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ORIGINAL ARTICLE

FIRST RECORD OF THE NORTH AFRICAN CATFISH *CLARIAS GARIEPINUS* (BURCHELL, 1822) (SILURIFORMES, CLARIIDAE) IN TIGRIS RIVER, IRAQ

Hind D. Hadi*,♦, Abed H. Baraaj**, Atheer H. Ali*** and Maab R. Sajet*
*Iraq Natural History Research Centre and Museum, University of Baghdad, Baghdad, Iraq
**College of Science, University of Baghdad, Iraq.
*** Department of Fisheries and Marine Resources, College of Agriculture, University of Basrah, Basrah, Iraq.
♦Corresponding author E-mail: hind.d@nhm.uobaghdad.edu.iq

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ABSTRACT

The current study aimed to determine the morphometric and meristic characteristics of the North African catfish *Clarias gariepinus* (Burchell, 1822). Six specimens of *C. gariepinus* were collected from the Tigris River, in central Iraq. This study is considered the confirmation first record of this species in Iraq, and the second documentation of this exotic fish. The present species is characterized by a very long dorsal fin, a rounded caudal fin and four pairs of barbels.

Keywords: Clariidae, Cat Fish, Exotic fish, Morphology, Tigris River.

INTRODUCTION

The African catfish, *Clarias gariepinus* (Burchell, 1822), is one of the most important fish species cultured in many parts of the world. This is mainly due to its high demand, better growth rate, lower susceptibility to disease, and higher survival rate in poor water quality. This fish is highly valued by consumers and represents an important source of animal protein for rural populations. *Clarias* species are originally freshwater catfishes characterized by their ability to utilize atmospheric air and move on land for several hundred meters with the help of their pectoral spines (Teugels, 1996; Fagbuaro, 2010). They are exposed to many chemical, and physical changes, resulting from human activities, temperature fluctuations, and salinity changes which threaten ecosystems. Catfishes are most diverse in tropical regions of South America, Asia, and Africa (Wimberger, 1992). In Syria, the presence of African catfish is limited to a small number of warm springs and gradually increases to high levels of production, Semi-intensive culture is common in earth ponds, while intensive culture in cages is limited to a small number of farms in large reservoirs (FAO, 2024).

Morphometric and meristic traits in fish species have been commonly used to identify fish populations. These characters remain the simplest and most direct methods of species identification (Turan, 2004). According to some works e. g. Mamuris *et al*. (1998), Bronte *et*

al. (1999), and Hockaday *et al*. (2000), analyzing phenotypic differences in morphometric or meristic characters is the most commonly used method to delineate fish populations.

No information is available on the morphometric and meristic characteristics of Clariid catfish in natural waters in Iraq, except one report from FAO (Bartley, 2006) regarding the introduction of this species into fisheries and aquaculture, Iraq is listed as one of the countries where this catfish has been introduced. Unfortunately we could not access this report although the species is mentioned in the distribution area of the North African catfish (See Froese and Pauly, 2024). Hence, the current study is considered the first confirmation record of this exotic *C. gariepinus* in Iraq, providing for the first time, the morphometric and meristic characters. Hadi *et al*. (2023) explained that Mohammed (2021) in her unpublished thesis reported catching this catfish from the Little Zab River northern Kirkuk province but only for parasitological purposes.

MATERIALS AND METHODS

Study area: Al-Zubaydia Sub-district is one of the sub-districts of the Al-Suwaira district in Wasit Province. Al-Zubaydia is situated in the southeast of Baghdad, at coordinates 32°45'46.6"N 45°10'48.7"E, 50 km south of Al-Suwaira and 85 km north of Kut City.

Sample collection: A total of six fish specimens were collected using gill nets by fishermen, during the period from May to December, 2022. The fishes were transported in a cool box with crushed ice to the laboratory of the Iraq Natural History Research Centre and Museum, University of Baghdad.

Morphology study: Each specimen was measured using a 1-meter measuring board graduated in millimeters (mm) and a digital caliper. The weight of each individual fish was measured immediately using a digital balance. The morphometric features were measured from left side of each fish. The morphometric and meristic characters were assessed following the methods described by Hubbs and Lagler (1964). The specimens were photographed using a Samsung camera of Korean origin.

RESULTS

Order: Siluriformes
Family: Clariidae
Clarias gariepinus (Burchell, 1822)
Common names: North African catfish.
Synonyms: *Silurus gariepinus* Burchell, 1822
Macropteronotus charmuth Lacepède, 1803
Clarias capensis Valenciennes, 1840

The body is elongated, with the head appearing somewhat between rectangular and pointed in dorsal outline. The snout is rounded, and the eyes are relatively small. The body lacks scales and has four pairs of barbels. The pelvic fin positioned closer to the snout than to the caudal fin base or approximately midway. The pectoral fin extends from the

operculum to below the first dorsal fin ray. Pectoral spine is robust and serrated only on its outer surface (Pl. 1) and (Tab. 1, 2).

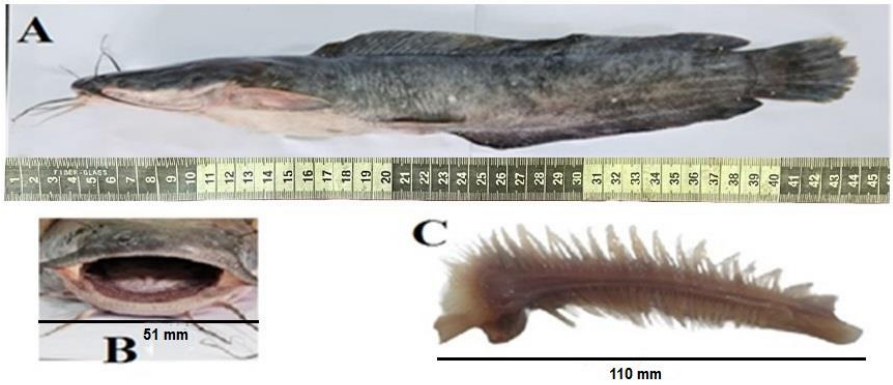

Plate (1): A-Lateral view of *Clarias gariepinus*, B- Frontal view of the mouth, C- First gill arch.

Table (1): The morphological characters of *Clarias gariepinus*.

Character	Min-Max (Mean ±SD)	Proportional measurements as expressed as percentage of Standard Length or of Head length*
Weight	469-530 (495.12±26.09)	-
Total Length (TL)	450-550 (493.75±42.69)	-
Standard Length (SL)	371-472 (420.25±43.27)	-
Maximum Body Height (MBH)	60-69 (62.62±4.26)	14.02-16.17 (14.96±0.90)
Minimum Body Height (MIBH)	32-41 (35.75±3.86)	8.28-8.69 (8.51±0.18)
Caudal Peduncle Length (CPL)	9-12 (10.375±1.25)	2.12-2.76 (2.48±0.27)
Dorsal Fin Length (DFL)	300-350 (320.62±22.94)	63.56-94.34 (77.32±13.49)
Dorsal Fin Height (DFH)	32-35 (33.12±1.31)	7.42-8.63 (7.92±0.54)
Pectoral Fin Length (PFL)	54-60 (57±2.58)	11.44-15.09 (13.68±1.58)
Pelvic Fin Length (VFL)	45-48 (46.37±1.25)	9.75-12.13 (11.11±1.01)
Pectoral-pelvic Distance (PVD)	91-109 (97.37±8.01)	22.07-24.53 (23.22±1.00)
Predorsal Distance (PDD)	145-149 (146.37±1.79)	31.57-39.08 (35.08±3.25)
Prepelvic fin Distance (PVD)	200-220 (210.62±8.75)	46.61-53.91 (50.36±3.09)
Prepectoral Distance (PPD)	86-95 (88.62±4.26)	20.00-23.18 (21.19±1.48)
Preanal fin Distance (PAD)	235-267 (250.87±13.75)	56.57-63.34 (59.92±2.89)
Pelvic-Anal fin Distance (VAD)	41-45 (43.5±1.91)	9.53-11.05 (10.40±0.64)
Anal Fin Length (AFL)	155-216 (181.5±26.05)	41.78-45.76 (43.06±1.82)
Anal Fin Height (AFH)	25-31 (27.25±2.62)	5.75-7.28 (6.51±0.62)
Preanus Distance (PASD)	221-255 (240.37±15.33)	54.03-59.57 (57.38±2.39)
Post Back Distance (PBD)	75-80 (77.75±2.21)	16.95-20.22 (18.61±1.38)
Center Caudal Fin Length (UCFL)	52-55 (53.62±1.25)	11.44-14.02 (12.84±1.09)
Head Length (HL)	121-125 (123.5±1.91)	-
Head Height* (HH)	65-69 (66.75±1.70)	52.80-55.20 (54.05±1.02)
Snout Length* (SnL)	32-36 (33.75±1.70)	28.80-29.60 (29.15±0.36)
Orbit Diameter* (OD)	6-6.2 (6.05±0.1)	4.80-4.90 (4.90±0.47)
Eye Diameter* (ED)	3-3 (3±0)	2.40-2.48 (2.43±0.03)

Post Orbit Distance* (POD)	79-85 (80.8±27.8)	64.00-68.00 (65.48±1.75)
Interorbital Distance* (IOD)	50-53 (51.125±1.31)	64.8- 42.4 (41.39±0.70)
Mouth Width* (MW)	41-56 (49.25±6.39)	32.80- 44.80 (39.89±5.16)
Anterior (Maxillary) Barbles Length* (ABL)	36-43 (38.12±3.27)	29.60-34.40 (30.86±2.36)
Posterior (Mandibular) Barbles Length* (PBL)	79-98 (88.5±3.27)	63.20-80.99 (71.65±7.73)

Table (2): The meristic characters of *Clarias gariepinus*.

Character	Min-Max (Mean ±SD)
Dorsal Fin Rays	62-64 (62.75±0.95)
Pectoral Fin Spine	1-1 (1±0)
Pectoral Fin Rays	9-10 (9.75±0.5)
Anal Fin Rays	48-50 (49.5±1)
Caudal Fin Rays	19-19 (19±0)
Unbranched Pelvic Fin Rays (UVFR)	1-1 (1±0)
Branched Pelvic Fin Rays (BVFR)	6-6 (6±0)
Gill Rakers	35-47(41±8)
Barbles No.	8-8 (8±0)

DISCUSSION

Turn *et al*. (2005) studied morphometric variation among six populations of *Clarias gariepinus* in Turkey and observed that some differences were mainly associated with measurements taken from the fish's head. In comparison of some of meristic characters obtained from the present study, the mean number of the dorsal fin rays, anal fin rays, pectoral fin rays, and pelvic fin rays were 62.75, 49.5, 9.57, and 6.0 respectively. Whereas the mean number reported by Fagbuaro *et al*. (2015) from the Ogbese River in Nigeria were 66.0 and 64.0; 51.0 and 48.0; 8.0 and 8.0 and 6.0 and 6.0 for cultured and wild populations, respectively.

The meristic characters reported by the present study the means number of dorsal fin rays, anal fin rays, pectoral fin rays, pelvic fin rays, and caudal fin rays are 62.75, 49.5, 9.57, 6.0 and 19.0 respectively. Whereas the mean numbers reported by Solomon *et al*. (2015) from Benue State, Nigeria waters are 68.40 and 67.80; 51.70 and 54.07; 8.50 and 7.80; 5.30 and 5.73 and 17.90 and 18.40 for cultured and wild populations respectively.

The meristic characters reported in the current study, including the mean numbers of dorsal fin rays, anal fin rays, pectoral fin rays, pelvic fin rays, and caudal fin rays were 62.75, 49.5, 9.57, 6.0 and 19.0 respectively, By comparison, the mean number obtained by Solomon *et al*. (2016) were 72.26 and 72.40; 55.14 and 56.06; 8.12 and 8.36; 5.82 and 6.06; 19.9 and 19.8 from two eco-areas in Nigeria respectively.

The mean number of dorsal fin rays, anal fin rays, pectoral fin rays, pelvic fin rays, and number of barbels in the present specimens was 62.75, 49.5, 9.57, 6.0 and 8 respectively, Whereas the means reported by Ola-Oladimeji *et al*. (2016) from Ekiti State, Nigeria waters are 65.8 and 63.97; 50.50 and 48.17; 7.93 and 6.29; 5.65 and 5.08; 8 and 8 for wild and

cultured populations respectively. Onyekwelu *et al*. (2021) explored the relationship between some morphometric characters (total length, standard length, head width head length, and snout length) and body weight, confirming a significantly high correlation between body weight and these morphometric parameters.

As a comparison of some meristic characters obtained from the current study the mean numbers for the dorsal fin rays, anal fin rays, pectoral fin rays, and pelvic fin rays, caudal fin rays were 62-62, 48-50, 9-10, 7 and 19 respectively. In contrast, Singh *et al*. (2021) for specimens from the Ganga River in India (Tab. 3).

According to Bilal (Pers. Comm.) this catfish has been part of food of the local diets in Mosul for more than two years ago; in addition a few specimens have been collected from Al-Gharraf River (Thi Qar Provine) and Northern Basrah Province (Personal data), Baghdad (M. I. Ghazwan, Pers. Comm.). As well as very recently the species was also observed in the Huwazah marsh (A.M. Moejer, Pers. Comm.).

Hadi *et al*. (2023) reported that the number of exotic fish species in Iraq has reached 20, spanning seven orders and 12 families, including *C. gariepinus*. Mohammed (2021) captured 93 specimens during her parasitology study between 2020 and 2021. Providing strong evidence of a well-established population of this exotic species in the northern part of Iraq and its successful invasion of the central and southern part of Iraq. Based on the present observations, the North African catfish has been recorded in the Tigris River (Mosul, Kirkuk, Baghdad, Kut, Huwazah and Northern Basrah). It is the most likely that this species entered Iraq through the Tigris river (Turkey) rather than the Euphrates River via (Syria).

Table (3): Comparison the meristic characters of *Clarias gariepinus* among different historical studies with present study.

Meristic Characters of *Clarias gariepinus*	**Present study**	**Fagbuaro *et al.* (2015)**	**Solomon *et al.* (2015)**	**Solomon *et al.* (2016)**	**Oladimeji *et al.* (2016)**	**Singh *et al.* (2021)**
Dorsal Fin Rays	62-64	64.0, 66.0	68.40, 67.80	72.26, 72.40	65.8, 63.97	70-74
Anal Fin Rays	48-50	51.0, 48.0	51.70, 54.07	55.14 , 56.06	50.50, 48.17	51-53
Pectoral Fin Rays	9-10	8.0, 6.0	8.50, 7.80	8.12, 8.36	7.93, 6.29	6-8
Pelvic Fin Rays	7-7	6.0	5.30, 5.73	5.82, 6.06	5.65, 5.08	6-8
Caudal Fin Rays	19-19	-	17.90, 18.40	19.8, 19.9	-	15-17
Barbles No.	8-8	-	-	-	8-8	-

CONCLUSIONS

In view of the results of the current study and historical studies it can be concluded that both morphometric and meristic characters are affected by changes in environmental factors.

However, their responses vary in certain situations and may differ from species to species. This species is now distributed in the Tigris River.

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CONFLICT OF INTEREST STATEMENT

"The author has no conflicts of interest to declare".

LITEREATURE CITED

Bartley, D. M. 2006. DIAS. Introduced species in fisheries and aquaculture: information for responsible use and control (CD-ROM). Rome, FAO. [Click here]

Bronte, C. R., Fleischer, G. W., Maistrenko, S. G. and Pronin N. M. 1999. Stock structure of Lake Baikal omul as determined by whole body morphology. *Journal of Fish Biology*, 54: 787- 798. [CrossRef]

Fagbuaro, O., Oso, J. A., Olurotimi, M. B. and Akinyemi, O. 2015. Morphometric and meristic characteristics of *Clarias gariepinus* from controlled and uncontrolled population from South Western Nigeria. *Journal of Agriculture and Ecology Research International*, 2(1): 39-45. [Click here]

Fagbuaro, O. 2010. Aquacultural implications of cephalic deformity in the African Catfish, *Clarias gariepinus* (Burchell, 1822*). Journal of Environmental and Sciences*, 6(1): 112-119. [Cited by Uruku, M. N., Adikwu, I. A., Oyebola, O. O. and Uchendu, T, E. 2021. Phenotypic Diversity of *Clarias gariepinus* (Burchell, 1822) from Benue River and a Tributary in North East Nigeria. *Magna Scientia Advanced Biology and Pharmacy*, 2(1): 009-018]. [CrossRef]

FAO. 2024. Fishery and Aquaculture Country Profiles. In: *Fisheries and Aquaculture*. [Click here]

Froese, R. and Pauly, D. (Eds.). 2024. FishBase. World Wide Web electronic publication, version (06/2024). [Click here]

Hadi, H. D., Baraaj, A. H. and Ali, A. H. 2023. Diversity of Freshwater Fishes in Iraq. *Revis Bionatura* 8(3): 109. [CrossRef]

Hockaday, S., Beddow, T. A., Stone, M., Hancock, P. and Ross, L.G. 2000. Using truss networks to estimate the biomass of *Oreochromis niloticus* and to investigate shape characters. *Journal of Fish Biology*, 57: 981-1000. [CrossRef]

Hubbs, C. L. and Lagler, K. F. 1964. Fishes of the Great Lakes region. *Cranbrook Institute of Science Bulletin*, 26: 1-213. Cited by Tanaka, F. and Iwatsuki, Y. 2015. *Amamiichthys*, a new genus for the sparid fish *Cheimerius matsubarai* Akazaki 1962, and redescription of the species, with designation of a neotype. *Zootaxa*, 4007(2): 195-206. [Click here]

Mamuris, Z., Apostolidis, A. P., Panagiotaki, P., Theodorou, A. J. and Triantaphllidis, C. 1998.Morphological variation between red mullet populations in Greece. *Journal of Fish Biology*, 52: 107-117. [CrossRef]

Mohammed, E. H. 2021. The affection of environmental conditions of Three types of fish with external parasites of the Little Zab river. M. Sc. Thesis, College of Education for Girls, University of Tikrit, 99pp.

Ola-Oladimeji, F. A., Awodiran, M. O., Fagbuaro, O. and Akomolafe, A. O. 2016. Morphological characterization of wild and cultured *Clarias gariepinus* (Burchell 1822) using principal component and cluster analyses. *Notulae Scientia Biologicae*, 8(4): 428-436. [Click here]

Onyekwelu, I., Anyadike, C. C., Ossai, N. I., Nwoke, O. A. and Ndulue, E. L. 2021. Interrelationship between some morphometric parameters and bodyweight of tank-based cultured African catfish (*Clarias gariepinus* Burchell, 1822). *Aquaculture and Fisheries*, 6(6): 628-633. [CrossRef]

Solomon, S. G., Okomoda, V. T. and Ogbenyikwu, A. I. 2015. Intraspecific morphological variation between cultured and wild *Clarias gariepinus* (Burchell) (Clariidae, Siluriformes). *Archives of Polish Fisheries*, 23: 53- 61. [CrossRef]

Solomon, S. G., Tiamiyu, L. O., Annune, P. A. and Apochi, J. O. 2016. Morphometric and meristic diversity between strains of *Clarias gariepinus* (Burchell, 1822) from two eco-regions of Nigeria. *Journal of Research in Forestry, Wildlife and Environment*, 8(2): 112-125. [Click here]

Singh, A. K., Ansari, A. and Srivastava, S. C. 2021. Morpho-meristics, maturity stages, GSI and gonadal hormone plasticity of African catfish *Clarias gariepinus* (Burchell 1822) that invaded into the Ganga River, India. *Journal of Basic and Applied Zoology*, 82(30): 1-12. [CrossRef]

Teugels, G. G. 1996. Taxonomy, phylogeny biogeography of catfishes (Ostariophysi: Siluroidei): An overview. *Aquatic Living Resources*, 9: 9- 34. [CrossRef]

Turan, C. 2004. Stock identification of Mediterranean horse mackerel (*Trachurus mediterraneus*) using morphometric and meristic characters. *ICES Journal of Marine Science*, 61: 774 - 781. [CrossRef]

Turan, C., Yalçin, S., Turan, F., Okur, E. and Akyurt, I. 2005. Morphometric comparisons of African catfish, *Clarias gariepinus*, populations in Turkey. *Folia Zoologica*, 54(1–2): 165-172.

Wimberger, P. H. 1992. Plasticity of fish body shape, the effects of diet, development, family and age in two species of *Geophagus* (Pisces: Cichlidae). *The Biological* Journal *of the Linnean Society*, 45: 197-218. [CrossRef]

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تسجيل اول لجري شمال افريقيا *Clarias gariepinus* (Burchell, 1822) (Siluriformes, Clariidae) في نهر دجلة، العراق

*هند ضياء هادي، **اثير حسين علي ، ***عبد حسن براج و *مآب رياض ساجت

*مركز بحوث ومتحف التاريخ الطبيعي، جامعة بغداد، بغداد، العراق.

**كلية الزراعة، قسم الثروة السمكية والبحرية، كلية الزراعة، جامعة البصرة، البصرة، العراق.

*** كلية العلوم، قسم علوم الحياة، جامعة بغداد، بغداد، العراق.

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الخلاصة

هدفت الدراسة الحالية إلى تحديد الخصائص المظهرية والعددية لجري شمال أفريقيا *Clarias gariepinus* (Burchell, 1822) ، حيث تم جمع ستة نماذج من سمك الجري *C. gariepinus* من نهر دجلة، وسط العراق. تعتبر هذه الدراسة بمثابة التسجيل المؤكد لهذه السمكة لاول مرة في العراق، والوثيقة الثانية عن هذه الأسماك الغريبة. ويتميز هذا النوع من الاسماك بزعنفة ظهرية طويلة ، وزعنفة ذنبية مستديرة، و اربعة ازواج من الزوائد اللحمية الفمية.