

Distribution and ecology of pycnodont fishes

J. Ralph NURSALL

Abstract

Pycnodont fishes persisted from Late Triassic (Norian) to Eocene (Ypresian-Lutetian) times, about 175 million years. They inhabited shallow, marginal, often reefal seas, located subtropically or tropically around Tethys and into the developing Atlantic. They were deep-bodied, manoeuvrable fish, restricted to a durophagous habit. Pioneers in their mode of life, they were supplanted by the teleosts, which were evolving rapidly into much more diversified forms.

Introduction

The pycnodonts were inhabitants of the margins of the Tethyan Sea and its extensions into and beyond the developing Atlantic Ocean (Fig. 1). Their earliest recorded appearance was Late Triassic (Norian) in what is now northern Italy (TINTORI 1981). They persisted into the Eocene (Ypresian-Lutetian), according to deposits at Monte Bolca (BLOT 1980) and in Egypt and Mali (LONGBOTTOM 1984), encompassing a period of about 175 million years. There is an unconvincing record from the Oligocene (KOCH 1904).

The extent of their distribution can be measured by records from eastern Tibet in the east (YOUNG & LIU 1954), to northern Chile in the west by Late Jurassic (ARRATIA 1987) (Fig. 1). They extended further into South America during the Cretaceous (WENZ 1969, BENEDETTO & SANCHEZ 1971, 1972, SCHULTZE 1981). Pycnodonts also extended into the centre of North America (GREGORY 1950) as well as along eastern maritime coasts (BELL 1986). They were common in northern and southern marine extensions across Europe and Africa. Rich deposits have been found in the lagoonal seas of Solnhofen, Cerin, Lérida, Tepexi de Rodriguez, Monte Bolca and other marginal regions of Tethys and its extensions. See below under The Habitat for references. In almost all instances, the deposits within which pycnodonts have been found are believed to have been marine. It is generally believed that the Tethyan Realm was tropical or sub-tropical (LOWENSTAM 1964, REID 1967, VALENTINE 1967, SCHAEFFER 1969, KAUFFMAN 1973, SORBINI & TIRAPELLE RANCAN 1979, RAYNER 1981).

The habitat

GINSBURG (1964) has described the vast extent of epicontinental seas in Europe, Africa, the Middle East, North America, Mexico and South America, especially during Cenomanian and Turonian times. This concurs with the greatest extent of pycnodont distribution. It was followed by the Campanian regression and an apparent decrease in marine animal diversity across the Cretaceous-Tertiary boundary. The London and Hampshire Basins (Ypresian) were described by REID & CHANDLER (1933) as having tropical affinities with an Indo-Malaysian flora and communication with Tethys. These connections were illustrated by WILLS (1951) and described further by RAYNER (1981).

BOSELLINI & HSÚ (1973) described vast shelves of tidal flats in the Late Triassic, with Tethys expanding from the east. Earlier, RODGER (1957: 10) had commented on the "... extraordinary spread of limestone deposition over the world at several times during the Paleozoic and again in the Cretaceous..." with its implication of shallow seas and sub-tropical climates. RAYNER (1981) pointed out that intertransforma-

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