

Major Fishes of West African Coastal Waters and Their Morphological Characterization, with Emphasis on *Sarotherodon melanotheron* (Teleostei, Cichlidae)

G.G. Teugels¹ and T.M. Falk²

¹Laboratoire d'Ichthyologie Musee Royale de l'Afrique Centrale
B-3080 Tervuren, Belgium

²Zoologisches Institut und Zoologisches Museum der Universitat Hamburg Martin
Luther King Pl. 3, 20146 Hamburg, Germany

TEUGELS, G.G. and T.M. FALK 2000. Major fishes of West African coastal waters and their morphological characterization, with emphasis on *Sarotherodon melanotheron* (Teleostei, Cichlidae), p. 5-7. In E.K. Abban, C.M.V. Casal, T.M. Falk and R.S.V. Pullin (eds.) Biodiversity and sustainable use of fish in the coastal zone. ICIARM Conf. Proc. 63, 71 p.

The West African coastal zone is rich in estuaries and lagoons. Estuaries are abundant in the area from the mouth of Senegal to Guinea (e.g., Sine Saloum, Casamance); lagoons are generally present from Cote d'Ivoire to the Niger Delta in Nigeria (e.g., Ebrie Lagoon, Porto Novo Lagoon, Lagos Lagoon). Because of their important diversity, it is difficult to give their physical and biological definitions. They are all, however, characterized by a typical and rich fish species composition.

Leveque et al. (1992) reported over 40 fish families, mostly of marine origin, in the West African coastal waters. Albaret and Diouf (1994) compared the species diversity in these coastal zones and found that the species number ranged between 79 (Lagos Lagoon) and 153 (Ebrie Lagoon). Major fish families present include Elopidae (tenpounders) and Clupeidae (herrings, sardines and anchovies), which are primitive teleosts, and Mugilidae

(mulletts), which are much more derived. Elopidae are recognized by their large mouth, with the upper jaw extending past the eye, and their numerous (27-35) branchiostegal rays. Two species are present, *Elops lacerta* and *E. senegalensis*, which are distinguished only by the number of gill rakers on the lower part of the first branchial arch (17-19 in *E. lacerta* vs. 11-15 in *E. senegalensis*) and the number of lateral line scales (72-83 in *E. lacerta* vs. 92-100 in *E. senegalensis*) (Bauchot 1990). They have small (up to 5 cm) leptocephalus larvae.

Clupeidae are recognized by the presence of abdominal scutes. Typical coastal water genera in West Africa are *Sardinella* and *Ethmalosa*. Three species of *Sardinella* are found: *S. aurita*, *S. maderensis* and *S. rouxi*. *S. aurita* has nine pelvic fin rays whereas *S. maderensis* and *S. rouxi* have eight and can be distinguished by the number of gill rakers on the lower part of the first gill arch (70-166 in *S. maderensis* vs. 30-40 in *S.*

rouxi) (Whitehead 1985). *Ethmalosa*, differing from *Sardinella* in upper jaw osteology (one supramaxilla vs. two), is represented by *E. fimbriata*.

Mugilidae are derived teleosts recognized by widely separated spiny-rayed and soft-rayed dorsal fins, the absence of a lateral line and a moderate mouth size. Two genera are present in the coastal zone of West Africa: *Mugil*, with an adipose eyelid largely covering the eye, and *Liza*, with no adipose eyelid. *Mugil* is represented by three species: *M. curema*, *M. cephalus* and *M. bananensis*. *M. curema* has nine soft anal-fin rays, *M. cephalus* and *M. bananensis* have eight and can be distinguished by fin coloration and scale count (14-15 transversal scales in *M. cephalus* vs. 11-12 in *M. bananensis*). *Liza* also has three species: *L. falcipinnis*, *L. grandisquamis* and *L. dumerili*. The former has 10-11 soft anal-fin rays, the latter two have only 8-9 and can be distinguished by fin coloration and scale count (25-29 longitudinal scales in *L. grandisquamis* vs. 34-39 in *L. dumerili*; Albaret 1992).

The black-chinned tilapia, *Sarotherodon melanotheron* (Cichlidae), is another major fish found in West African coastal waters. In contrast to the marine species previously mentioned, cichlids are mostly freshwater species. *S. melanotheron*, however, is generally found in estuaries and lagoons and occasionally in the mouth and the lower course of coastal basins from Senegal to Congo (Trewavas and Teugels 1991). Trewavas (1983) (recognized five subspecies of *S. melanotheron*. Teugels and Hanssens (1995), based on a preliminary morphometric analysis, questioned the validity of some of them. Adepo-Gourene et al. (1998) reached the same conclusion using allozyme data.

New material has recently been examined morphometrically. Results show that *S.m. paludinosus*, described from the coastal region of Dakar (Senegal), should be considered as a junior synonym of *S.m. heudelotii*. The distribution range of *S.m. heudelotii* has also been extended and now covers the area from the mouth of the Senegal River to Murry Town (Sierra Leone). Meanwhile, the validity of

S.m. leonensis has become doubtful, and is being considered as another junior synonym of *S.m. heudelotii*. Additional material from southeast Sierra Leone and western Liberia should be examined to clarify this. The nominate subspecies *S.m. melanotheron* is present from Cote d'Ivoire to southern Cameroon. Finally *S.m. nigripinnis* is found from Equatorial Guinea to the mouth of Congo (see Falk et al., this vol.).

The most important distinguishing morphometric characters of *S.m. nigripinnis* are in their caudal peduncle length, body depth and pectoral fin length; *S.m. melanotheron* and *S.m. heudelotii* are distinguished by their snout length, dorsal fin height, anal fin height and pelvic fin length.

References

- Adepo-Gourene, B., L. Pouyaud, G.G. Teugels, M. Hanssens and I.F. Agnese. 1998. Morphological and genetic differentiation of West African populations of *Sarotherodon melanotheron* Rüppell, 1852 (Teleostei, Cichlidae), p. 189-198. In I.F. Agnese (ed.) Genetics and aquaculture in Africa. ORSTOM, Paris.
- Albaret, I.1. 1992. Mugilidae, p. 780-788. In C. Leveque, D. Paugy and G.G. Teugels (eds.) Faune des poissons d'eaux douces et saumâtres de l'Afrique de l'Ouest. Coll. Faune Trop. 28. ORSTOM, Paris and MRAC, Tervuren.
- Albaret, I.1. and es. Diouf. 1994. Diversité des poissons des lagunes et des estuaires Ouest-Africains, p. 165- 177. In G.G. Teugels, I.E. Guegan and I.1. Albaret (eds.) Biological diversity of African fresh- and brackishwatertishes. Ann. Mus. Roy. Afr. Centr. 275.
- Bauchot, M.L. 1990. Elopidae, p. 88-89. In C. Leveque, D. Paugy and G.G. Teugels (eds.) Faune des poissons d'eaux douces et saumâtres de l'Afrique de l'Ouest. Coll. Faune Trop. 28. ORSTOM, Paris and MRAC, Tervuren.
- Leveque, c., D. Paugy and G.G. Teugels, Editors. 1992. Faune des poissons d'eaux douces et saumâtres de l'Afrique de l'Ouest. Coll. Faune Trop. 28. ORSTOM, Paris and MRAC, Tervuren.
- Teugels, G.G. and M. Hanssens. 1995. Differentiation morphologique de huit populations de *Sarotherodon melanotheron* Rüppell, 1852 (Cichlidae), p. 84-90. In I.F. Agnese (ed.) Comptes rendus de l'atelier biodiversité et aquaculture, Abidjan. CRO, Abidjan; EU, Brussels; and ORSTOM, Paris.
- Trewavas, E. 1983. Tilapiine fishes of the genera *Sarotherodon*, *Oreochromis* and *Danakilia*. British Museum (Natural History), London.
- Trewavas, E. and G.G. Teugels. 1991. *Sarotherodon*, p. 425- 437. In I. Daget, I.e Gosse, G.G. Teugels and D.F.E. Thys van den Audenaerde (eds.) Check-list of the

freshwater fishes of Africa. CLOFF A 4. ISNB, Brussels; MRAC, Tervuren; and ORSTOM; Paris.

Whitehead, P.J.P. 1985. FAO species catalogue. Vol. 7. Clupeoid fishes of the world. An annotated and illustrated catalogue of the herrings, sardines, pilchards, sprats, shads, anchovies and wolf-herrings. Part I - Chirocentridae, Clupeidae and Pristigasteridae. FAO Fish. Synop. 125 (7) 1: 303 p.

Discussion

Dr. Folack: You use morphogenetic parameters on the main component analysis, but I think you will have more information on species groups if physical and chemical parameters are included in the analysis (temperature, salinity, etc.).

Reference

Wood and Holtby 1998. Defining conservation units for Pacific salmon using genetic survey data, p. 233-250. In B. Harvey, C. Ross, D. Greer and J. Carolsfeld (eds.) Action before extinction: an international conference on conservation on fish genetic diversity. World Fisheries Trust, Victoria, B.C., Canada.

Dr. Teugels: We did not include them because principal component analysis is recommended for the analysis of morphometric data. As I said, estuaries are found especially between Senegal and Sierra Leone, and lagoons are abundant from Cote d'Ivoire to Nigeria. If you have seen the subspecies that were retained, we have *S.m. heudelotii* from Senegal and *S.m. melanotheron* from Cote d'Ivoire/Nigeria and southern Cameroon. Estuaries and lagoons are different, so definitely you are right; it is likely that physical conditions may influence differences.

Dr. Pullin: Could you apply the classification of populations suggested by Wood and Holtby (1998) for salmon "conservation units" to the various populations of *S. melanotheron*, and estimate the gene flows among these?

Dr. Teugels: We can try.