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On the presence of the African catfish *Clarias anguillaris* (Linnaeus, 1758) (Siluriformes Clariidae) in south-eastern Algeria (Ifni-Illizi)

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ABSTRACT Experimental fisheries carried out in August 2019 made it possible to report the presence of a species of freshwater fish, Mudfish *Clarias anguillaris* (Linnaeus, 1758) (Siluriformes Clariidae), to Guelta Ifni (Illizi) an integral part of the Tassili N'Ajjer National Park (south-eastern Algeria). This species is on the IUCN red list as Least Concern (LC) being a taxon that does not qualify for Critically Endangered, Endangered, Vulnerable or Nearly Threatened. Surveys of 16 morphometric variables and three meristics, representing specific distinguishing characteristics, established on two male specimens, confirm this determination. This new locality will complete the current inventory of freshwater species reported in southern Algeria as well as the mapping of the distribution of the species in the in the African continent.

KEY WORDS Algeria; *Clarias anguillaris*; Ifni; Illizi; Morphometric; Meristic.

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INTRODUCTION

In South of Algeria despite the existence of several water bodies, the studies on the ichthyo-fauna are rare. The objective of this study is the identification and reporting for the first time in this locality of a species of African catfish, Mudfish *Clarias anguillaris* (Linnaeus, 1758) (Siluriformes Clariidae). The greatest diversity of the Clariidae family is found in Africa with 14 genera and 92 species and in Asia with two genera and some 17 species currently known (Teugels, 1996). The genus *Clarias* Scopoli, 1777 is the most widespread of the Clariidae family and it is represented by 32 species on the African continent (Teugels, 1986, 1992; Teugels et al., 2007).

African catfish *Clarias anguillaris* (Linnaeus, 1758) was found in a Guelta of the Ifni zone, where recent studies were not carried to update the inventory of the aquatic fauna of the extreme south of Algeria, particularly the Tassili N'Ajjer massif, which represents a protected area. This species which has a status LC (Least Concern) for its protection, according to the IUCN (Azeroual et al., 2010).

"Asataf" is the local name of the African catfish in southern Algeria, and these fishes are highly valued by consumers accounting an important source of animal protein for rural populations, especially in these Algerian regions (Bartley et al., 2015). The residents of the Ihrir Valley, in particular the Tuaregs of the region, have had a very important relationship with these fish for centuries. The presence of the species at the Ifni site encourages the measures of its protection and promises the development of a sustainable Saharan aquaculture.

MATERIAL AND METHODS

Study area

The African catfish, Mudfish *Clarias anguillaris*, was found in the Guelta of the Saharan rural area named Ifni, a village of Tassili N'Ajjer located 150 km from the capital of the willaya of Illizi, Algeria (25°45'51.4'N and 007°54'53.8' E) (Figs. 1, 2).

Samples

Two specimens of *Clarias anguillaris* were caught in August 2019 via fishing with a rod of 6 m, and a wire of 5 m, with hook of a total length of 30 mm and an opening of 10 mm. The bait consisted of a cooked paste (fish feed flour with a protein content of 40 %) mixed with wheat flour.

Specimens were transported to the laboratory for biometric measurements. The weights of the

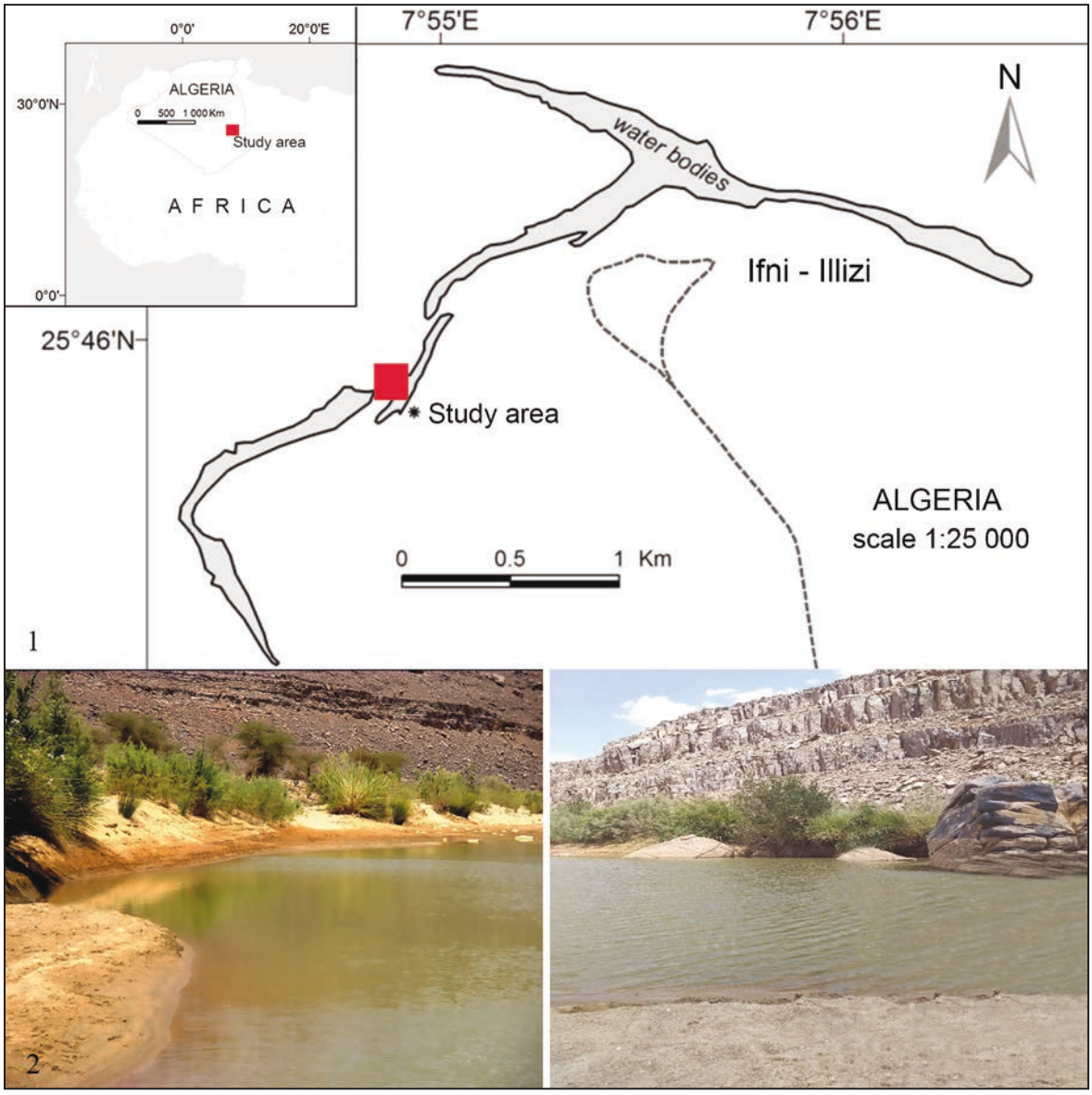

Figure 1. Map of geographical location of study area of Ifni - Illizi (south-eastern Algeria). Figure 2. Guelta Ifni sangling area.

specimens obtained by means of an electronic field precision scale with a maximum of 500 x 0.01 g, and the morphometric measurements made by means of sliding feet (0.05 mm) and a metric band.

Methodology

On each sample, 16 morphometric variables and three meristic variables were carried out for the identification of this siluriform according to Lévêque et al. (1990). The meristic counts carried out are: the number of branchiospines on the first branchial arch, number of dorsal fin rays, and number of anal fin rays (Teugels et al., 1998; Swain & Foote 1999; Turan, 2004) (Fig. 3). The percentages of morphometric measurements are given in relation to the standard length (SL) for the body and the Head length (HL). These data are shown in Table 1. The analyses and data collection were performed using Excel 2010 software.

ABBREVIATIONS. 1. Total length (TL); 2. Standard length (SL); 3. Body depth (BD); 4. Head length (HL); 5. Snout length (SNL); 6. Eye diameter (Ed); 7. Predorsal length (PDL); 8. Preanal Length (PAL); 9. Prepectoral Length (PPCL); 10. Pre-pelvic length (PPVL); 11. Length of dorsal-fin base (LDF); 12. Length of anal-fin base (LNA); 13. Pectoral-fin length (PECF); 14. Pelvic fin length (PELF); 15. Caudal-peduncle length (CPL); 16. Depth of caudal-peduncle (DCP). Number of dorsal fin rays (RD); number of anal rays (RA); number of branchiospines on the first branchial arc (BR).

RESULTS AND DISCUSSION

Systematics

Superclassis OSTEICHTHYES Huxley, 1880
Classis ACTINOPTERYGII Klein, 1885
Ordo SILURIFORMES G. Cuvier, 1817
Familia CLARIIDAE Bonaparte, 1846
Genus *Clarias* Scopoli, 1777

Clarias anguillaris (Linnaeus, 1758)

Description. The main morphometric variables measured on both specimens are shown in Table 1 for the first (a) and the second (b) specimen. The size of the first fish is 256 mm (LT), 236.5 mm of standard length (LS), 73 mm of head length and weight of 128.2 g. The size of the second specimen is 260 mm, 231 mm of standard length (LS) 70 mm cranial length and weight of 147.84 g. The head is very long with an average of 31% of the standard length (LS) (Figs. 4, 5).

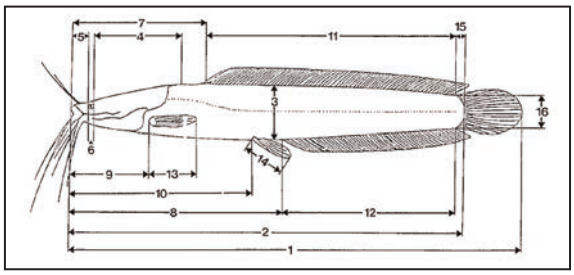

Figure 3. Diagram showing the measurements made (Lévêque et al. 1990).

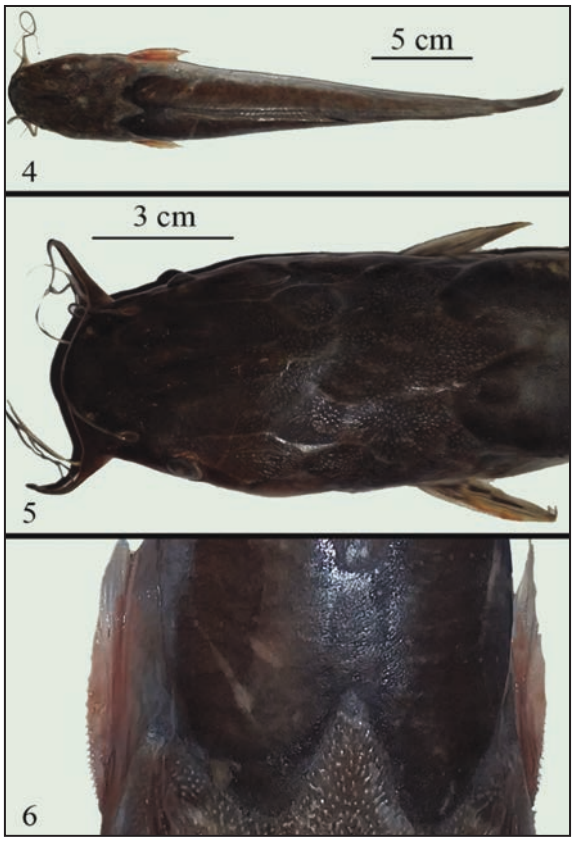

Figure 4. Front view of the body of *Clarias anguillaris* fished at Guelta of Ifni. Figure 5. Idem, dorsal view of the head. Figure 16. Idem, denticulate pectoral spine on anterior part.

The results of the parameters studied above coincide well with the range of proportions proposed by Teugels (1982a, b) for the two specimens in our study.

The results of the three meristic variables are presented in Table 2.

The number of rays at the dorsal fin (RD) is 72 in the first *C. anguillaris* (a) and 59 in the second (b). The number of anal fin rays (AR) is 51 in the first *C. anguillaris* (a) and 48 in the second (b).

The first specimen of *C. anguillaris* has 25 branchiospines and the second has 32 branchiospines. The pectoral spine is identified on the anterior part (Fig. 6); the neuromasts on the flanks show a regular pattern for the specimen reported to Ifni.

DISTRIBUTION. *Clarias anguillaris* is known from the lower Nigeria Cross River, Mauritania, southern Algeria and the Nile (Teugels, 1986; Paugy et al., 2003; Teugels et al., 2007). It is present also in Benin, Burkina Faso, Cameroon, Chad, Côte d'Ivoire, Egypt, Ethiopia, Gambia, Ghana, Guinea, Guinea-Bissau, Mali, Niger, Nigeria, Senegal, Sierra Leone, South Sudan, Togo (Azeroual et al., 2010).

Code	The abbreviations	Catfish Male (a)	Catfish Male (b)	Teugels,1982 in mm
0	W (g)	128.2	147.84	/
1	TL (mm)	256	260	/
2	SL (mm)	236.5	231	(119.7-426)
3	BD (SL %)	12.68	14.29	(9.2-16.3)
4	HL(SL %)	30.87	30.30	(29.1-33.6)
5	SNL (SL %)	20.55	22.86	(19.6-22.9)
6	Ed (HL %)	9.59	7.14	(5.9-10.2)
7	PDL (SL %)	35.94	37.66	(32.9-38.4)
8	PAL (SL %)	54.97	58.44	(53.2-59)
9	PPCL (SL %)	25.37	26.41	(22.5-28.9)
10	PPVL (SL %)	45.67	48.48	(44.3-49.9)
11	LDF (SL %)	59.35	58.87	(54.4-64.7)
12	LNA (SL %)	41.19	43.29	(39.4-44.6)
13	PECF (SL %)	11.84	12.55	(11.4-14.6)
14	PELF (SL %)	10.99	11.26	(7.3-11.4)
15	CPL (SL %)	2.33	3.90	(3-5.7)
16	DCP (SL %)	5.50	6.93	(5.7-9.4)

Table 1. Body measurements for *Clarias anguillaris from* Guelta of Ifni compared with reference Teugels, 1982a, b.

HABITAT AND ECOLOGY. *Clarias anguillaris* is a demersal, potamodromous species, that is widespread in flooded areas. It lives mainly in deep waters, in muddy and semi-muddy bottoms, and bury itself in mud when water bodies dry up. According to Albaret (1982), the reproduction of some *Clarias* is generally limited to the flood period. The diets of the different *Clarias* are very similar in their food. According to Lauzanne (1988), they consume insects and larvae of insects, various crustaceans, molluscs, fish, plant debris, and combined with their ability to breathe atmospheric oxygen, these fish can adapt to the harshest living conditions, hence their presence in the Saharan areas.

REMARKS. *Clarias anguillaris* is very similar to *C. gariepinus* Burchell, 1822. The only net difference between the two species is the number of branchiospines on the first branchial arch, which is much smaller (15-60) in *C. anguillaris* (Fig. 10).

Clariidae are distinguished from other Siluriformes by the combination of lack of spine to the dorsal, very long dorsal and anal fins, an anguilliform type body, the presence of four pairs of barbels and a supra-organbranchial, formed by evaginations of the second and fourth branchial arc, allowing fish to practice aerial breathing. This organ is synapomorphic for the family (Teugels & Adriaens, 2003). Several species, including those of the genera *Clarias* and *Heterobranchus* É. Geoffroy Saint-Hilaire, 1809, play an important role in fishing and fish farming (Paugy et al., 2003).

The genus *Clarias* is characterized by the presence of a single dorsal fin extending up to the caudal (Fig. 7), the adipose being absent. Vertical fins are not confluent. The body is more or less elongated, with the caudal peduncle measuring less than 50% of the standard length.

The head is flattened and longer (20-34% LS), the lateral cephalic bones are generally contiguous. The eyes, with free-edge, are very small (Fig. 8), The genus *Clarias* was divided into six sub-genera (Teugels 1982b, 1986; Teugels & Adriaens,

2003; Agnese & Teugels, 2001; Jansen et al., 2006 demonstrated that the genus is paraphyletic.

The Head Length represents 27-35% of LS; 16-110 branchiospines throughout the first branchial arch; the postorbital bones are fully contiguous; the lower part of the head shows two blackish lateral bands; neuromasts on the sides form a regular pattern, which is consistent with the observations reported for the species.

CONCLUSIONS

Our results, compared with those of Compaoré et al. (2015) in Burkina Faso, reveal the presence of *C. anguillaris* in the southern Algeria.

	RD	RA	BR
Clarias anguillaris (a)	72	51	25
Clarias anguillaris (b)	59	48	32
Teugels, 1982	60-82	42-61	16-50

Table 2. Distinguishing characteristics of the two specimens of the genus *Clarias anguillaris* from Guelta of Ifni compared to Teugels (1982a).

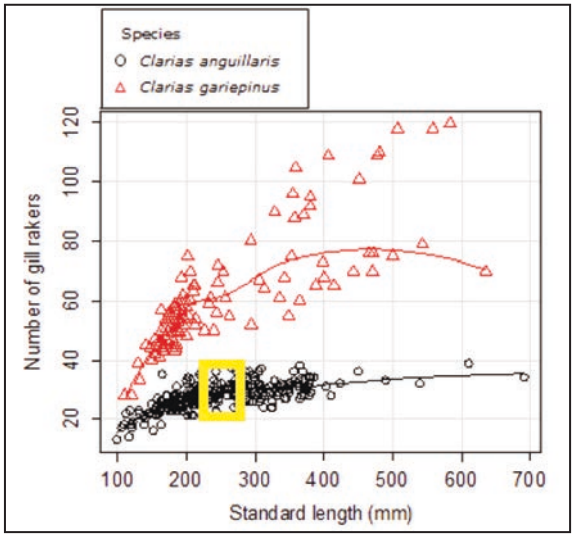

Figure 14. Number of branchiospines on the first branchial arch relative to standard length (LS) in *Clarias gariepinus* and *C. anguillaris* (Compaoré et al., 2015).

The presence of *C. anguillaris* in Guelta Ifni, wilaya Illizi, an integral part of the Tassili N'Ajjer National Park, testifies to a past as wet location and the presence of an interesting aquatic fauna. This study helps to improve knowledge on the inventory of the aquatic species of the southern Algeria and on distribution of the species in the African continent. The presence of *C. anguillaris* in this large and protected territory is reassuring for the future monitoring of this species

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