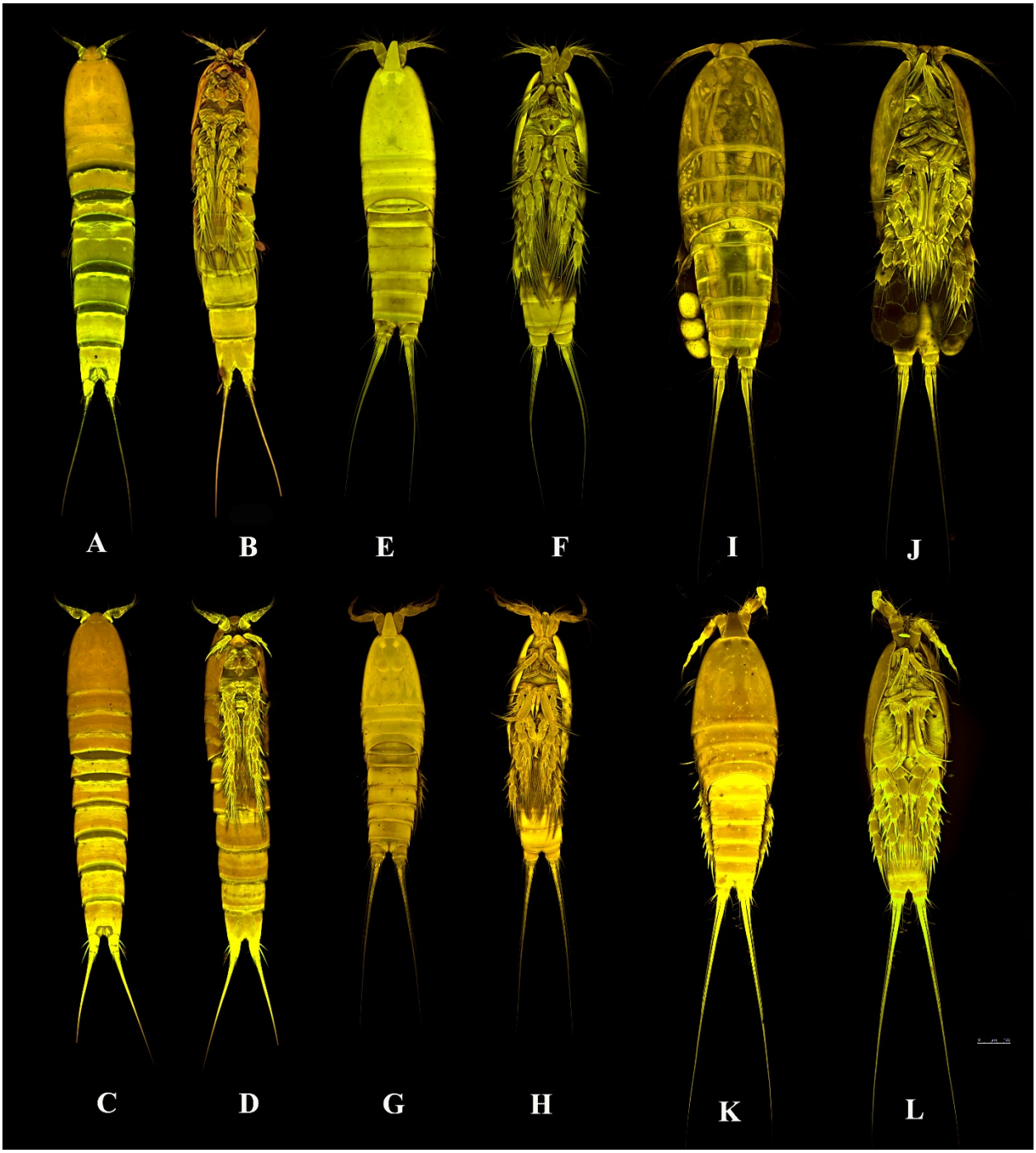

FIGURE 6. Louriniidae: *L. armata*: A female dorsal, B female ventral, C male dorsal, D male ventral; Miraciidae: *A.* cf. *southgeorgiensis*: E female dorsal, F female ventral, G male dorsal, H male ventral; *M. hirsutus bermuda*: I female dorsal, J female ventral, K male dorsal, L male ventral. Scale: 100 μm.

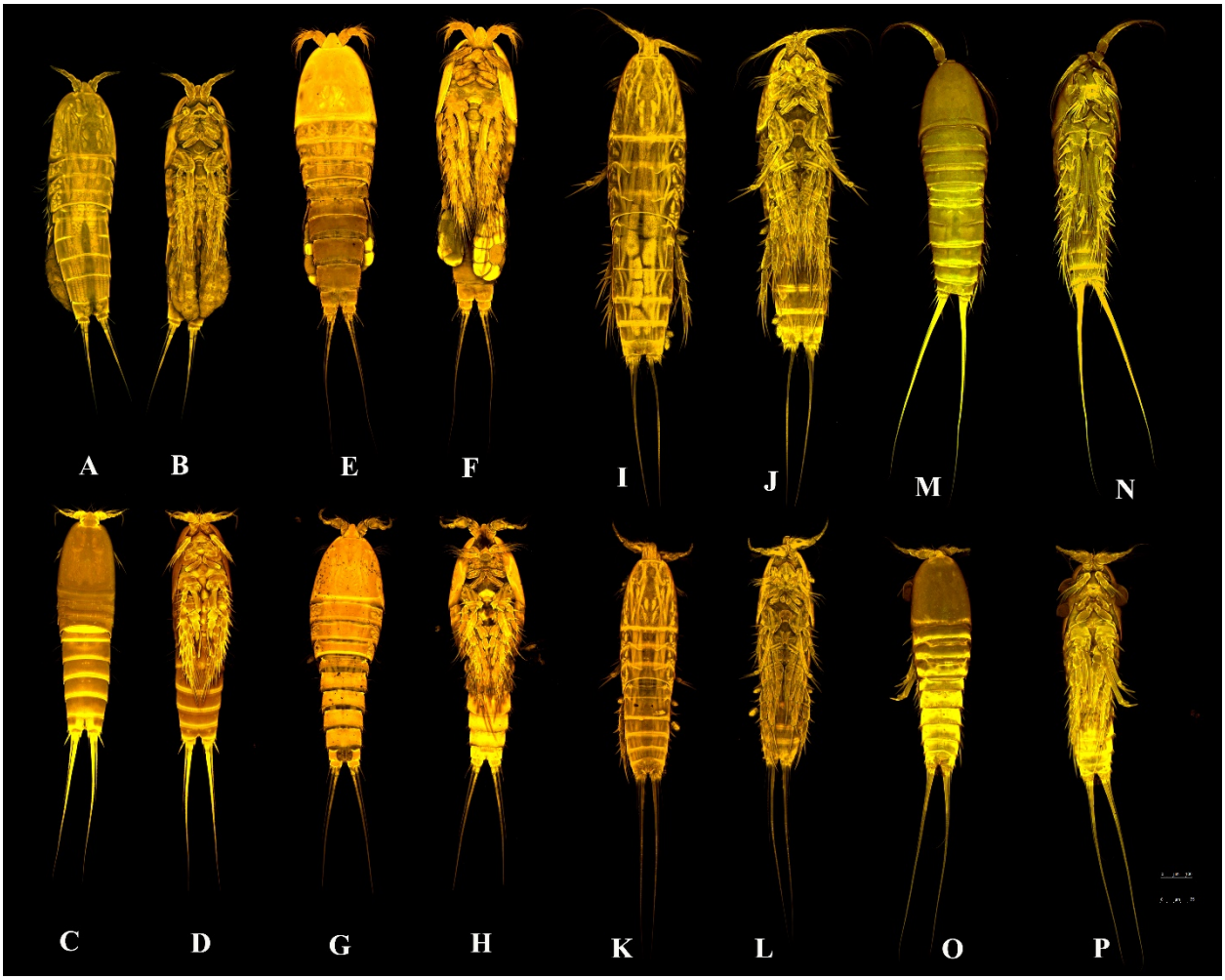

FIGURE 7. Miraciidae: *P. sirbonica*: A female dorsal, B female ventral, C male dorsal, D male ventral. Scale: 75 µm. *R. propinqua*: E female dorsal, F female ventral, G male dorsal, H male ventral Scale: 100 µm. Parastenheliidae: *P. horneli*: I female dorsal, J female ventral, K male dorsal, L male ventral; *P.* cf. *spinisa*: M female dorsal, N female ventral, O male dorsal, P male ventral. Scale: 75 µm.

Family Parastenheliidae Lang, 1936

***Parastenhelia hornelli* Thompson I. C. & Scott A., 1903 (Figs. 7 I-L)**

Type. *Parastenhelia hornelli* I. C. Thompson & A. Scott, 1903, *Rep. Govt. Cevlon Pearl Oyster Fish. Gulf Manaar,* 1:263.

Distribution of the species. Cosmopolitan. Recorded from: Sri Lanka (Thompson & A. Scott, 1903); Carolina Islands (Vervoort, 1964); New Zealand (Wells *et al*., 1982); Mozambique (Wells, 1967); Caribbean Sea, Barbados (Coull, 1970); Virgin Isles (Coull, 1971, Hartzband & Hummon, 1974); Black Sea (Apostolov, 1973); Sea of Marmara (Noodt, 1955a); Andaman and Nicobar Islands (Wells & Rao, 1987).

Distribution in Iran. Bushehr, North Haleh, Nayband Gulf, Parsian, Bostaneh, Hormoz. New to the Persian Gulf and the Gulf of Oman (Fig. 1).

***Parastenhelia* cf. *spinosa* (Fischer, 1860) (Figs. 7 M-P)**

Type. *Harpacticus spinosus* S. Fischer, 1860, *Asb. Baver. Akad. Wiss., Abt. 3, 8: 665.*

Distribution of the species. Cosmopolitan. Recorded from: Plymouth area of England (Fraser, 1936); Maldive Archipelago (Sewell, 1940); Helgoland (Klie, 1941); Canary Island (Noodt, 1955b);

Caroline Islands (Vervoort, 1964); Bulgaria (Apostolov, 1968); Andaman and Nicobar Islands (Wells & Rao, 1987); Mediterranean Sea (Apostolov, 1973).
Distribution in Iran. Bushehr, North Haleh, Nayband Gulf, Parsian, Moqm, Bandar Lengeh, Berke Soflin, Jask, Ramin, Larak, Hengam, Hormiz, Qeshm. New to the Persian Gulf and the Gulf of Oman (Fig. 1).

Family Peltidiidae Claus, 1860
***Peltidium* cf. *perplexum* Thompson I. C & Scott A., 1903 (Figs. 8 A-D)**
Type. *Peltidium perplexum* I. C. Thompson & A. Scott, 1903, *Rep. Govt. Cevlon Pearl Oyster Fish. Gulf Manaar,* 1:263.
Distribution of the species. Ceylone (Thompson & A. Scott 1903).
Distribution in Iran. Larak, Hengam, Qeshm. New to the Persian Gulf and the Gulf of Oman (Fig. 1).

Family Pseudotachidiidae Lang, 1936
***Idomene* cf. *laticaudatus* Thompson I. C & Scott A., 1903 (Figs. 8 E-H)**
Type. *Dactylopusia laticauda* Thompson & A. Scott, 1903. *Rep. Govt. Cevlon Pearl Oyster Fish. Gulf Manaar,* 1: 263.
Distribution of the species. Ceylone (Thompson & A. Scott 1903); Maldive Archipelago (Sewell, 1940); Inhaca Island, Mozambique (Wells, 1967).
Distribution in Iran. Tis. New to the Persian Gulf and the Gulf of Oman (Fig. 1).

Family Tegastidae Sars G. O., 1904
***Syngastes parilis* Bartsch, 1994 (Figs. 9 A-C)**
Type. *Syngastes parilis* I. Bartsch, 1994. *Spixiana, Munich*, 17, 2:161-173.
Distribution of the species. Australia (Bartsch 1994).
Distribution in Iran. Bushehr, Nayband Gulf, Parsian, Bostaneh, Larak, Hengam, Hormoz, Qeshm. New to the Persian Gulf and the Gulf of Oman (Fig. 1).

***Tegastes* cf. *clausi* Sars, 1904 (Fig. 9D)**
Type. *Tegastes longimanus* Claus, 1863. *sensu* G. O. Sars, 1904. *An Account of the Crustacea of Norway Bergen Muse*, 5:57-80.
Distribution of the species. North Sea (Claus, 1863); West coast of Norway (Sars, 1904); Banyuls-Sur-Mer, France (Monard, 1928); Helgoland (Klie, 1949).
Distribution in Iran. Qeshm. New to the Persian Gulf and the Gulf of Oman (Fig. 1).

Family Thalestridae Sars G. O., 1905
***Eudactylopus* cf. *latipes* (Scott T., 1893) (Figs. 10 A-D)**
Type. *Dactylopus latipes* T. Scott, 1893. *Transact. Linn. Soc. London. 2nd Series: Zool.* 6(1): 1-161.
Distribution of the species. Gulf of Guinea (Scott T., 1894); Nicobar Islands, the Ceylon Pearl Banks (Thompson & A. Scott, 1903); Malay Archipelago (A. Scott, 1909); Nicobar Island and Maldive Archipelago (Sewell, 1940); Marmara Sea (Noodt, 1955a); Shingu (Tanaka & Hue, 1967).
Distribution in Iran. Nayband Gulf, North Haleh, Parsian, Qeshm. New to the Persian Gulf and the Gulf of Oman (Fig. 1).

Family. Tisbidae Stebbing, 1910
***Tisbe alaskensis* Chullasorn, Dahms, Lee, Ki, Schizas, Kangtia, Park & Lee, 2011 (Figs. 10 E-H)**
Type. *Tisbe alaskensis* S. Chullasorn, H. Dahms, K. Lee, J. Ki, N. Schizas, P. Kangtia, H. G. Park & J. Lee, 2011. *Zool. Studi.* 50, 1: 103-117.
Distribution of the species. Juneau, Alaska (Chullasorn *et al*., 2011).
Distribution in Iran. Bushehr, Parsian, Tis, Ramin, Qeshm. New to the Persian Gulf and the Gulf of Oman (Fig. 1).

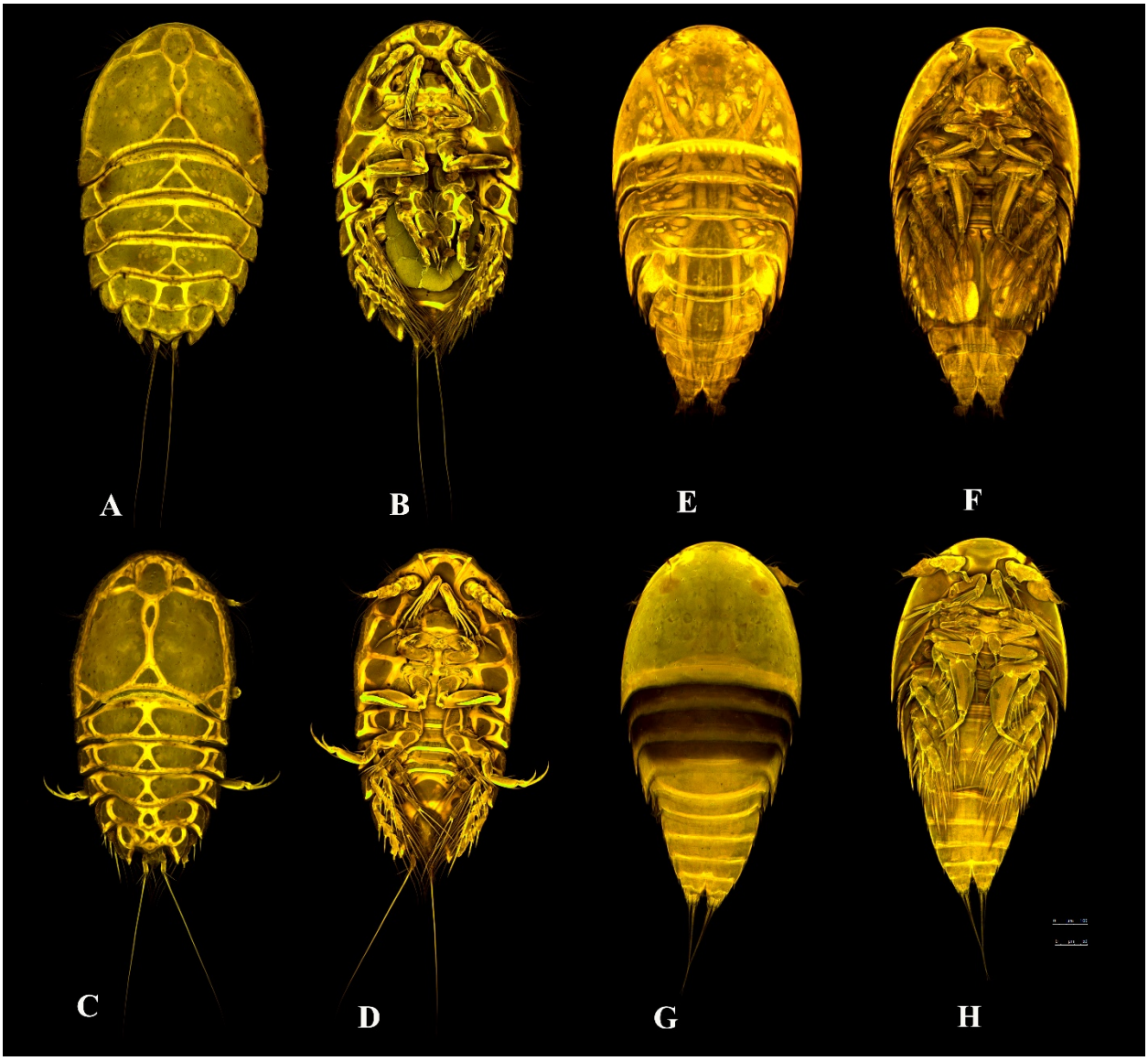

FIGURE 8. Peltidiidae: *P.* cf. *perplexum*: A female dorsal, B female ventral, C male dorsal, D male ventral. Scale: 100µm. Pseudotachidiidae: *I.* cf. *laticaudatus*: E female dorsal, F female ventral, G male dorsal, H male ventral. Scale: 50µm.

FIGURE 9. Tegastidae: *S. parilis*: A female lateral, B male lateral, C male grasping female; D *T.* cf. *clausi*: female lateral. Scale: 50 μm.

***Tisbintra jonesi* Ummerkutty, 1960 (Figs. 10 I-L)**
Type. *Tisbintra jonesi* N. P Ummerkutty, 1960. *Mar. Biol. Ass. India,* 2, 2:149-164
Distribution of the species. Gulf of Mannar (Ummerkutty, 1960)
Distribution in Iran. Bandar Abbas, Kolahi, Old Jask. New to the Persian Gulf and the Gulf of Oman (Fig. 1).

DISSCUSSION

In this study, we present a total of 26 species belonging to 12 harpacticoid families. All taxa are reported for the first time from the Persian Gulf and the Gulf of Oman. These were compared carefully with original species descriptions. However, the identification of some species has to be defined with reservation (names indicated with cf.).

Ameira parvula is represented as the species complex based on variation in the morphological characters in different populations (See Wells, 2007). Thus, revision of the species based on morphological and molecular studies is necessary.

Dactylopusia tisboides was mentioned as a cosmopolitan species (Vervoort, 1964). It has been reported from all oceans in the world, but only a few published works have been shown the distribution and description of the species. Wells (2007) mentioned the species as either variable cosmopolitan or complex. Therefore, the decision must be taken with caution.

Quinquelaophonte quinquespinosa is a cosmopolitan species. There is interpopulation variability in the number of antennary exopod seta, number of setae on P4 exp-3 and enp-2, P1 exp-2: exp-1 length ratio, furcal rami length: width and the number of female P5 armatures (Wells & McKenzie, 1973; Lee, 2003). Therefore, this was considered as a species complex by Lee (2003). The material was found in Iran were congruent well with the descriptions presented by Lee (2003) and Gomez & Morales-Serna (2013), especially female which was described by the later authors (they found only the female from Mexico). Using *COI* barcoding is the only way to clear species delimitation of this species.

Moreover, the decision about *A.* cf. *southgeorgiensis*, *P.* cf. *spinosa, P.* cf. *perplexum*, *I.* cf. *laticaudatus*, *T.* cf. *clause* and *E.* cf. *latipes* is uncertain. Unfortunately, insufficient information on these taxa hampered definite identification of the species. Furthermore, in some cases, species delimitation can be possible only by using molecular data. Therefore, poor genetic data makes the positions of these taxa unclear.

The result of this survey is only a small part of copepods diversity in the Persian Gulf and the Gulf of Oman. High species diversity and richness in copepod fauna indicated in this study is in its early stage and further thorough taxonomic surveys are needed to shed more light to our current knowledge on this taxon in the region.

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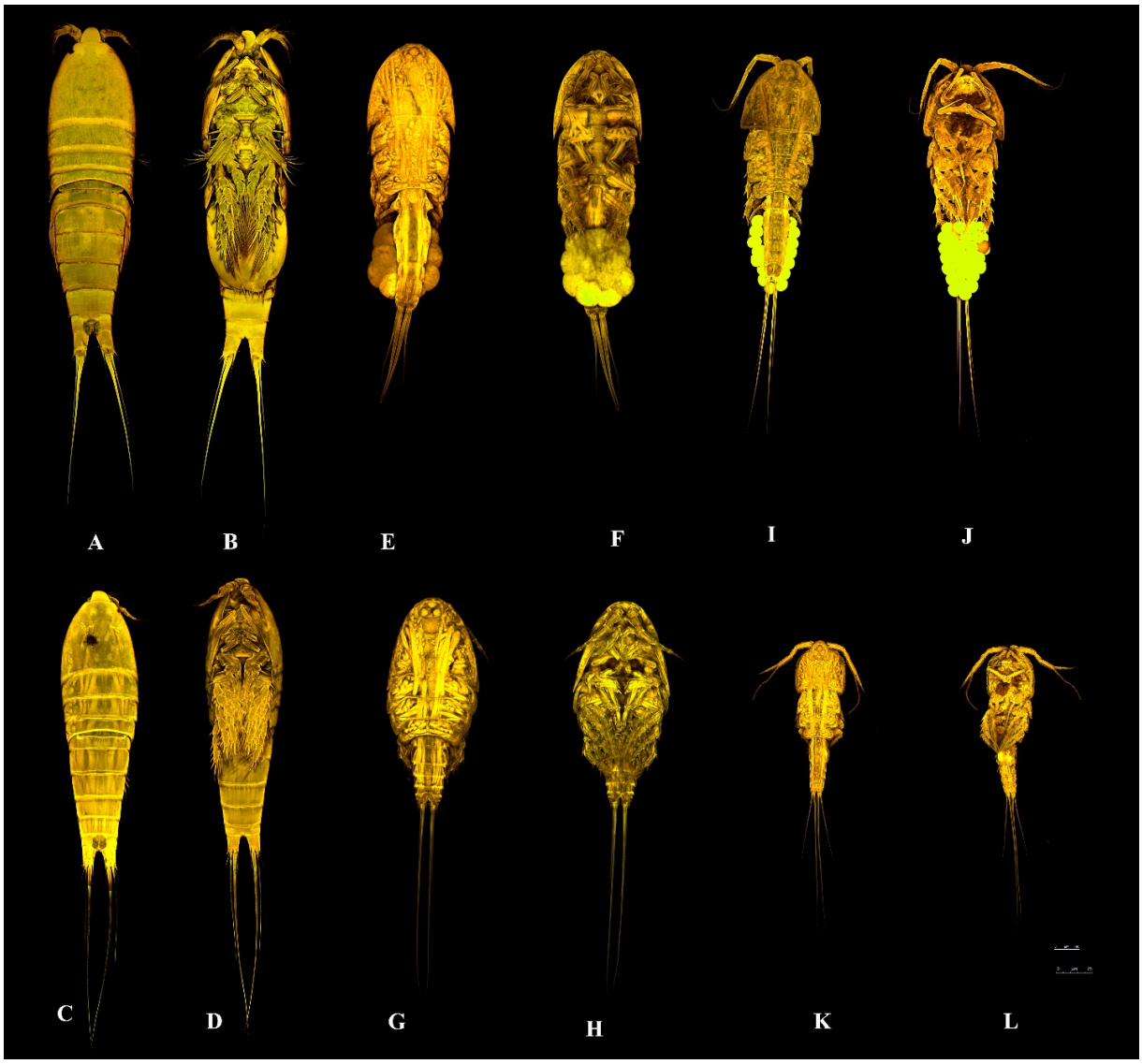

FIGURE 10. Thalestridae: *E.* cf. *latipes*: A female dorsal, B female ventral, C male dorsal, D male ventral. Scale: 100µm. Tisbodae: *T. alaskensis*: E female dorsal, F female ventral, G male dorsal, H male ventral. Scale: 75µm. *T. jonsi*: I female dorsal, J female ventral, K male dorsal, L male ventral. Scale: 100 µm.

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