

# Three fish species from Horchi (Tibesti Mountains, Central Sahara): Rediscovery after decades of drought

Drei Fischarten aus Horchi (Tibesti-Gebirge, Zentralsahara): Wiederentdeckung nach Jahrzehnten der Trockenheit

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**Summary:** The short report documents a current occurrence of *Labeobarbus bynni occidentalis*, *Labeo* cf. *ogunensis* and *Clarias* cf. *garipepinus* in the guelta of Horchi/Tibesti Mountains/Central Sahara. These three fish species have survived the drought prevailing in the Sahara and Sahel since the 1970s; *L. bynni occidentalis* even occurred in large numbers. There is no recent survey of fish occurrence in the Tibesti after decades of drought in the Sahara and Sahel, nor are there any reports of fish occurrence in the high mountain guelta of Horchi (1,505 m).

**Keywords:** *Labeobarbus bynni occidentalis*, *Labeo* cf. *ogunensis*, *Clarias* cf. *garipepinus*, drought resistance, current occurrence

**Zusammenfassung:** Der Kurzbericht dokumentiert ein Vorkommen von *Labeobarbus bynni occidentalis*, *Labeo* cf. *ogunensis* und *Clarias* cf. *garipepinus* im Guelta von Horchi/Tibesti Gebirge/Zentralsahara. Diese drei Fischarten haben dort die seit den 1970-er Jahren anhaltende Trockenheit in Sahara und Sahel überlebt; *L. bynni occidentalis* trat sogar in großer Dichte auf. Eine rezente Dokumentation von Fischvorkommen im Tibesti nach Jahrzehnten der Dürre in Sahara und Sahel gibt es nicht, noch gab es bisher Nachweise von Fischen für das Hochgebirgs-Guelta von Horchi (1.505 m).

**Schlüsselwörter:** *Labeobarbus bynni occidentalis*, *Labeo* cf. *ogunensis*, *Clarias* cf. *garipepinus*, Trockenresistenz, aktuelles Vorkommen.

## 1. Introduction

A formerly active hydrographic system connected water bodies of the Tibesti with the Lake Chad basin until the middle Holocene (TALBOT 1980). Then, 5,000 to 6,000 years B.P., the Sahara began to dry up (KRÖPELIN et al. 2008). There are 19 documented relict fish species in the Sahara today (TRAPE 2013, 2018), as also one recently described new species (TRAPE 2016). However, due to the difficulty of accessing the field, little research is now being carried out in the Sahara, and surveys on the presence and distribution of fish species, with a few exceptions from Mauritania and the Ounianga Lakes in the Borku region/Northern Tchad (TRAPE 2009,

2016, 2018), mainly date from before the 1960s (PELLEGRIN 1919a,b; DAGET 1959).

Since the 1970s, an unprecedented drought is prevailing in the Sahara and Sahel (HÔTE et al. 2001; THOMAS & NIGAM 2018). As emphasized by TRAPE (2009), recent documentations of fish populations in the Sahara are extremely needed, because they allow insights into whether and to what extent the ichthyofauna has survived the decade-long drought. Such a documentation, to which the present report aims to contribute, has not yet been carried out in the Tibesti Mountains, a biodiversity hotspot in the hyper-arid Central Saharan desert.

The area of the Tibesti, a mountain range shaped by volcanism, reaches roughly from 24°

north to 18° north. Here, annual precipitation increases with altitude but remains still extremely low, resulting in arid to highly arid environmental conditions. Precipitation can vary significantly in the Tibesti (GRUNERT 1975). For example, Bardai (approx. 1,020 m above sea level) had 60.7 mm in 1966 and 0 mm in 1970 (HECKENDORF 1972). After decades of drought, extensive rainfall occurred in 2019 (MUSCH 2020a). In 2020 rainfall was again abundant, but in 2021 largely absent (author's own observations). The low humidity and high noon temperatures cause high evaporation rates (HECKENDORF 1972), leading to water loss in the middle reaches of rivers and much greater loss in their lower reaches. This usually causes them to dry up before they leave the mountains (GRUNERT 1975).

Among the fish species found in the Sahara, eight have been recorded from the Tibesti (see TRAPE 2013 for a review): *L. bynni occidentalis* ('*Barbus bynni occidentalis*' (Boulenger, 1911), *Enteromius macrops* ('*Barbus macrops*' Boulenger, 1911), *L. cf. ogunensis* ('*Labeo parvus*'), *Labeo niloticus* (Linné, 1758), *Raiamas senegalensis* (Steindachner, 1870), *C. cf. gariépinus* ('*Clarias gariépinus*'), *Sarotherodon galilaeus borkuanus* (Pellegriin, 1919), and *Tilapia zillii* (Gervais, 1848). First specimens have been gathered by a French colonial military exploration of the Tibesti, Borku and Ennedi regions between 1912 and 1917 (TILHO 1920) and have then been studied in France (e.g. PELLEGRIN 1919a+b).

In earlier studies on the Tibesti's fish fauna (PELLEGRIN 1919a,b; DAGET 1959), specimens of the here presented species originated from the Totous guelta (550 m above sea level), and from the valleys of Doboher and Marou (ill. 1). *L. bynni occidentalis* was previously known within the Sahara only from the Totous guelta, where it was documented as '*B. batesi*' by DAGET (1959).

The voucher specimens were then re-identified as '*B. bynni occidentalis*' by LÉVÊQUE & GUÉGAN (1990). *Labeo tibestii* was described as a new species by PELLEGRIN in 1919 on the basis of a specimen from the Doboher valley (PELLEGRIN 1919b), but was then synonymized by Reid in 1985 with *L. ogunensis* (REID 1985). DAGET (1959) has recorded *L. parvus* in the Totous guelta and in the valley of Marou. Specimens of *C. cf. gariépinus* from the Totous guelta were documented by PELLEGRIN (1919a) and DAGET (1959) as *C. lazera*.

The guelta of Horchi (N20° 46.133' E16° 58.897') is located at an altitude of 1,505 m above sea level (figs 1, 2). The surface area of this guelta is probably barely 15 m<sup>2</sup>; its depth is estimated at 2 m at the deepest point. It is possible that it is connected to other basins. A rivulet flows through it which is part of a regional river system draining to the SW and ending in one of the four main dry delta fans of the Tibesti (cf. MUSCH 2021).

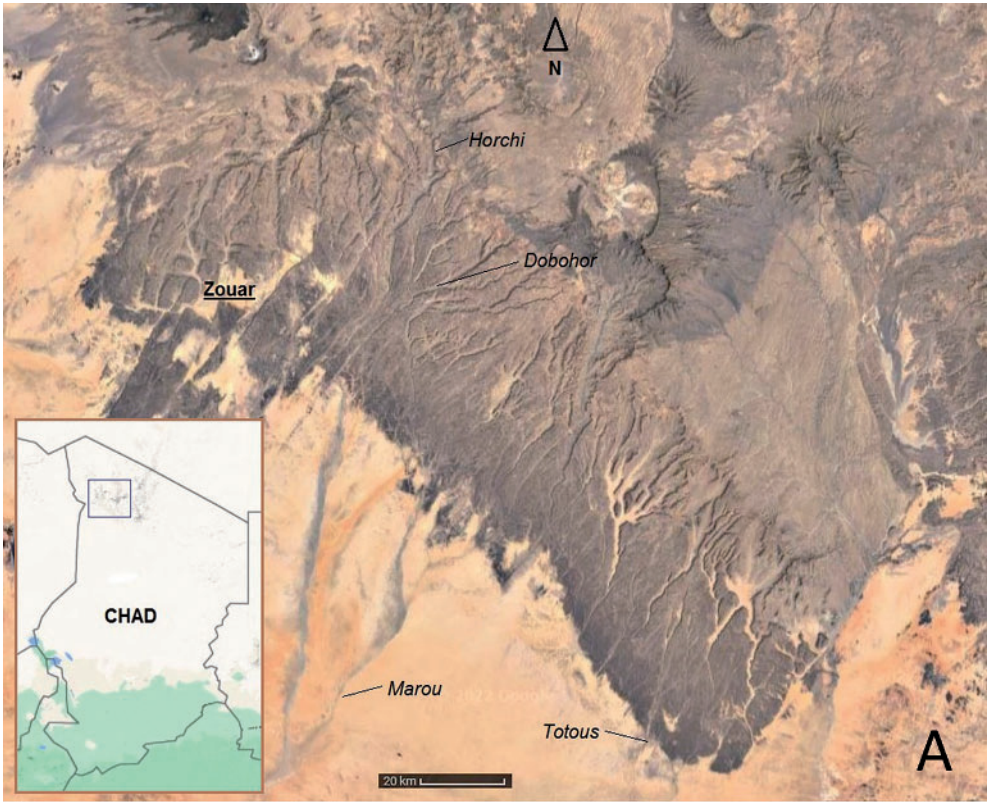
This report documents findings of *Labeobarbus bynni occidentalis* (Boulenger, 1911), *Labeo cf. ogunensis* (Boulenger, 1910) and *Clarias cf. gariépinus* (Burchell, 1822) from the guelta of Horchi in the Tibesti Mountains/Central Sahara/Northern Republic of Chad.

## 2. Material and methods

The author is conducting ethnographic research on environmental resources and environmental change since 2014 in the Central Sahara in general and since 2017 in the Tibesti in particular (e.g. MUSCH 2018, 2020b). A fieldwork in October-November 2020 took him to Horchi, where he was able to observe inhabitants fishing and photographically document the fishes caught.

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**Fig. 1:** **A** Map of the southwestern Tibesti with the Horchi valley, the pre-1960s finding sites and the settlement of Zouar. The mountainous area extending northwards into Libya on the inset are the Tibesti Mountains. The blue frame (inset) roughly circumscribes the area shown on the large map. Map material from Google Maps modified by the author. **B** Part of the Horchi guelta (lower left) with a connected rivulet (right). **Abb. 1:** **A** Karte des Südwest-Tibesti mit dem Tal von Horchi, den Fundorten aus der Zeit vor 1960 und dem Ort Zouar. Das im Norden nach Libyen reichende Bergland auf der kleinen Karte ist das Tibesti-Gebirge. Der blaue Rahmen umschreibt ungefähr das auf der großen Karte dargestellte Gebiet. Kartenfond



von Google Maps, verändert vom Autoren. **B** Teil des Gueltas von Horchi (unten rechts) mit dem dieses durchfließenden Bach (rechts).

### 3. Observations and discussion

Hundreds of animals of *Labeobarbus bynni occidentalis* swam very densely in the guelta. Most of the animals had a body length with tail fin of 5-8 cm (fig. 2 A, B). Besides several specimens of *L. bynni occidentalis* the inhabitants caught one specimen each of *L. cf. ogunensis* (approx. 17 cm) (fig. 2 C) and *C. cf. gariépinus* (approx. 20 cm) (fig. 2 D), too. No other specimens of these two species were sighted.

With the present findings of *Labeobarbus bynni occidentalis*, *Labeo cf. ogunensis* and *Clarias cf. gariépinus*, the occurrence of these three species in the guelta of Horchi and thus in the high mountains of the Tibesti (< 1,500 m above sea level) is documented for the first time. The present findings show that these three species survived in the Tibesti a 50-year-period of extreme drought.

The large number of *L. bynni occidentalis* found in the small guelta of Horchi suggests even

that decades of drought had little effect on the population size. It seems also possible that the population reached rapidly again big numbers after the rainy year of 2019 and the abundant rainy season that preceded the 2020 fieldwork.

The all-younger inhabitants who were fishing at the Horchi guelta had no deeper knowledge about the fish. A man of about 70 years of age, interviewed later by the author, said that there were four different species of fish in Horchi. He could remember three of the local names (ebichī, furogañ, ofune), but could no longer assign them to the individual species. In his childhood, the rivers of the Western Tibesti often had so much water during rainy seasons that it seeped only when reaching the sandy dry delta fan of Madagada outside the massif, in its southwest. At that time, the inhabitants gathered there the fish that had been transported by the floods in large numbers for their own consumption.



**Fig. 2:** Fishes from Horchi, November 2020. **A** Two specimens of *Labeobarbus bynni occidentalis*. **B** After the rainy season of 2020, *L. bynni occidentalis* occurred in large numbers in the guelta. **C** *Labeo cf. parvus*. **D** *Clarias cf. gariépinus*.

**Abb. 2:** Fische aus Horchi, November 2020. **A** Zwei Exemplare von *Labeobarbus bynni occidentalis*. **B** Nach der Regenzeit 2020 trat *L. bynni occidentalis* in großer Zahl im Guelta auf. **C** *Labeo cf. parvus*. **D** *Clarias cf. gariépinus*.

As the amount of rainfall in the Tibesti increases with altitude (GRUNERT 1975), permanent water bodies, such as that of Horchi, may always carry enough water to allow fish to survive. Decades of drought could therefore be more likely to affect fish populations in lower-lying water bodies, like the guelta of Totous. Here, a continuous renewal could take place through fish from higher water bodies that are carried downstream by the mountain rivers during rainy seasons.

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## References

DAGET, J. 1959. Note sur les poissons du Borkou – Ennedi – Tibesti. *Travaux de l'Institut de Recherches Sahariennes* 18(1-2), 173-181.

GRUNERT, J. 1975. Beiträge zum Problem der Talbildung in ariden Gebieten am Beispiel des zentralen Tibestigebirges (République du Tchad). Selbstverlag der Freien Universität Berlin, Berlin.

HECKENDORF, W.D. 1972. Zum Klima des Tibesti-Gebirges. *Berliner Geographische Abhandlungen* 16, 145-164.

LÉVÊQUE, C. & J.-F. GUÉGAN, J.-F. 1990. Les grands *Barbus* (Pisces, Cyprinidae) d'Afrique de l'Ouest. Révision systématique et parasitofaune branchiale. *Revue d'Hydrobiologie* 23, 41-65.

L'HÔTE, M., G. MAHÉ, B. SOMÉ, J.-P. TRIBOULET. 2002. Analysis of a Sahelian annual rainfall index from 1896 to 2000; the drought continues. *Hydrological Sciences Journal* 47, 563-572.

KRÖPELIN, S., D. VERSCHUREN, A.-M. LÉZINE, H. EGGERMONT, C. COCQUYT, P. FRANCUS, J.-P. CAZET, M. FAGOT, B. RUMES, J.M. RUSSELL, F. DARIUS, D.J. CONLEY, M. SCHUSTER, H. VON SUCHODOLETZ, D.R. ENGSTROM. 2008. Climate-driven ecosystem succession in the Sahara: The past 6000 years. *Science* 320. 765-768. DOI: 10.1126/science.1154913.

PELLEGRIN, J. 1919a. Poissons du Tibesti, du Borkou et de l'Ennedi récoltés par la mission Tilho. *Bulletin de la Société zoologique de France* 44. 148-153.

PELLEGRIN, J. 1919b. Sur un Cyprinidé nouveau du Tibesti appartenant au genre *Labeo*, *Bulletin de la Société zoologique de France* 44, 325-327.

MUSCH, T. 2018. Sorten der Kulturdattel (*Phoenix dactylifera*) im Kaouar-Tal (Niger). *Mitteilungen der Deutschen Dendrologischen Gesellschaft*, 103. 186-194.

MUSCH, T. 2020a. Constat sur la désertification au B.E.T. Toumai Action 80. 4. [https://cnar-cnr.org/images/pdf/Bulletin\\_Toumai\\_juin\\_2020.pdf](https://cnar-cnr.org/images/pdf/Bulletin_Toumai_juin_2020.pdf) Accessed 02/09/2022.

MUSCH, T. 2020b. Am Rande und im Zentrum – die Teda und das Tibesti. *Zentralblatt für Geologie und Paläontologie I*(1): 151-181.

MUSCH, T. 2021. Exploring Environments through Water: An Ethno-Hydrography of the Tibesti Mountains (Central Sahara). *Ethnobiology Letters* 12(1). 1-11. DOI: 10.14237/ebl.12.1.2021.1709

REID, G.McG. 1985. A revision of African species of *Labeo* (Pisces, Cyprinidae). *Theses Zoologicae* 6. Cramer, Braunschweig.

TALBOT, M.R. 1980. Environmental responses to climatic change in the West African Sahel over the last 20 000 years, pp. 37-62. In: *The Sahara and the Nile* (WILLIAMS, M.A.J. & H., FAURE, eds). Balkema A.A., Rotterdam.

THOMAS, N. & S. NIGAM. 2018. Twentieth-century climate change over Africa: Seasonal hydroclimate trends and the Sahara Desert expansion. *Journal of Climate* 31, 3349-3370. DOI: 10.1175/JCLI-D-17-0187.1

TILHO, J. 1920. The exploration of Tibesti, Erdi, Borkou, and Ennedi in 1912-1917: A mission entrusted to the author by the French Institute (continued). *The Geographical Journal* 56(3), 161-183.

TRAPE, S. 2009. Impact of climate change on the relict tropical fish fauna of Central Sahara: threat for the survival of Adrar mountains fishes, Mauritania. *PLoS One* 4(2). e4400. DOI: 10.1371/journal.pone.0004400

TRAPE, S. 2013. A study of the relict fish fauna of northern Chad, with the first records of a polypterid and a pociliid in the Sahara desert. *Comptes Rendus Biologiques* 336(11-12), 582-587. DOI: 10.1016/j.crv.2013.10.001

TRAPE, S. 2016. A new cichlid fish in the Sahara: The Ounianga Serir lakes (Chad), a biodiversity hotspot in the desert. *Comptes Rendus Biologiques* 339, 529-536. DOI: 10.1016/j.crv.2016.08.003

TRAPE, S. 2018. *Epiplyats bifasciatus* (Steindachner, 1881) (Nothobranchiidae) and *Hemichromis fasciatus* Peters, 1852 (Cichlidae), two relict fish species in the Sahara Desert. *Bonn Zoological Bulletin* 67(1), 37-40.

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