



Comparative Taxonomy of Two Species of *Acanthopagrus* Peters, 1855 (Pisces: Sparidae) with the First Record of *A. sheim* Iwatsuki, 2013 from Iraq

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Abstract: Morphometric and meristic characteristics of two species of genus *Acanthopagrus* (*A. arabicus* and *A. sheim*) were described based on 19 specimens of *A. arabicus* and 10 specimens of *A. sheim*. Distinguished morphometric characteristics between two species are included; obvious black streak on anal fin in fresh specimens and the black spots on the membrane between spines of dorsal fin found in *A. sheim* only, while yellow lower lobe of caudal fin in *A. arabicus* in compared with black or dusky once in *A. sheim*. Pectoral, pelvic and anal fins being vivid yellow (yellow in *A. sheim*, anal fin with black streaks), caudal fin being yellow in the lower part, while grayish on the upper part of *A. arabicus*. The biometric characters of 33 out of 42 morphometric characters of *A. arabicus* were larger than that of *A. sheim*, which reported for the first time in Iraqi waters.

Keywords: Marine fish, Sparidae, *Acanthopagrus arabicum*, *Acanthopagrus sheim*, Iraq

Introduction

Sparidae Rafinesque, 1818 (166 porgies and seabreams) is a family of the order Perciformes, that comprises 39 genera (Fricke *et al.*, 2018). *Acanthopagrus* Peters, 1855 is the largest genus, which includes 22 valid species (Froese & Pauly, 2018). In Iraq, sparids are represented with 11 valid species (Ali *et al.*, 2018).

Body of sparids with one dorsal fin consists of anterior spiny part (10-13 spines) and posterior soft part (9-17 rays); Anal fin bears three spines and 7-15 rays, cheek being scaled with preopercular has un-serrated posterior margin, mouth with canine-like, conical or

incisor like teeth, molar often present. Members of Sparidae are marine (occasionally some spend its life in estuaries) mainly in temperate of Atlantic, Indian, and Pacific Oceans, they are demersal, mostly on rocky or sandy bottoms (Carpenter *et al.*, 1997; Nelson, 2006).

Fishes of this family have been considered as of a great commercial, marketing table fishes (Froese & Pauly, 2018). Three sparid species were recommended to be raised in marine aquaculture programs in the Arab Emirates (NordOest, 2015). *Acanthopagrus latus* (= *Acanthopagrus* sp.) was successfully

cultured in Iran (Regunathan & Kitto, 2005; Abdi *et al.*, 2011) and Kuwait (Abou-Seedo *et al.*, 2003a,b). During 2012 a total catch of 3500 tons were landed in Iran (Vahabenzhad *et al.*, 2016).

A. arabicus represents 4.2% of the total catch in Shatt Al-Arab river (Mohamed and Abood, 2017), and 8.4% of the total catch in Iraqi marine water (Younis *et al.*, 2014). The same species was recorded as a member of the fish population of Al-Hammar marsh (Hussain *et al.*, 2009).

Al-Hassan (1990) compared the morphometric and meristic and electrophoresis analysis of two populations of *A. latus* (= *Acanthopagrus* sp.) from Shatt Al-Arab and Khor Al-Zubair regions. Hussain *et al.* (2001) investigated some biological aspects of juvenile and immature of it in Khor Al-Zubair lagoon. Mohamed *et al.* (2010) studied the taxonomy of *A. latus* (= *Acanthopagrus* sp.) from Shatt Al-Arab river, Shatt Al-Basrah canal and Iraqi marine water. Resean *et al.* (2010) estimated stock assessment of *A. latus* (= *Acanthopagrus* sp.) in the North western Arabian Gulf. Al-Faiz (2015) cultivated *A. arabicus* in various stocking densities and feeding rations under three rearing systems in Basrah province.

Recently, morphological and taxonomical studies of sparids, were conducted in the region, such as Mohamed *et al.* (2012), Iwatsuki (2013), Esmaeili *et al.* (2014) and Siddiqui *et al.* (2014). However, another studies are still published with misidentification and/or inaccurate taxonomy of the studied sparids (Jassim, 2013; Mohamed *et al.*, 2014a, b, 2015; Vahabnezhad *et al.*, 2016; Yaseen, 2016; Ghasemi and Shadi, 2018). *A. sheim* was recorded from Qatar and Saudia Arabia waters of the Arabian (Iwatsuki, 2013) and from Pakistani coastal waters (Siddiqui *et al.*, 2014). Hence, for the commercial importance as mentioned above, and the identification and taxonomical problems of this group of fishes (Ali *et al.*, 2018), the present study was conducted to insure the accurate identification and taxonomy of sparid genus *Acanthopagrus* of Iraq that previously mentioned as *A. latus*.

Materials and Methods

Acanthopagrus arabicus Iwatsuki, 2013 and *A. sheim* Iwatsuki, 2013 were collected as follow: 11 specimens of *A. arabicus* were collected from Shatt Al-Arab river at Abu Al-Khaseeb town on February 2015 and eight specimens from Shatt Al-Arab River near Hamdan village during November 2016. Three specimens of *A. sheim* were collected from the Iraqi marine waters near Al-Fao city during February 2015 and seven specimens from Shatt Al-Arab river at Abu Al-Khaseeb town during November 2016. All collection sites are located south of Basrah province. Marine specimens were caught by trawler, while the rest were collected by gill nets.

Fish samples were transferred in cooling box to the laboratory of Parasites and Fish Diseases, College of Agriculture, University of Basrah. Counts and measurements of 42 morphometric and eight meristic characters in addition to fish identifications generally followed Iwatsuki (2013). Fish measurement were used to detect the main characters, while fine measurements were detected using a digital vernier under Meigi dissecting microscope.

Specimens of both fishes were labelled, fixed on hard cartons and kept in 10% formalin for seven days, then sent and deposited in the Iraqi Natural Museum for History in Baghdad. Deposited numbers as follow: *A. arabicus* 18.698.Z4-18.701.Z4, *A. sheim* 18.694.Z4-18.696.Z4

Results

Fourty two morphometric and eight meristic characters were counted, measured and detected from 19 specimens of *A. arabicus* and 10 specimens of *A. sheim*. The former species was 110-191 mm, while the later was 142-300 mm in total length (Fig. 1).

Descriptions

1- *Acanthopagrus arabicus* Iwatsuki, 2013

English name: Arabian yellowfin seabream.

Local name: Shanak.

Body deep and represents 43.19% of the standard length. Head about one third of the

body, snout short and pointed. Eye orbit slightly shorter than snout and represents 9.67% of the standard length. Dorsal fin base very long, consist of XI, 11 or XII, 10 and rarely XI, 12, the fourth spine being the longest. Anal fin with three anterior powerful spines from which the second being longest and stoutest. Pectoral fin, long reaching slightly beyond the pelvic fin. Pelvic fin located under and slightly beyond the pectoral fin with one stout spine (Tables 1 & 2). Body of fresh specimens pale grayish dorsally, whitish abdominally, conspicuous black blotch on the upper margin of the operculum, and extended to the beyond two scales. Pectoral, pelvic and anal fins being vivid yellow, caudal fin being yellow in the lower part, while grayish on the upper part (Fig. 1A).

2- *Acanthopagrus sheim* Iwatsuki, 2013

English name: Spotted yellowfin seabream.

Local name: Sheim.

Body deep, thick and represents 42, 91% of the standard length (SL). Head about one third of SL, snout short and pointed. Eye orbit much shorter than snout and represents 8.54% of the standard length. Dorsal fin base very long, consist of XI, 11 or XII, 10, and rarely XII, 11; the fourth spine being the longest. Anal fin with three anterior powerful spines from which the second being longest and stoutest. Pectoral fin very long reaching the anterior of the anal fin. Pelvic fin located under the pectoral fin with one stout spine (Tables 1 & 2).

Body of fresh specimens pale grayish dorsally, whitish abdominally, black blotch on the upper margin of the operculum, extended to the beyond three scales. Dorsal fin membrane grayish with two rows of dark spots (Fig. 1C). Pelvic and anal fins being yellow. Anal fin being yellow with black streaks. Caudal fin being dusty to dark grayish (Fig. 1B).

Table (1): Meristic characters of *A. arabicus* and *A. sheim* collected from Iraqi waters.

Character	<i>A. arabicus</i>	<i>A. sheim</i>
Pored scales lateral line	43-45 (43.57)	46-47 (46.75)
Scale rows number between lateral line to 1 st dorsal spine	4.5	5
Scale rows number between lateral line to 5 th dorsal pine	4	4.5
Scale bellow lateral line	11-12	10-12
Dorsal fin (spine, rays)	XII, 10 (n=7) XI, 11 (n=11) XI, 12 (n=1)	XII, 10 (n=5) XI, 11 (n=4) XII, 11 (n=1)
Anal fin (spine, rays)	III, 8-III-9.5	III, 8 or III-9
Pelvic fin (spine, rays)	I, 5	I, 5
Pectoral fin rays	12-15	14-16

Table (2): Morphometric data and proportional measurements of Iraqi specimens of *A. arabicus* and *A. sheim* expressed as percentages of standard length.

The character	<i>A. arabicus</i>				<i>A. sheim</i>			
	min	max	mean	±SD	min	max	mean	±SD
Predorsal Length	41.9	45.5	43.5	0.01	38.22	46.65	42.21±	2.13
Prepelvic Length	35.7	40.2	37.9	0.02	32.09	38.12	36.11±	2.04
Prepectoral Length	30.6	35.4	33.5	0.02	20.76	34.81	30.78±	3.95
Preanal Length	68.2	72.4	70.3	0.02	64.58	73.19	69.57	2.78
Head Length.	29.48	33.57	30.99	1.49	27.33	32.65	30.78	1.54
Head W.	16.7	17.9	17.3	0.08	15.16	18.57	17.02	1.14
Body W.	15.21	20.39	17.26	1.50	15.7	19.45	17.89	1.47
Body Depth 1st dorsal spine	40.84	46.49	43.10	1.62	39.14	46.37	42.91	2.34
Body Depth at 1st Anal spine	30.3	38.43	34.54	2.12	32.16	39.27	36.46	2.35
Upper Jaw	11.5	13.3	12.2	0.01	11.64	13.17	12.37	0.68
Lower Jaw	10.9	13.2	11.8	0.01	9.78	11.62	11.17	0.68
Eye diameter	6.74	9.95	8.08	0.94	6.33	8.27	7.58	0.97
Orbit Length	8.51	11.65	9.67	1.02	7.47	10.08	8.54	0.87
Snout Length	10.45	12.96	11.82	0.75	10.1	12.24	11.06	0.78
Anal Fin base	16.19	18.63	17.51	0.83	13.07	18.13	15.82	0.57
Dorsal spinous part	34.87	39.81	37.28	1.80	31.29	40.57	35.47	1.62
Dorsal fin base	53.19	61.6	56.96	2.60	49.16	57.64	55.02	2.75
Longest pect. fin Length	27.5	42	37.9	0.04	34.68	41.89	38.34	2.39
1st dorsal fin ray	9.93	14.22	11.95	1.26	9.82	14.35	11.9	6.28
Caudal peduncle depth	14.7	17.1	16.3	0.01	16.04	18.52	16.99	0.90
Caudal peduncle Length	14.4	18.2	16.4	0.01	11.2	16.26	13.66	1.40
Caudal fin Length	29.2	33.3	30.3	0.03	24.68	31.04	29.25	1.86
1st dorsal spine	5.72	9.15	7.48	1.00	4.53	14.89	7.77	3.53
2nd dorsal spine	11.43	17.11	13.06	1.87	8.13	18.35	12.26	3.21
3rd dorsal spine	10.90	18.46	16.15	2.03	11.4	19.09	15.8	2.70
4th dorsal spine	15.6	19.84	17.29	1.32	12	19.05	16.21	2.72
5th dorsal spine	15.18	19.91	16.59	1.43	12.36	18.78	15.56	2.35
6th dorsal spine	14.24	18.96	16.05	1.45	10.94	18.23	14.76	2.46
7th dorsal spine	13.3	16.6	15.6	0.01	10.85	16.18	14.03	2.04
8th dorsal spine	13.3	15.8	14.8	0.01	9.82	16.04	13.51	2.09
9th dorsal spine	13.2	15.2	14.0	0.01	9.33	15.15	12.64	1.91
10th dorsal spine	12.2	14.0	13.2	0.01	9.11	14.74	11.4	1.70
11th dorsal spine	11.6	16.1	12.81	0.85	8.49	12.09	10.47	1.40
12th dorsal spine	10.14	13.81	11.6	1.10	7.91	10.9	9.54	1.11
Pelvic spine	16.3	19.4	18.2	0.01	14.53	17.17	15.68	1.17
Longest pelvic ray	23.5	34.5	27.5	0.03	20.09	27.55	23.34	2.24
1st anal spine Length	5.06	8.06	6.08	0.80	3.07	6.26	4.82	1.11
2nd anal spine Length	18.08	22.75	20.02	1.40	12.4	23.14	18.04	3.99
3rd anal spine Length	11.87	15.55	13.41	1.20	9.83	14	12.5	1.89
1st anal ray Length	13.7	15.6	14.7	0.01	9.56	16.11	12.98	2.09

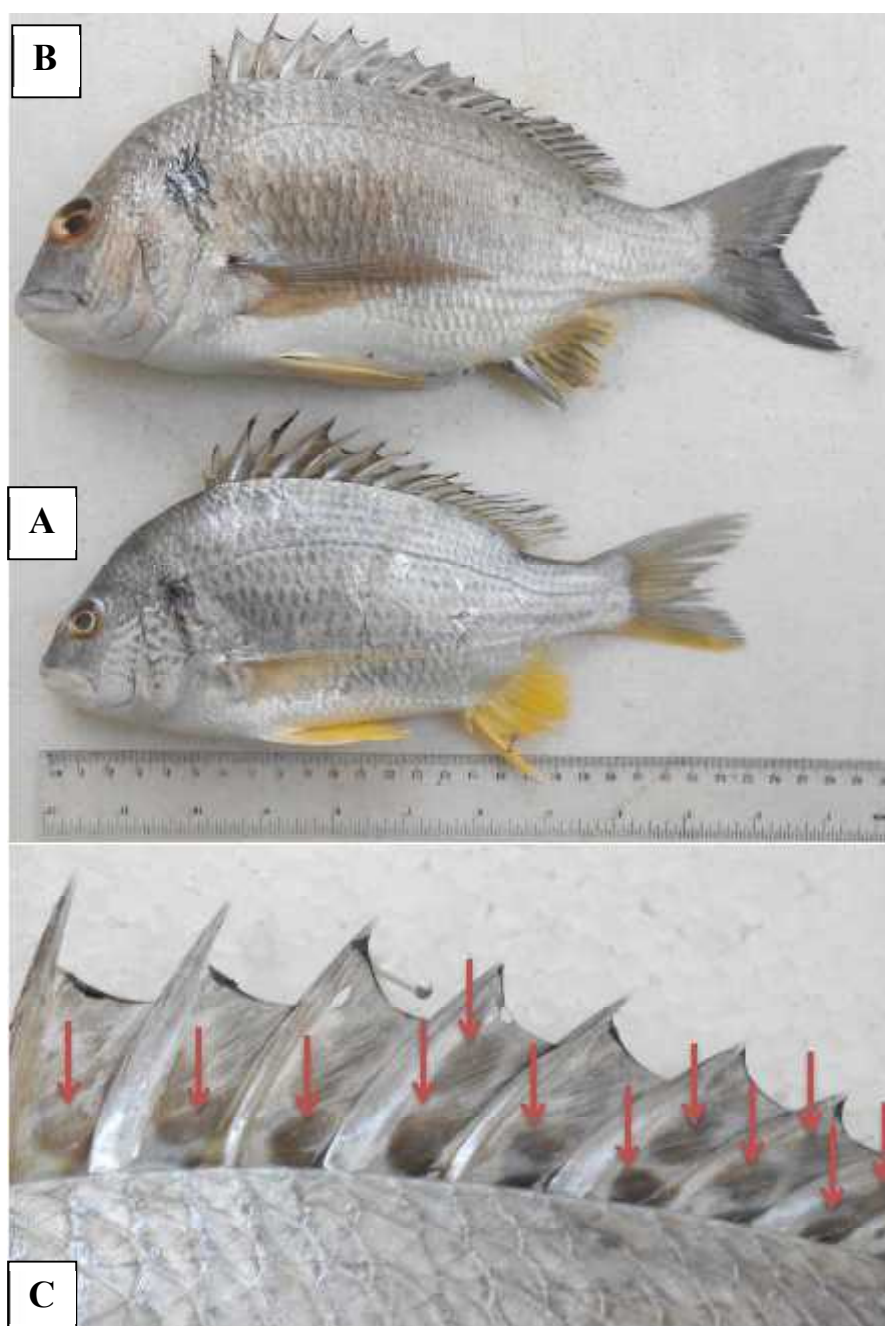


Fig. (1): (A): *Acanthopagrus arabicus*, (B): *A. sheim*. (c): Dorsal fin membrane with two rows of dark spots (arrows) in *A. sheim*.

Discussion

The present study indicates that the descriptions of *A. arabicus* and *A. sheim* are identical with that of Iwatsuki (2013). However additional morphological features were added here, such as dorsal fin formula being XI, 11 or XII, 10 in *A. arabicus*, while he found XI, 11 in the population of the Arab Gulf and XII, 10 in the populations of the Arab Sea and Gulf of Oman. The biometric

ratio of 33 out of 42 morphometric characters that clarified in table (2) of *A. arabicus* were larger than that of *A. sheim*, which reported for the first time here. The number of scales on the lateral line, being 43-45 in *A. arabicus* and 46-47 in *A. sheim*, both are within the range that given by Iwatsuki (2013) and Siddiqui *et al.* (2014). The black blotch of both species are described in details here and it seems to cover slightly larger area in *A. sheim*. The last important feature which can

be used to differentiate between both species is the dark spots on the membrane of the dorsal fin which is present only in *A. sheim*.

Siddiqui *et al.* (2014) established a guide key to 14 sparid species and added new distribution of both *A. arabicus* and *A. sheim* in Pakistani waters. Their study refer to the colours of pelvic and anal fins as vivid yellow in *A. arabicus* and faint yellow in *A. sheim*, moreover the number of spines and rays of dorsal fin being XI, 11 or XII, 10, which are agreed with findings of present study.

Historically in Iraq and adjacent countries, several studies mentioned the above two species as *A. latus* (Ali *et al.*, 2018); according to this review it is very difficult to confirm now the true identity of the fish samples of that studies because of no clear photographs nor fish specimens were preserved.

Al-Hassan (1990) studied some meristic (dorsal fin and pectoral fin rays) and electrophoretic characters of two populations of *A. arabicus* (mentioned as *A. latus*) in Shatt Al -Arab river and Khor Al-Zubair estuary. He concluded that there is only one stock of this species in southern Iraq as meristic variations may reflect environmental influences. However, the two meristic characters are inadequate to confirm the presence of two different species.

Mohamed *et al.* (2010) compared the meristic and morphometric characters of *A. latus* (= *Acanthopagrus* sp.), their results show some relative differences of morphometric characters as the ratio of SL to height of the dorsal fin ranged from 4.75 in Shatt Al-Arab river to 6.15 in the Iraqi marine water, moreover the meristic character of dorsal fin (XI, 10) was not conspecific with the known characters of *A. arabicus* or *A. sheim* (XI, 11 or XII, 10). Hence it is difficult to conclude which species was examined in their investigation.

Iwatsuki (2013) reviewed *A. latus* complex in Indo west-Pacific Ocean. He described three new species, all so far misidentified as *A. latus*. These new species namely *A. arabicus* from middle east except Red Sea, *A.*

sheim from Arabian Gulf and *A. longispinnis* from Bengal bay. Esmaili *et al.* (2014) confirmed that populations the past *A. latus* in estuaries and inland rivers in coastal area of the Persian (=Arabian) Gulf and Strait of Hormuz belong to *A. arabicus*. Siddiqui *et al.* (2014) surveyed the species of Sparidae in Pakistani waters and prepared keys to 14 species that recoded there and reported five new records included *A. arabicus* and *A. sheim*.

Ghasemi and Shadi (2018) published genetic article on the population structure of *A. latus* (= *Acanthopagrus* sp.) in Northern Persian (=Arabian) Gulf and Gulf of Oman. That was a bad paper, due to no identification evidence and there are several sparid species in the Middle east except *A. latus* (Prof. Dr. Yukio Iwatsuki, Pers. Comm., 6.10.2018).

Conclusions

In the meantime, two species of the genus *Acanthopagrus* viz., *A. arabicus* and *A. sheim* are distributed in marine and inland water of Iraq in addition to *A. berda*, *A. bifasciatus* and *A. catenula*.

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