



## Two new sympatric *Sarotherodon* species (Pisces: Cichlidae) endemic to Lake Ejagham, Cameroon, west-central Africa, with comments on the *Sarotherodon galilaeus* species complex

DIRK NEUMANN<sup>1</sup>, MELANIE L. J. STIASSNY<sup>2</sup> & ULRICH K. SCHLIEWEN<sup>1</sup>

<sup>1</sup>Department of Ichthyology, Bavarian State Collection of Zoology, Münchhausenstr. 21, D-81247 München, Germany. E-mail: dirk.neumann@zsm.mwn.de; schliewen@zsm.mwn.de

<sup>2</sup>Division of Vertebrate Zoology, Department of Ichthyology, American Museum of Natural History, 79th Street at Central Park West, New York, New York 10024, USA. E-mail: mljs@amnh.org

### Abstract

Morphometric differentiation among 25 populations of the widespread *Sarotherodon galilaeus* species complex is investigated, and two new species are described from Lake Ejagham, Cameroon in west-central Africa. *Sarotherodon lamprechtii* **sp. nov.** is characterized by a prognathous lower jaw, scales over the pectoral fin-base restricted at maximum to the basal third, and an elongate ventral keel on the lower pharyngeal jaw. *Sarotherodon knaueri* **sp. nov.** is characterized by the possession of an inflated second pharyngobranchial element of the upper pharyngeal jaw, and small size at maturation. It is further differentiated from its sympatric congener in having a shorter anal fin (12.0–14.6 % SL vs. 14.1–15.7 % SL), larger eyes (24.0–31.2 % HL vs. 20.4–29.2 % HL), higher total gill raker count (24–30 vs. 20–25), and a terminal mouth. Molecular evidence for a sister group relationship for these two sympatric species is corroborated by the shared possession of a reduced number of teeth on the second pharyngobranchial element of the upper pharyngeal jaw.

**Key words:** sympatric speciation, *Sarotherodon galilaeus* species complex, Cameroon, Lake Ejagham, two new species, sympatric speciation

### Introduction

The presence of mouth brooding cichlids in Lake Ejagham, western Cameroon, was first noted by Thys van den Audenaerde (1967) and subsequently Schliewen *et al.* (2001) confirmed the presence of two undescribed *Sarotherodon* of the *S. galilaeus* species complex (sensu Trewavas 1983). *Sarotherodon galilaeus* sensu lato inhabits a vast area of northern and western Africa and the Levant, including all major Sahelian rivers (e.g., Gambia, Senegal, Volta, Niger and Benue), rivers of Upper and Lower Guinea, (e.g., Bandama, Tano, Pra, as well as the Cross, Wouri, Sanaga in Cameroon), the Lake Chad basin, the Congo basin, the Nile and rivers draining the Ethiopian highlands including the Turkana and Omo basins, and the Jordan valley. Since the pioneering works of Thys van den Audenaerde (1971) and Trewavas (1983) comparatively few publications have dealt with the morphological diversity of the widespread and taxonomically problematical *S. galilaeus* species complex. Despite considerable overlap in standard morphometric and meristic features of populations throughout its range (Trewavas 1983), phylogenetic analyses of mitochondrial and nuclear DNA-markers identified riverine *Sarotherodon galilaeus* from the Cross River basin as being most closely related to the two undescribed *Sarotherodon* of Lake Ejagham, which were in turn resolved as reciprocally monophyletic (Schliewen *et al.* 1994; Schliewen & Klee 2004). Although it is clear that a comprehensive revision will be needed to fully resolve the composition and relationships of the *S. galilaeus* complex (Neumann in prep.), it seems reasonable to begin this process by delineating diagnosable component taxa. The type material of *Sparus galilaeus* Linnaeus, 1758, described from “lacu Genezareth” (Lake Kinnereth or Tiberias) is not available (Eschmeyer 2010; Kullander pers. comm. to UKS in Nov. 2001). Here we provide diagnoses and descriptions of the two endemic sister species of Lake Ejagham based on morphological comparisons with a representative selection of *Sarotherodon* species including all currently recognized *S. galilaeus* subspecies from all major drainages and the Jordan Valley, encompassing geographically proximate populations from northwestern Africa, the two sympatric *Sarotherodon* phenotypes from the type locality of Lake Kinnereth, as well as additional populations from the Jordan Valley (see legend Fig. 2).