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THE DANUBE STURGEON *ACIPENSER GUELDENSTAEDTII* BRANDT & RATZEBURG, 1833 (ACTINOPTERYGII, ACIPENSERIDAE) IN THE EUPHRATES RIVER, IRAQ

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ABSTRACT

Acipenser gueldenstaedtii is recorded for the first time from the Euphrates River, west of Iraq. The species has not previously been mentioned as introduced to the Tigris-Euphrates River basin. There are two possibilities for this occurrence, first, the natural dispersal from adjacent Turkey and second, the aquaculture introduction. Both possibilities were discussed. Confirmation for the origin of the sporadic appearance of individuals of this species will wait for the appearance of more specimens in the inland waters of Iraq.

Key words: aquaculture, metric characters, meristic characters, introduction, range extension

INTRODUCTION

Sturgeon fishes are among the primitive teleosts. They are recognised with their large sized body and most species of these fishes living in the sea, but they need to return to the freshwater for reproduction [Koutrakis et al. 2011]. Moreover, sturgeons are regarded as globally threatened and close to extinction species due to the complexity in their life style and human wide usage exemplified in fishing by-catch, poaching, habitat dilapidation, and physical hindrances [Gessner 2000, Ludwig 2008].

The sturgeon species composition in Turkey was reviewed several times (see Akbulut et al. [2011] for details) and the results showed that there are seven species belonging to the Family Acipenseridae (*Huso huso*, *Acipenser sturio*, *Acipenser stellatus*, *Acipenser gueldenstaedtii*, *Acipenser nudiventris*, *Acipenser ruthenus*, *Acipenser persicus*). These species are distributed in the Turkish Black Sea coastal waters, with some of them entering the freshwater system [Bat et al. 2005].

Instances of fish escape from aquaculture facilities to the wild (marine or freshwater environments) are not unusual and have been seen in several countries around the world and for several species [Morris et al. 2008] including Turkey [Innal and Erkakan 2006]. Such incidences happened in spite of the presence of manageable preventing measures around the aquaculture facilities. Damage to the aquaculture facilities and predation are among the main causes for the aquaculture escapees and such events were happened in Turkey [Innal and Erkakan 2006].

The Danube sturgeon *A. gueldenstaedtii* Brandt & Ratzeburg, 1833 is mainly a marine species, but can be found in both the fresh and brackish waters and the individuals of this species prefer demersal habitats and living at depth range 2–100 meters [Riede 2004]. It is an anadromous species in which the mature adults migrate from the sea to the rivers for spawning and return to their feeding grounds in the sea after spawning. The juveniles that are hatching in the rivers will find their way to the sea for feeding and continue living there until reaching maturity [Demonte et al. 2017]. It distributed in the Eurasia from the Black Sea to the Sea of Azov and the Caspian Sea basins. Individuals of this species reach a maximum total length of 2360 mm [Kottelat and Freyhof 2007] and reported to live for 46 years [Chugunova 1959].

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Table 1. Morphometric and meristic characters of the Danube sturgeon *Acipenser gueldenstaedtii* collected from the Euphrates River, Iraq

Characters	Value
Morphometric characters	
Total length	300
Fork length (%TL)	290.7 (96.9)
Standard length (%TL)	287.1 (95.7)
Pre-anal length (%SL)	216.5 (75.4)
Pre-pelvic length (%SL)	188.1 (65.5)
Pre-pectoral length (%SL)	69.3 (42.1)
Pre-narial length (%HL)	14.4 (22.9)
Pre-orbital length (%HL)	21.6 (34.3)
Head length (%SL)	63.0 (21.9)
Pre-dorsal length (%SL)	204.1 (71.1)
Meristic characters	
Number of scutes in the dorsal row	12
Number of scutes in the lateral row	31
Number of scutes in the abdominal row	9
Number of pectoral fin rays	33
Number of dorsal fin rays	38
Number of anal fin rays	26
Number of pelvic fin rays	25

HL, Head length; SL, standard length; TL, total length

Several incidences of aquaculture escapes were recorded for sturgeon fish species such as the case of the estuary of the River Evros [Koutrakis and Economidis 2006] and the present study add another incidence of aquaculture escapee of the sturgeon species *A. gueldenstaedtii* from the Iraqi side of the Euphrates River. The importance of this record is to archive the event offish aquaculture escapees in general and the sturgeon fish in particular as the sturgeon species are not native to the freshwater fish fauna.

MATERIAL AND METHODS

A single specimen (Fig. 1) of *A. gueldenstaedtii* caught on 30th October 2020 in gillnets by an artisanal fishermen operating in Euphrates River at Anah City, Al-Anbar Governorate, 63 km northwest of the capital Baghdad (34° 22′ 51.10″ N, 42° 00′ 49.84″ E) and made available for the 2nd and 3rd authors. The fisherman refused to sell the specimen, but allowed to take several photos and record body total and standard lengths. The basic measurements of taxonomical significance were recalculated from the photos, while meristic characters were counted and shown in Table 1. Body measurements follow those of Hilton et al. [2011]. All measurements are taken in a straight line (i.e., not following the curve of the body). Measurements were recorded to the nearest millimeter. Total length was taken from the anterior tip of the snout to the posteriormost tip of the caudal fin. Fork length from the anterior tip of the snout to the fork of the caudal fin. Standard length from the anterior tip of the snout to posteriormost keeled lateral scute. Prepelvic length from the anterior tip of the snout to the anterior base of the pelvic fin. Prepectoral length from the anterior tip of the snout to the anterior base of the pectoral fin. Predorsal length from the anterior tip of the snout to the anterior base of the dorsal fin. Preanal length from the anterior tip of the snout to the anterior base of the anal fin. Head length from the anterior tip of the snout to the posteriormost extent of

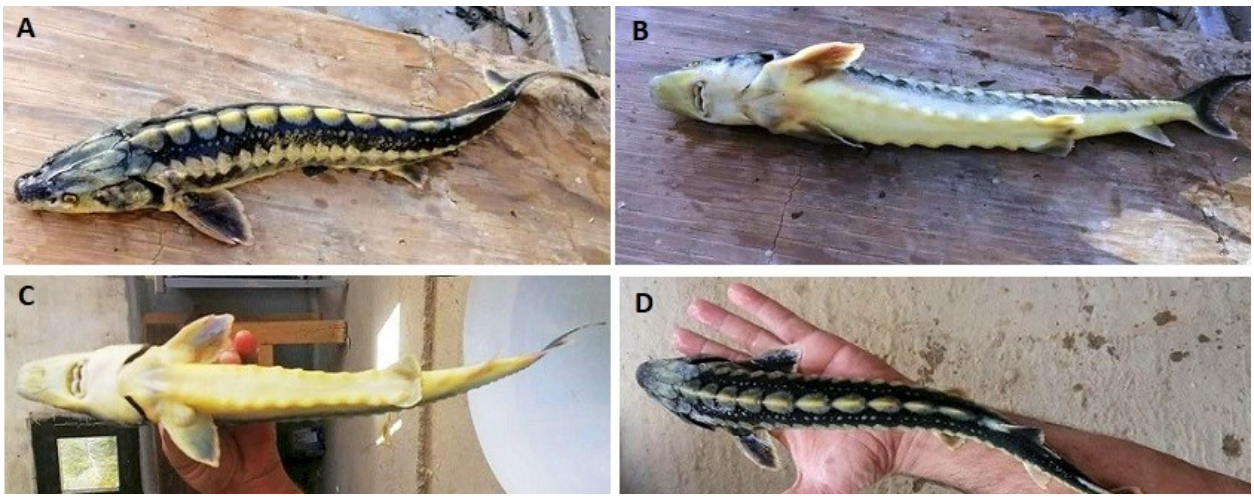

Fig. 1. Danube sturgeon *Acipenser gueldenstaedtii*, 300 mm TL, collected from the Euphrates River, Anah, Al-Anbar, West Iraq. A, dorsal-lateral view; B, ventral-lateral view; C, ventral view; D, dorsal view

the subopercle bone. Preorbital length from the anterior tip of the snout to the anterior bony margin of the orbit. Prenarial length from the anterior tip of the snout to the anterior margin of the anterior nares.

RESULTS

The collected specimen measures 300 mm total length. *Acipenser gueldenstaedtii* is identified by the following set of characters: highest point not at first dorsal scute (vs. highest point at first and largest dorsal scutes in *A. schrenckii* and *A. nudiventris*); postdorsal and/or post-anal plates present (vs. post-dorsal and post-anal plates absent in *A. baerii*, *A. ruthenus*, *A. transmontanus* and *A. stellatus*); plates absent on sides of anal-fin base (vs. plates present on left and right side of anal-fin base in *A. sturio* and *A. oxyrinchus*); first dorsal scute separate from head plates (vs. first dorsal scute connected to head plates in *A. medirostris*, *A. mikadoi*, *A. brevirostrum*, *A. naccarii* and *A. fulvescens*); less than 44 dorsal fin rays (vs. more than 44 dorsal fin rays in *A. dabryanus* and *A. sinensis*); dorsal outlines of head and body creating an obtuse angle, snout short, blunt and slightly rounded (vs. dorsal outlines of head and body uninterrupted, snout elongate and curved downward in *A. persicus* and *A. colchicus*). The position of the barbels nearer the snout tip.

DISCUSSION

The data collected in this study were compared with those reported by other authors for populations living in the wild [Bănărescu 1964, Mageramov 1972, Artûhin 1979, Kazančeev 1981, Peseridi 1986] and found to be within the range of those populations.

The meristic characters attained are different from those obtained for this species kept in heated water in the aquaculture facilities. Keszka and Krzykawski [2008] showed a noticeably different meristic counts from those of the wild individuals. The major difference related the number of scutes in the lateral row, while counts of other meristic features were in the range depicting the natural populations of this species. Keszka and Krzykawski [2008] suggested that the deviation in number of scutes of the cultured population may reflect temperature effects on the scute counts. Poduška [1998] concluded that impacts of water temperature is a major determinant of the number of scutes. The number of scutes in the lateral row is a meristic character most frequently quoted in identification keys as diagnostic for *A. gueldenstaedtii*. Conferring to Koblickaâ [1966], this species has 30–50 lateral scutes and the count of scutes in the present study agrees with that of Koblickaâ [1966].

The metric features (expressed as percentages) considered in the identification keys of the species of the genus Acipenser as diagnostic for *A. gueldenstaedtii* comprise snout shape, snout length (not longer than 60% of the head length), and the barbels being located closer to the snout tip than to the mouth [Koblickaâ 1966, Hochleithner 1996]. The shape of the snout observed in the present specimen was short, blunt and slightly rounded and the snout length was lower than 60% of the head length stated in the keys (Table 1). In spite of the small size of the specimen (300 mm TL) it was possible to recognise the position of the barbels nearer the snout tip.

The metric characters showed lower values for the characters fork length, standard length, pre-dorsal length and pre-anal length compared to the heated aquaculture population observed by Keszka and Krzykawski [2008]. It appears that the dissimilarities perceived in metric characters between the cultured population examined by Keszka and Krzykawski [2008] and the specimen described in the present study from the wild were caused by the fast growth rate of the fish kept in heated water, whereby the trunk grew faster than the head. Ruban and Sokolov [1986] suggested that the changes in the metric features of the heated population might be due to the absence of strong current in the fish farm. Some authors elucidated variations in body proportions or a decrease of the number of meristic components in acipenserids by taming of some species in aquaculture [Prokeš et al. 1999] or by a adjusting reaction within the genetically established range of responses [Ruban and Sokolov 1986].

The occurrence of *A. gueldenstaedtii* in the Euphrates River drainage mainly due to the absence of physical barriers that limit its expansion. Such activity was also observed for the same species in different aquatic environments of southern South America in the Rio de la Plata Basin [Demonte et al. 2017]. Such presence within the Euphrates River basin in Turkey, Syria and west of Iraq seems to indicate this anadromous species is capable of spread to other freshwater drainages.

The natural dispersal from adjacent countries has largely been the indirect consequence of human activities. For example, in the Euphrates upstream, the hydrologic and irrigation facilities especially in Turkey have been facilitated by the creation of river impoundments and canal construction; this is known as the manmade hydrologic connection between the rivers and other freshwater bodies [Altinbilek 2004, Yenigün et al. 2008].

Turkey will remain the main donor to Syrian and Iraqi non-native aquatic species that arrive by natural dispersal or unintentional introduction [Tarkan et al. 2017]. Similar results were obtained in the Republic of Belarus when several non-native fish species arrived from Ukrainian territory [Rizevsky et al. 2007, Karatayev et al. 2008].

The other possible way for *A. gueldenstaedtii* to in the Euphrates River basin is the deliberate introduction for aquaculture. Aquaculture is the principal introduction route for non-native fishes worldwide [Gozlan 2008,

Turchini and De Silva 2008], being linked to global population growth and the inability of capture based fisheries to respond to the demand for fish proteins [Casal 2006]. Thus, intentional introductions and translocations may continue as the chief agents of spread of non-native fishes in different parts of the world [Mastitsky et al. 2010].

In case the establishment of *A. gueldenstaedtii* in the freshwater system of Iraq, the interaction of this species with local species needs to be studied mainly with those that require similar ecological conditions. The sporadic occurrences of such species should be scrutinized thoroughly; the achievement of the creation and the data of the influences on the local ichthyofauna would permit gaining a profound information for the progress of management plans of this species in the Euphrates-Tigris Rivers basin. In this setting, it is anticipated that local societies have a main part in the course of observing and acclimatising to these unceasing fluctuations in natural aquatic environments and their resources.

CONCLUSIONS

The presence of *Acipenser gueldenstaedtii* in Euphrates River, Iraq was confirmed based on one specimen. Since this species has not been reported from the Iraqi part of the Euphrates River, the present case is considered a new record for the Iraqi freshwater fish group. Also, this record confirm the ability of the young individuals of this species to navigate a long distance from their sources whether a natural habitat or an aquaculture facility to reach a new environment. The future observations on the fish catch from the Euphrates River in Iraq will show whether this species be able to establish and built a sustainable population.

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Conflict of interest None declared.

Ethical statement Authors state that the research was conducted according to ethical standards.

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JESIOTR WSCHODNI *ACIPENSER GUELDENSTAEDTII* BRANDT & RATZEBURG, 1833 (ACTINOPTERYGII, ACIPENSERIDAE) W RZECE EUFRAT, IRAK

STRESZCZENIE

Acipenser gueldenstaedtii został po raz pierwszy odnotowany w rzece Eufrat na zachód od Iraku. Gatunek nigdy wcześniej nie został wymieniony jako introdukowany do dorzecza Tygrysu i Eufratu. Istnieją dwa możliwe wytłumaczenia tego zjawiska: (1) naturalna wędrówka z sąsiedniej Turcji, (2) ucieczka z hodowli. W pracy omówiono obie możliwości. Potwierdzenie pochodzenia sporadycznie występujących osobników tego gatunku będzie możliwe, jeśli w wodach śródlądowych Iraku pojawią się kolejne osobniki.

Słowa kluczowe: akwakultura, cechy metryczne, cechy merystyczne, introdukcja, rozszerzenie zasięgu występowania

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