

# FOUR NEW RECORDS OF FISHES FROM THE ARABIAN GULF COAST OF IRAQ

Laith JAWAD<sup>1</sup>

## ABSTRACT

New records of four fish species from the Arabian Gulf coast of Iraq are reported: Arabian Sea meagre *Argyrosomus heinii*, Geelbeck croaker *Atractocion aequidens*, Majan croaker *Johnius majan* and the wedge snout mullet *Osteomugil cunnesius*. All specimens were obtained from the Iraqi waters of the Arabian Gulf during fishing survey on the 7<sup>th</sup> March 2012. The sampling was done during the routine sampling in the northern part of the Arabian Gulf funded by Al-Marifa Fisheries Company during the period September 2011 to May 2012 and it represents a significant contribution to the fish diversity of the northern Arabian Gulf.

**Keywords:** Sciaenidae; Mugilidae; Basrah; range extension; taxonomy

# QUATRO NOVOS REGISTROS DE PEIXES DA COSTA DO GOLFO PÉRSICO DO IRAQUE

## RESUMO

Novos registros de quatro espécies de peixe da costa do Golfo Pérsico do Iraque foram relatados: "Arabian Sea meagre" *Argyrosomus heinii*; corvina de Geelbeck *Atractocion aequidens*; "Majan croaker" *Johnius majan* e tainha "focinho de cunha" *Osteomugil cunnesius*. Todos os espécimes foram obtidos a partir das águas iraquianas do Golfo Pérsico durante a pesquisa de pesca, no dia 7 de março de 2012. O registro foi realizado durante a amostragem de rotina na parte norte do Golfo Pérsico, financiada pela Al-Marifa Empresa Pescas, no período de setembro de 2011 a Maio de 2012 e representa uma contribuição significativa para a diversidade do norte do Golfo Pérsico peixes.

**Palavras chave:** Sciaenidae; Mugilidae; Basrah; distribuição; taxonomia

---

**Case Report/Relato de Caso:** Recebido em 28/03/2015 – Aprovado em 11/09/2015

<sup>1</sup> 14, Tin Turn Place, Flat Bush, Manukau, Auckland, 2016, New Zealand. e-mail: laith\_jawad@hotmail.com

## INTRODUCTION

The history of the study of the fish fauna of Iraq starts when the Sumerian, Babylonian and Assyrian people have learnt to know fish species by names (SAGGS, 1962). They succeeded in identifying and naming several freshwater and marine species, which were recorded on clay tablets (LANDSBERGER, 1962). However, the real taxonomic works did not start until the 19<sup>th</sup> century, when HECKEL (1843) described 17 freshwater fish species from the Tigris River at Mosul City, northern Iraq. The late first half of the 20<sup>th</sup> century represents the emergence of the taxonomic work on the marine fish fauna of Iraq. KENNEDY (1937), HORA and MISRA (1943) and MISRA (1947) were the first to report on the marine fish being collected from the waters of the Arabian Gulf of Iraq. Studies on the marine fish species (AL-DAHAM, 1982; BANISTER, 1980; BANISTER and BUNNI, 1980; HUSSAIN *et al.*, 1988; AL-HASSAN and AL-BADRI, 1986; AL-HASSAN and MUHSIN, 1986) continued to appear until the mid of the second half of the 20<sup>th</sup> century, but due to the conflicts that erupted in the country during this period the scientific explorations in general and the fish taxonomy in particular halted (JAWAD, 2012). Only recently new additions to the Iraqi fish fauna have been made (AL-BADRI and JAWAD, 2014; HUSSAIN and JAWAD, 2014; JAWAD and AL-BADRI, 2014; JAWAD and HUSSAIN, 2014; JAWAD *et al.*, 2014 a, b, c, d), but Iraqi marine waters are still poorly known in terms of their fish fauna. The present study is a part of a program that takes into consideration a thorough survey of the Iraqi marine waters.



**Figure 1.** *Argyrosomus heinii*, 458 mm total length (TL) (OMMSFC1196).

In the present paper, I report four fish new records belonging to the families Sciaenidae and Mugilidae from the Arabian Gulf waters of Iraq. They represent records from the northern most part of their distribution. *Argyrosomus heinii* (Steindachner, 1902); *Atractoscion aequidens* (Cuvier, 1830), and *Johnius majan* Iwatsuki, Jawad and Al-Mamry, 2012, are recorded for the first time from Arabian Gulf area. Also, the second record for *Osteomugil cunnesius* (Valenciennes, 1836) in study area is provided.

## MATERIALS AND METHODS

Fish specimens were obtained by gill net at depth ranging between 12-13 m in the Iraqi marine waters, in the Arabian Gulf (29°49'11.9"N 48°45'50.31"W) on the 7<sup>th</sup> March 2012. Standard length (SL), from tip of snout to base of caudal fin, was used for proportional measurements, and total length (TL) for the maximum length of specimens following the method of FISCHER and BIANCHI (1984) and SASAKI (1996). Fish specimens were fixed in 10% formalin and stored in 70% ethanol. Measurements were made with dial calipers to the nearest 0.1 mm. These specimens were deposited in the fish collection of the Marine Science and Fisheries Centre, Ministry of Fisheries Wealth, Muscat, Sultanate of Oman, catalogue number OMMSFC 1196-1199.

## RESULTS

*Argyrosomus heinii* (Steindachner, 1902) (Figure 1; Table 1).

- Material examined: 6 specimens: 456-467 mm TL (OMMSFC 1196).

- Description: Large body with large terminal mouth. Teeth in both jaws. Emarginate caudal fin. Body with ctenoid scales. Axil of pectoral fin naked. Lateral line scales reaching to tip of

caudal fin. Top of head and back dark. Sides' silver-grey with white ventral side. Dark pelvic, anal and caudal fins. Black spot at base of pectoral fin.

**Table 1.** Morphometric and meristic characters of *Argyrosomus heinii* collected from the Arabian Gulf coast of Iraq (TL: total; HL: head length; SL: standard length). Minimum and maximum values (mm) and percentage (%) in parenthesis.

Morphometric	Values
Total length (mm)	456-467
Standard length (% in TL)	444-455 (97.6-97.8)
Head length (% in SL)	107- 113 (24.2-24.9)
Eye diameter (% in HL)	20-24 (18.5-21.4)
Preorbital length (% in HL)	30-35 (28.0-30.8)
Posorbital length (% in HL)	47-53 (43.8-45.6)
Predorsal fin length (% in SL)	107-112 (24.3-24.8)
Postdorsal fin length (% in SL)	335-342 (75.3-75.8)
Prepectoral fin length (% in SL)	115-118 (25.7-26.0)
Prepelvic fin length (% in SL)	126-129 (28.5-28.8)
Preanus length (% in SL)	244-250 (54.7-55.0)
Preanal fin length (% in SL)	265-269 (59.8-60.0)
Postanal fin length (% in SL)	292-297 (65.6-65.9)
Maximum body depth (% in SL)	125-132 (28.3-29.4)
Caudal peduncle depth (% in SL)	44-46 (9.7-10.4)
Pectoral fin length (% in SL)	187-193 (42.0-43.5)
Meristic characters	
Dorsal fin spines	11
Dorsal fin rays	32
Anal fin spines	2
Anal fin rays	7
Pectoral fin rays	17

*Atractoscion aequidens* (Cuvier, 1830) (Figure 2; Table 2).

- Material examined: 8 specimens: 413-425 mm TL (OMMSFC 1197).



**Figure 2.** *Atractoscion aequidens*, 420 mm total length (TL) (OMMSFC 1197).

- Description: Body slender and sometime large with pointed snout and oblique mouth. Rostral marginal pores and anterior pair of mental pores absent. Teeth narrow and pointed with mixed large and small teeth in upper jaw and equal size in lower jaw. Caudal fin emarginate to

lunate. Head with cycloid scales and posterior of body with ctenoid. Lateral line scales extending to tip of caudal fin. Body with iridescent blue and purple. Pectoral fin axil with black blotch. Edges of jaws and inside of gill cover bright yellow.

**Table 2.** Morphometric and meristic characters of *Atractoscion aequidens* collected from the Arabian Gulf coast of Iraq (TL: total; HL: head length; SL: standard length). Minimum and maximum values (mm) and percentage (%) in parenthesis. Data is compared with JAWAD *et al.* (2012).

<b>Morphometric</b>	<b>Present study</b>	<b>JAWAD <i>et al.</i> (2012)</b>
Total length (mm)	413-425	802
Standard length (% in TL)	390-397 (94.7-94.9)	671 (83.7)
Head length (% in SL)	113-124 (28.6-31.5)	202 (25.2)
Eye diameter (% in HL)	17.5-21.0 (15.3-17.1)	22(10.9)
Preorbital length (% in HL)	22.5-26.0 (19.5-20.7)	45 (22.7)
Posorbital length (% in HL)	40.0-46.0 (35.2-37.6)	117 (57.90)
Pre-dorsal fin length (% in SL)	110-118 (28.1-29.5)	205 (30.6)
Post-dorsal fin length (% in SL)	315-320 (80.5-80.90)	341 (50.8)
Prepectoral fin length (% in SL)	103-110 (26.2-27.4)	198 (29.5)
Pectoral fin length (% in SL)	70-78 (17.6 -19.2)	97 (14.5)
Preanus length (% in SL)	185-192 (47.2- 48.1)	490 (73)
Preanal fin length (% in SL)	287-293 (73.4-74.6)	521 (77.6)
Postanal fin length (% in SL)	312-316 (80.0-82.5)	575 (85.7)
Maximum body depth (% in SL)	103-112 (26.2-28.4)	152 (22.7)
Caudal peduncle depth (% in SL)	33-38 (8.3-9.8)	50 (7.5)
<b>Meristic characters</b>		
Dorsal fin spines	11	10
Dorsal fin rays	10	10
Anal fin spines	2	2
Anal fin rays	9	9

*Johnius majan* Iwatsuki, Jawad and Al-Mamry 2012 (Figure 3; Table 3).

- Material examined: 5 specimens: 330-338 mm TL (OMMSFC 1198).

- Description: Body deep with rounded dorsal and ventral profiles. Snout rounded and projected. Three upper and three marginal snout pores. Three pairs of mental pores, anterior pair with two small openings, very closely positioned. Mental barbell absent. Upper jaw with enlarged, closely spaced teeth and uniform, small teeth in lower jaw. Eye large and circular. Gill rakers short. Head with large, cycloid and body with ctenoid scales. Third or fourth dorsal spine longest. First soft ray of pelvic fin with short

filament. Strong second anal spine. Caudal fin rounded. Black axillary spot on upper pectoral fin base. Iridescent bronze head and upper body sides with ventral side creamy white. Scale pockets with broad, darkish margin. Dense pigmentation on upper operculum appearing darkish owing densely pigmented branchial cavity. Spinous and soft dorsal fins dusky brownish. Anal fin slightly mottled dusky-brownish; caudal fin brownish hyaline, dark distally.

*Osteomugil cunnesius* (Valenciennes, 1836) (Figure 4; Table 4).

- Material examined: 2 specimens: 227; 234 mm TL (OMMSFC 1199).

- Description: Wedged-shape snout. Adipose eyelid well developed. Maxilla with posterior end reaching posterior edge of eye. Upper lip fleshy. Thin edge of lower lip projecting forward. Origin of 1<sup>st</sup> dorsal fin nearer to snout than caudal fin base.

Second dorsal fin originate below middle of anal fin. Caudal fin forked. Pectoral fin reaching the base of 3<sup>rd</sup> dorsal spine. Dorsal body side silvery-blue. Blackish spot on upper base of pectoral fin. Dorsal fin with black edges. Caudal fin yellowish.



**Figure 3.** *Johnius majan*, 417 mm total length (TL) (OMMSFC 1198).

**Table 3.** Morphometric and meristic characters of *Johnius majan* collected from the Arabian Gulf coast of Iraq Iraq (TL: total; HL: head length; SL: standard length). Minimum and maximum values (mm) and percentage (%) in parenthesis.

<b>Morphometric</b>	<b>Values</b>
Total length (mm)	330-338
Standard length (% in TL)	326-334 (98.6-98.9)
Head length (% in SL)	68-72 (20.7-21.7)
Eye diameter (% in HL)	14-19 (20.3-26.2)
Preorbital length (% in HL)	9-13 (13.1-17.9)
Posorbital length (% in HL)	23-28 (33.6-34.8)
Predorsal fin length (% in SL)	81-95 (24.5-25.7)
Postdorsal fin length (% in SL)	255-263 (78.0-78.6)
Prepectoral fin length (% in SL)	69-73 (21.0-21.5)
Pectoral fin length (% in SL)	75-79 (22.8-23.4)
Preanus length (% in SL)	138-144 (42.2-43.5)
Preanal fin length (% in SL)	198-203 (60.4-60.9)
Postanal fin length (% in SL)	234-239 (71.3-71.9)
Maximum body depth (% in SL)	116-120 (35.2-36.0)
Caudal peduncle depth (% in SL)	36-42 (10.8-12.3)
<b>Meristic characters</b>	
Dorsal fin spines	10
Dorsal fin rays	29-30
Anal fin spines	2
Anal fin rays	8
Pectoral fin rays	17-18



**Figure 4.** *Osteomugil cunnesius*, 228 mm total length (TL) (OMMSFC 1199).

**Table 4.** Morphometric and meristic characters of *Osteomugil cunnesius* collected from the Arabian Gulf coast of Iraq (TL: total; HL: head length; SL: standard length). Minimum and maximum values (mm) and percentage (%) in parenthesis.

<b>Morphometric</b>	<b>Values</b>
Total length (mm)	227-234
Standard length (% in TL)	217-226 (95.4-96.3)
Fork length (% in SL)	203-209 (93.3-93.8)
Head length (% in SL)	53-59 (24.6-26.3)
Eye diameter (% in HL)	14-19 (26.6-31.2)
Preorbital length (% in HL)	10-15 (18.7-25.3)
Postorbital length (% in HL)	24-28 (45.1-47.2)
Pre 1 <sup>st</sup> dorsal fin length (% in SL)	99-103 (45.4-45.7)
Post 1 <sup>st</sup> dorsal fin length (% in SL)	117-120 (53.7-53.9)
Pre 2 <sup>nd</sup> dorsal fin length (% in SL)	139-143 (64.1-64.6)
Post 2 <sup>nd</sup> dorsal fin length (% in SL)	157-163 (72.6-72.9)
Prepectoral fin length (% in SL)	61-69 (28.0-30.4)
Preanus length (% in SL)	131-138 (60.2-61.6)
Preanal fin length (% in SL)	139-144 (64.1-64.7)
Postanal fin length (% in SL)	154-158 (70.5-70.8)
Maximum body depth (% in SL)	46-49 (21.0-21.9)
Caudal peduncle depth (% in SL)	19-23 (8.5-10.4)
Pectoral fin length (% in SL)	38-42 (17.3-18.9)
<b>Meristic characters</b>	
Dorsal fin spines	4
Dorsal fin rays	9
Anal fin spines	3
Anal fin rays	9
Pectoral fin rays	17

## DISCUSSION

The Arabian Sea meagre, *A. heinii* was first described by STEINDACHNER (1902) from Quishm,

Yemen, southeastern Arabia. It is also reported from the Gulf of Oman by RANDALL (1995) and the Arabian Sea coast of Oman by MANILO and

BOGORODSKY (2003). The nearest area to the Arabian Gulf where this species is recorded is the Gulf of Oman (RANDALL, 1995). No reports on record about its presence in the Arabian Gulf area (FISCHER and BIANCHI, 1984; FROESE and PAULY, 2013). Such record from Iraqi coast extends its range to the northern Arabian Gulf waters, of and it is considered as a new record to this area.

FISCHER and BIANCHI (1984) stated that other *Argyrosomus* species differ from this species in having soft dorsal fin rays less than 30 (32 or 33 in *A. heinii*). Furthermore, caudal fin bluntly rhomboid in adults of *A. amoyensis*, and lower teeth much smaller and exit of pectoral fin scaly in *A. thorpei*.

The range of the total length of the specimens obtained in the present study falls just below that given by FROESE and PAULY (2013) and that reported by RANDALL (1995) for specimens obtained from the Gulf of Oman and the Arabian Sea coasts of Oman.

The Geelbeck croaker *A. aequidens* was described for the first time from Cape of Good Hope, South Africa by Cuvier (in CUVIER and VALENCIENNES, 1830). KUITER (1993) reported it from South-eastern Australia and BIANCHI *et al.* (1993) recorded it from Namibia. It was also reported from the Arabian Sea by MANILO and BOGORODSKY (2003) and JAWAD *et al.* (2012) reported it from the Arabian Sea coasts of Oman. HEEMSTRA and HEEMSTRA (2004) noted its presence in the coasts of South Africa. It has not reported from the Arabian Gulf area (FISCHER and BIANCHI, 1984; FROESE and PAULY, 2013). Our record represents a northward extension of its known range.

The range of the total length of the specimens of *A. aequidens* taken in the current study lies well below that reported by both FROESE and PAULY (2013) and JAWAD *et al.* (2012). The finding of eight specimens of this species from the Arabian Gulf waters of Iraq suggests that this species may be overlooked and the lack of sampling in the area prevents its regular detection in the north-western part of the Arabian Gulf.

IWATSUKI *et al.* (2012) described the Majan croaker *J. majan* from Madrakah, southern Oman.

This species was previously known only from the type locality (IWATSUKI *et al.*, 2012), but our new record extends its range to the north, to the Arabian Gulf waters of Iraq.

This species has the following characters that separate it from the remaining members of the genus *Johnius*: enlarged upper jaw teeth and lacks enlarged teeth in the inner row of the lower jaw. Unique prominent black axillary spot on the upper pectoral fin base has never been reported from the *Johnius* species of the Indian Ocean (TREWAVAS, 1977; LAL MOHAN *et al.*, 1984; HEEMSTRA, 1986; SASAKI, 1996) or the western Pacific (SASAKI, 1996, 2001), respectively. Accordingly, the species with such a prominent black spot is considered as endemic to the Indian Ocean. Furthermore, only 10 *Johnius* species are known from the Western Indian Ocean (IWATSUKI *et al.*, 2012). The distribution of these species extends to the Eastern Indian Ocean, including the Andaman Sea. The new species also has only eight soft anal-fin rays, while only *J. fuscolineatus* among the others has eight soft anal-fin rays in some individuals (usually seven or eight, IWATSUKI *et al.*, 2012). It can be distinguished from *J. fuscolineatus* by having higher counts for both dorsal fin rays and gill rakers.

The range of the standard length of the specimens obtained in the present study is larger than both of the holotype (147 mm, IWATSUKI *et al.*, 2012) and the paratype specimens used in the description of this species (117-130 mm, IWATSUKI *et al.*, 2012). Until more specimens become available in the future, the finding of five specimens of this species from the Iraqi waters of the Arabian Gulf might not suggest that this species has formed an established population.

The wedge snout mullet *O. cunnesius* was described for the first time from the Coromandel Coast, India by Valenciennes (in CUVIER and VALENCIENNES, 1836). It has also been reported from the Red Sea (DOR, 1984), Japanese Archipelago (Yoshino and Senou *apud* MASUDA *et al.*, 1984), Darwin Harbour (LARSON and WILLIAMS, 1997), Western coast, Arabian Gulf (CARPENTER *et al.*, 1997) (Western coast, Arabian Gulf); South Africa (HEEMSTRA and HEEMSTRA, 2004), Omani waters (RANDALL,

1995) and Arabian Sea (MANILO and BOGORODSKY, 2003). The only record of this species from the Arabian Gulf is that of CARPENTER *et al.* (1997) from the western coast of the Arabian Gulf. In their record, CARPENTER *et al.* (1997) did not specify the waters of which country they recorded this species in. The present record of *O. cunnesius* is considered a confirmation for the presence of this species in the northern part of the Arabian Gulf and the first record for the Iraqi marine waters.

The standard length of the two specimens obtained in the present study is higher than that given by FROESE and PAULY (2013) (132 mm). Alternatively, the total length is far below that reported by RANDALL (1995) (350 mm), but he have not seen any specimens with this large total length.

Why this species is not recorded previously on the Arabian Gulf waters of Iraq might be that (i) it is rare in the area and/or (ii) less frequent on ichthyological expeditions and fishery surveys. It is premature to assess whether the present population is represented by only a few visitors of this species simply exploring the new area, or whether these specimens are part of a well-established population.

## CONCLUSION

Four fish species are reported for the first time from the Arabian Gulf coast of Iraq, these are: *Argyrosomus heinii*, *Atractocion aequidens*, *Johnius majan* and *Osteomugil cunnesius*. Rarity of the recorded species in the area and lack of ichthyological surveys are the factors that might have ceased their appearance in the area previously. This record represents a significant contribution to the fish diversity of the northern Arabian Gulf.

## ACKNOWLEDGEMENTS

My sincere thanks are due to Kunio Sasaki, Japan; Sergey Bogorodsky of Station of Naturalists, Omsk, Russia; and Ronald Fricke of Staatliches Museum für Naturkunde, Rosenstein, Germany for the confirmation of the identification of the species. I am grateful to David Smith, Smithsonian Institution, USA, for reading the manuscript and for his advice and suggestions.

## REFERENCES

- AL-BADRIM, E. and JAWAD L.A. 2014 New fish records from the marine waters of Iraq. *Cahiers de Biologie Marine*, 55: 431-436.
- AL-DAHAM, N.K. 1982 Ichthyofauna of Iraq and the Arab Gulf: A check-list. *Basrah Natural History Publication*, 4: 1-102.
- AL-HASSAN, L.A.J. and AL-BADRI, M.E.H. 1986 First record of some fishes from Khor al-Zubair, Khor Abdullah and Shatt al-Arab, Basrah, Iraq. *Cybiurn*, 10: 295-297.
- AL-HASSAN, L.A.J. and MUHSIN, K.A. 1986 The presence of *Barbus luteus* and *Heteropneustes fossilis* in Khor al-Zubair, North-west of the Arabian Gulf. *Zoology in the Middle East*, 1(1): 116-118.
- BANISTER, K.E. 1980 The fishes of the Tigris and Euphrates Rivers. p.95-108. In: RÓSKA, J. *Euphrates and Tigris, Mesopotamian ecology and destiny*. Monographiae Biologicae. 122pp.
- BANISTER, K.E and BUNNI, M.K. 1980 A new blind cyprinid fish from Iraq. *Bulletin of the British Museum (Natural History) Zoology*, 38(3): 151-158.
- BIANCHI, G.; CARPENTER, K.E.; ROUX, J.-P.; MOLLOY, F.J.; BOYER, F.J.; BOYER, H J. 1993 *FAO Species Identification Field Guide for Fisheries Purposes*. The Living Marine Resources of Namibia. FAO, Rome. I-viii + 1-250, I-VII.
- CARPENTER, K.E.; KRUPP, F.; JONES, D.A.; ZAJONZ, U. 1997 *FAO species identification guide for fishery purposes*. The living marine resources of Kuwait, eastern Saudi Arabia, Bahrain, Qatar, and the United Arab Emirates. FAO Rome. 1-293p., Pls. 1-17.
- CUVIER, G. and VALENCIENNES, A. 1830 *Histoire naturelle des poissons*. Tome cinquième. Livre cinquième. Des Scie'not'des. Hist Nat Poiss 5: 1-499.
- CUVIER, G. and VALENCIENNES, A. 1836 *Histoire naturelle des poissons*. Tome dixième. Suite du livre neuvième. Scomberoides. Livre dixième. De la famille des Teuthyes. Livre onzième. De la famille des Taenioïdes. Livre douzième. Des Athérines. v. 10: i-xxiv + 1-482 + 2p., Pls. 280-306.
- DOR, M. 1984 *Checklist of the fishes of the Red Sea*. CLOFRES. Israel Academy of Sciences and Humanities, Jerusalem. Checklist of the fishes of the Red Sea. CLOFRES: i-xxii, map + 1-437p.



- FISCHER, W. and BIANCHI, G. (eds) 1984 *FAO species identification sheets for fishery purposes. Western Indian Ocean (Fishing area 51)*. FAO Fisheries Department, Rome, Food and Agricultural Organization of the United Nation, Vol. IV, Fam. Scatophagidae to Trichiuridae.
- FROESE R. and PAULY D. (eds) 2013 FishBase. World Wide Web electronic publication. [online] URL: <www.fishbase.org>, version (08/2014).
- HECKEL, J.J. 1843 *Abbildungen und Beschreibungen der Fische Syrien nebst neuer Classification und Charakteristik sämmtlicher Gattungen der Cyprinen*. Stuttgart. 109p.
- HEEMSTRA, P.C. 1986 Family No. 199: Sciaenidae. Kob. In: SMITH, M.M. and HEEMSTRA, P.C. (eds) *Smiths' sea fishes*. Springer-Verlag, Berlin, Heidelberg, New York, London, Paris, Tokyo. p.616-619
- HEEMSTRA, P.C. and HEEMSTRA, E. 2004 *Coastal fishes of southern Africa*. NISC and SAIAB. i-xxiv + 1-488p.
- HORA, S.L. and MISRA, K.S. 1943 On a small collection of fish from Iraq. *Journal of the Asiatic Society of Bengal, Science*, 9(1): 1-15.
- HUSSAIN, N.A.; NAAMA, A.K.; AL-HASSAN, L.A.J. 1988 Annotated check-list of the fish fauna of Khor al-Zubair, North West of the Arabian Gulf, Iraq. *Acta Ichthyologica et Piscatoria*, 18(1): 17-23.
- HUSSAIN, S. and JAWAD, L.A. 2014 First records of *Opisthognathus muscatensis* Boulenger, 1888 (Opisthognathidae), *Trachinotus baillonii* (Lacepède, 1801) (Carangidae), and *Atroubucca nibe* (Jordan & Thompson, 1911) (Sciaenidae) off the Iraq Coast, Arabian Gulf. *International Journal of Marine Science*, 2014, 4(28): 253-258.
- IWATSUKI, Y.; JAWAD, L.A.; AL-MAMRY, J.A. 2012 *Johnius (Johnius) majan* sp. nov., a sciaenid fish (Pisces: Sciaenidae) from Oman, Indian Ocean. *Ichthyological Research*, 59(2): 151-155.
- JAWAD, L.A. 2012 History of the Study of the Fish Fauna of Iraq. *Water Research and Management*, 2(3): 11-20.
- JAWAD, L.A. and AL-BADRI, M.E. 2014 *Lophiomus setigerus* (Vahl, 1797), *Nemipterus zysron* (Bleeker, 1856), and *Parascalopsis eriomma* (Jordan & Richardson, 1909) (Osteichthyes: Lophiidae and Nemipteridae) in the marinewaters of Iraq. *Zoology in the Middle East*, 60(2): 186-188.
- JAWAD, L.A. and HUSSAIN, S. 2014 First record of *Antennarius indicus* (Pisces: Batrachoidiformes: Antennariidae), *Equulites elongates* (Pisces: Perciformes: Leiognathidae) and second record of *Cheilinus lunulatus* (Pisces: Perciformes: Labridae) from the Marine Waters of Iraq. *International Journal of Marine Science*, 40: 1-5.
- JAWAD, L.A.; AL-BADRI, M.E.; FRICKE, R. 2014a New records of thicklips and grunts from the marine waters of Iraq (Teleostei: Haemulidae). *Journal of Ocean Science Foundation*, 12: 18-24.
- JAWAD, L.A.; AL-MUKHTAR, M.; AL-FADDAGH, M.S. 2014b Confirmation of the presence of *Heniochus acuminatus* (Linnaeus, 1758) (Chaetodontidae) and *Pomacanthus maculosus* (Forsskål, 1775) (Pomacanthidae) in Iraqi marine waters, Arabian Gulf. *Arxius de Miscel-lània Zoològica*, 12: 124-129.
- JAWAD, L.A.; AL-MUKHTAR, M.A.; AL-FAISAL, A.J.; HAMMED T. 2014c New Record of *Neobythites steatiticus* Alcock, 1894 (Actinopterygii: Ophidiidae) from the Marine Waters of Iraq. *International Journal of Marine Science*, 32: 1-3.
- JAWAD, L.A.; AL-MUKHTAR, M.A.; AL-HILALI, H.I.; AL-FAISAL, A.J.; AL-DERAWI A.M. 2014d Occurrence of pinecone fish *Monocentris japonica* (Teleostei: Monocentridae) in the marine waters of Iraq. *Marine Biodiversity Records*, 7: 1-3.
- JAWAD, L.A.; AL-SHOGEBAL, S.; AL-MAMRY, J.M. 2012 First record of *Atractoscion aequiden* (Sciaenidae) from the Arabian Sea Coasts of Oman and *Acanthopagrus catenula* (Sparidae) from the Oman Sea (Gulf of Oman), northwestern Indian Ocean (Teleostei, Sciaenidae, Sparidae). *Arxius de Miscel-lània Zoològica*, 10: 9-15
- KENNEDY, W.P. 1937 Some additions to the fauna of Iraq. *Journal of the Bombay Natural History Society*, 39: 745-749.
- KUITER, R.H. 1993 *Coastal fishes of south-eastern Australia*. University of Hawaii Press, Honolulu. i-xxxi + 1-437p.

- LAL MOHAN, R.S.; TREWAVAS, E.; WHITEHEAD, P.J.P. 1984 Sciaenidae. In: FISHERS, A. and BIANCHI, G. (eds) *FAO species identification sheets for fishery purposes*. Vol 4. Western Indian Ocean (Fishing Area 51). FAO, Rome. 6p.
- LANDSBERGER, B. 1962 *The fauna of ancient Mesopotamia*. MSL VIII/2, second part. Pontificium Institutum Biblicum, Roma 204, Piazza Pilotta 35. Publié avec le concours financier de l'UNESCO et sous les auspices du Conseil International de la Philosophie et des Sciences Humaines, 180p.
- LARSON, H.K.; WILLIAMS, R. S. 1997 Darwin Harbour fishes: a survey and annotated checklist. In: HANLEY, J.R.; CASWELL, G.; MEGIRIAN, D.; LARSON, H.K. (eds) *Proceedings of the Sixth International Marine Biological Workshop*. The Marine Flora and Fauna of Darwin Harbour, Northern Territory, Australia. Museums and Art Galleries, Northern Territory and Australian Scientific Association: p.339-380.
- MANILO, L.G. and BOGORODSKY S.V. 2003 Taxonomic composition, diversity and distribution of coastal fishes of the Arabian Sea. *Journal of Ichthyology*, 43(1): 575-614.
- MASUDA, H.; AMAOKA, K.; ARAGA, C.; UENO, T.; YOSHINO, T. 1984 *The fishes of the Japanese Archipelago*. Tokyo (Tokai University Press). Text: i-xxii + 1-437, Atlas: Pls. 1-370.
- MISRA, K.S. 1947 On a second collection of fish from Iraq. *Records of the Indian Museum*, 45: 115-127.
- RANDALL, J.E. 1995 *Coastal fishes of Oman*. Crawford House Publishing Pty Ltd, Bathurst, Australia. i-xvi + 1-439.
- SAGGS, H.W.F. 1962 *The greatness that was Babylon*. Sedgwick and Jackson, London, 562p.
- SASAKI, K. 1996 Sciaenid fishes of the Indian Ocean (Teleostei, Perciformes). *Memoire of the Faculty of Science, Kochi University Series D Biology*, 16-17: 83-95.
- SASAKI, K. 2001 Sciaenidae. In: NIEM, V.H. (ed.) *FAO species identification guide for fishery purposes*. The living marine resources of the Western Central Pacific. Vol 6. FAO, Rome. p.2791-3380.
- STEINDACHNER, F. 1902 Wissenschaftliche Ergebnisse der südarabischen Expedition in den Jahren 1898 bis 1899. Fische von Südarabien und Socotra. *Anzeiger der Akademie der Wissenschaften in Wien*, 39: 316-318.
- TREWAVAS, E. 1977 The sciaenid fishes (croakers or drums) of the Indo-West Pacific. *Transaction of the Zoological Society of London*, 33(4): 253-541.