

Mesozoic sarcopterygians

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Abstract

Only two piscine sarcopterygian groups, actinistians and dipnoans, survived into the Mesozoic. They peak in species diversity at the beginning of the Mesozoic, in the Early Triassic. A second peak of actinistian diversity falls into the marine Late Jurassic, whereas dipnoans are more diverse in freshwater deposits of the Late Triassic and the Neogene of Australia. A connection with catastrophic events cannot be shown, only the radiation in the Early Triassic could be the result of faunal change at the Permo-Triassic boundary. As advanced sarcopterygians, actinistians and dipnoans are quite distinct from each other and from other Mesozoic osteichthyans. The actinistians are very well known. Knowledge of Mesozoic and Cenozoic dipnoans has progressed during the last 20 years beyond tooth plates.

Introduction

The diversity of sarcopterygian fishes declined with the end of the Paleozoic. The actinistians and dipnoans are the only survivors, beside the tetrapods. Both groups have some features in common: the lack or loss of the maxilla, short dentary, short hyomandibula, axial internal skeleton of paired fins and symmetrical caudal fin (Fig. 1). These features commonly are interpreted as convergent because of differences in morphology (short dentary), late appearance in the phylogenetic history of each group (symmetrical tail, see ARRATIA et al. 2001) and different position of both groups in interrelationship schemes of sarcopterygians (loss of maxilla). However, both groups are characterized by many synapomorphies. Mesozoic actinistians and dipnoans are more distinct from each other than their early representatives, because common primitive features, e.g. heterocercal tail, are replaced by derived features, e.g. morphologically different symmetrical tails (ARRATIA et al. 2001).

Actinistians are preserved as complete specimens in most cases, whereas the record of Mesozoic dipnoans is essentially based on tooth plates. Complete actinistians are known from marine “Fish-Lagerstätten” in the Early Triassic of Spitsbergen (STENSIÖ 1921), East Greenland (STENSIÖ 1932) and Madagascar (BELTAN 1996), in the Upper Triassic/Lower Jurassic Newark Supergroup between Connecticut and North Carolina (OLSEN et al. 1982), in the Upper Jurassic from Southern Germany (FRICKHINGER 1994) and France, and in the Lower Cretaceous of Brazil (MAISEY 1986). In contrast, dipnoan remains generally are isolated tooth plates or skull bones except for the Triassic genera *Gosfordia* (RITCHIE 1981), *Asiatoceratodus* (VOROBYEVA 1967), *Paraceratodus* (LEHMAN et al. 1959) and *Microceratodus* (LEHMAN et al. 1959). Remains of actinistians and dipnoans are more common in the Triassic than in the later Mesozoic, and they became restricted from a worldwide distribution in the Triassic to a southern hemisphere distribution today.

I will present here the main features of the two sarcopterygian groups, the interrelationships within both groups and the resulting classifications, the fossil record of the two groups in the Mesozoic, their distribution and frequency in time, and their evolutionary rate.

Abbreviations used in figures: AB, ABC, C, E, EC, EQ, I, II, J, JKLMN, JLM, KLMN, X, XK, Y, YZ, Z, bones of the skull roof in dipnoans; a, angular; af, anal fin; df1, df2, first and second dorsal fin; fe.na.ex.a., p., anterior and posterior external nasal opening between bones; fe.ro.a., m., p., anterior, median and posterior opening of the rostral organ between bones; Io, ossicles around infraorbital canal; Mo, ossicles around mandibular canal; na.c, nasal sack; Op, operculum; pef, pectoral fin; po.ca.ioc, soc, pores of the infraorbital and supraorbital sensory canal; Po, ossicles around preopercular canal; pvf, pelvic fin; Ro.l, lateral rostrals; ro.o, rostral organ; Sop, suboperculum; Spl, splenio-postsplenic; Te, tectal.

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