

# The Jurassic and the early history of teleosts

Gloria ARRATIA

## Abstract

Whether the history of Teleostei begins in the Triassic or the Jurassic depends on the composition of the group. Teleostei sensu PATTERSON (1973, 1977), includes pachycormiforms, aspidorhynchiforms, and pholidophorids within the group, but is known in the Triassic only by pholidophorids. PATTERSON's (1977) cladogram indicates that pachycormiforms and aspidorhynchiforms should be older groups than the pholidophorids, but the known fossil record does not support that hypothesis because Triassic pachycormiforms and aspidorhynchiforms are unknown. New morphological evidence questions the assignment of pachycormiforms and aspidorhynchiforms to Teleostei.

Of about 450 living teleostean families, only 15 can be recognized in the Mesozoic (Cretaceous). Living teleosts are extremely diverse, both morphologically and in terms of number of species. Some major clades and morphological patterns can be traced back to the Late Jurassic, e.g., the elopomorphs with *Anaethalion*, the ostariophysans with an undescribed fish from southern Germany, and probably the "salmoniforms" with *Orthogonikleithrus*, and to the Early Cretaceous or Late Jurassic the osteoglossomorphs with numerous genera.

Three radiations of teleostean fishes can be identified in the Jurassic. The first is represented by the family Leptolepidae with two genera, which occur in the Early Jurassic. About five genera known from the Middle Jurassic represent the second teleostean radiation. About 20 genera and about five families known from the Late Jurassic represent the third radiation. Some of the Jurassic genera were described as Teleostei incertae sedis and not assigned to families. Among the Jurassic teleosts only two monophyletic assemblages are recognized; the ichthyodectiforms and the unnamed clade [*Ascalabos* + [*Domeykos* + [*Varasichthys* + [*Protoclupea* + *Luisichthys*]]]]. The phylogenetic relationships of the latter assemblage support the hypothesis that the European locality Solnhofen (with *Ascalabos*) is the sister region of the Chilean locality El Profeta (with *Domeykos*, *Varasichthys*, and *Protoclupea*) plus the Cuban locality Pinar del Río (with *Luisichthys*). This is the first evidence from the teleostean fossil record that supports a connection between European and Chilean fish faunas through the Tethys Seaway.

## Introduction

Numerous marine, fossil fish localities are known from the Jurassic (Fig. 1; SCHAEFFER & PATTERSON 1984: tables 3, 4); however, only a few of them show a broadly diversified fauna that includes teleostean fishes. The available information on Jurassic localities and their fish faunas do not allow detailed comparison between them. Among the best known Jurassic localities and the best known fish faunas are those from Great Britain, Germany, and France. Among the Jurassic localities in southern Germany, Solnhofen is most commonly mentioned, despite the fact that many other localities are rich also in fossil fishes. These include Eichstätt, Kelheim, Zandt, and others. Outside Europe, a few localities could be compared in fish diversity with those in Europe. For instance, Pinar del Río in Cuba (which has yielded only one teleostean taxon) and Cordillera de Domeyko in Chile.

Our knowledge of various fish groups during the Jurassic is mostly derived from a few European fossil localities, all of which are marine. These various fish groups indicate that teleosts were scarce in the Jurassic. Today, teleosts include an estimated 21,000 species (NELSON 1984) included in about 450 families (ESCHMEYER 1990). This exceeds by far the diversity of any other Recent vertebrate group.

Although living teleosts can be easily differentiated from other fish groups, the morphology of early teleost species is more problematic. Depending on our definition of Teleostei, the known duration of the group in geologic time changes. Therefore, before going into the early radiations of teleosts, I discuss briefly the composition of the group.

## The whole contribution can be purchased as PDF file.

### Availability

Generally all our publications are available as PDF files; full publications as a general rule after the printed version is out of print. If you have questions concerning particular contributions please contact us by e-mail:

pdf@pfeil-verlag.de.

### The PDF files are protected by copyright.

The PDF file may be printed for personal use.

The reproduction and dissemination of the content or part of it is permitted.

It is not allowed to transfer the digital personal certificate or the password to other persons.

### Prices

Books: Prices are to be found in the catalog.

Articles in journals and single contributions or chapters in books:

10 EURO basic price per order (including the first 10 pages),  
and

0.50 EURO per page, beginning with the 11<sup>th</sup> page.

Page numbers are found in the contents of the publications.

### Orders

Use our order form for PDF files or send your order informal per e-mail (pdf@pfeil-verlag.de). The only accepted payment is by credit card. While using the order form for PDF files, your data will be transmitted by secure link (ssl). You also may send the informations informally by e-mail, fax, phone or mail.

### Handling

As soon as possible, depending on our business hours and your order, you will receive your PDF file together with the certificate and password by e-mail.

Larger PDF files can be downloaded from our webpage, if necessary.

Your invoice will be sent out by e-mail after we charged your credit card.

To open the encrypted PDF files you have to install your personal certificate after your first order. All PDF files with the same certificate can be opened from that time on.

## Dieser Beitrag kann als PDF-Datei erworben werden.

### Verfügbarkeit von PDF-Dateien

Prinzipiell sind von allen unseren Publikationen PDF-Dateien erhältlich. Komplette Publikationen in der Regel erst nachdem die gedruckte Version vergriffen ist. Anfragen bezüglich bestimmter Beiträge richten Sie bitte per E-Mail an pdf@pfeil-verlag.de.

### Die PDF-Dateien sind urheberrechtlich geschützt.

Ein Ausdruck der PDF-Dateien ist nur für den persönlichen Gebrauch erlaubt.

Die Vervielfältigung von Ausdrucken, erneutes Digitalisieren sowie die Weitergabe von Texten und Abbildungen sind nicht gestattet.

Das persönliche Zertifikat und das Passwort dürfen nicht an Dritte weitergegeben werden.

### Preise

Bücher: Die Preise sind dem Katalog zu entnehmen. Zeitschriftenbeiträge und einzelne Kapitel aus Sammelbänden bzw. Büchern:

10 EURO Grundbetrag pro Bestellung (einschließlich der ersten 10 Seiten),  
und

0,50 EURO pro Seite ab der 11. Seite.

Den Umfang der Beiträge entnehmen Sie bitte den Inhaltsverzeichnissen.

### Bestellungen

Bestellungen sind mit dem PDF-Bestellformular oder formlos per E-Mail (pdf@pfeil-verlag.de) an uns zu richten. Die Bezahlung ist ausschließlich per Kreditkarte möglich. Bei Verwendung unseres Bestellformulars werden die Kreditkartendaten über eine gesicherte Verbindung (ssl) übermittelt. Sie können die Daten aber auch formlos per E-Mail, Fax, Post oder telefonisch übermitteln.

### Abwicklung

So bald wie möglich, aber abhängig von unseren Bürozeiten und der gewünschten Bestellung, schicken wir Ihnen die PDF-Datei(en) zusammen mit Ihrem persönlichen Zertifikat und dem zugehörigem Passwort per E-Mail. Größere Dateien bieten wir Ihnen gegebenenfalls zum Herunterladen an.

Der fällige Betrag wird von Ihrer Kreditkarte abgebucht und Sie erhalten die Rechnung ebenfalls per E-Mail.

Um die verschlüsselten PDF-Dateien öffnen zu können, muss bei der ersten Bestellung das passwortgeschützte persönliches Zertifikat installiert werden, welches anschließend auf dem Rechner verbleibt. Alle mit diesem Zertifikat verschlüsselten Dateien können anschließend auf diesem Rechner geöffnet werden.