Mesozoic Fishes 2 – Systematics and Fossil Record, G. Arratia & H.-P. Schultze (eds.): pp. 9-19, 4 figs.
 – ISBN 3-931516–48-2

Mesozoic holocephalians

Barbara J. STAHL

Abstract

Almost all the Mesozoic holocephalians can be characterized either as myriacanthoids or chimaeroids. The interrelationship of the Mesozoic holocephalians and their connections to the Paleozoic holostylic chondrichthyans is problematic. Evidence from dentitions and tooth structure is difficult to interpret; body form and skeletal design is superficially similar but poorly known. Reduction in the number of tooth plates comprising the dentition can be predicated on the basis of a morphologic series and the apparent shift in the direction of tooth plate growth can be explained, but a phylogenetic progression from a tooth plate with a base of laminar tissue and a crown of orthotrabeculine to one of chimaeroid design, lacking both these features, is purely hypothetical. The skeletal evidence, especially cranial structure, indicates a difference in adaptive solutions to functional requirements. The myriacanthoid most similar to the chimaeroids in cranial structure is *Chimaeropsis*; the skull in that form cannot be studied further as the unique specimen has been lost. Myriacanthoid remains are still too sparse to permit speculation on relationships within this group of holocephalian fishes. More can be said about the evolution of the chimaeroids, although here, too, important parts of the record are missing. The availability of extant representatives makes it possible to affirm with some confidence the progressive reduction of tritoral tissue in the tooth plates and the increasingly sectorial nature of the dentition in these holocephalians. The classification of the known Mesozoic chimaeroids must be rethought: newly discovered specimens suggest that several of the generic assignments made by 19th century investigators are untenable. Genera were often based on tooth plates alone and differences in appearance due to age and wear may have led to the erection of spurious taxa. Discovery of associated dentitions will allow prunning of the nomenclature.

Morphology and evolution of Mesozoic holocephalians

The fossil record shows, at the beginning of the Carboniferous period of the Paleozoic era, a great diversification of cartilaginous fishes with slow-growing tooth plates. The term “bradyodont” was coined to distinguish these chondrichthyans from the sharks that renew their teeth through an endless series of tooth buds from the dental lamina as worn teeth fell away. It is assumed, from observation of extant fishes with tooth plates or pavements of flattened teeth, that the bradyodonts were durophagous; and the anchorage of their tooth plates supports that speculation: in almost all of these fishes there is no separate, movable palatoquadrate. The upper tooth plates are braced against the underside of the skull. From embryological studies of extant bradyodont chondrichthyans (SCHAUINSLAND 1903, DIDIER 1995), we can be virtually certain that, in fossil bradyodonts, the developing palatoquadrate cartilages fuse with the chondrocranium at an early ontogenetic stage, making a firm platform for the dentition. The body form of these fishes is largely a mystery because most of them are known from tooth plates alone. From the few specimens that are preserved more or less entire, it is apparent that this group of chondrichthyans shared little besides their possession of tooth plates and fused palatoquadrates. These two characters were made the basis of the taxon Holocephali by BONAPARTE (1832) and, ever since, most paleontologists have been listing chondrichthyan tooth plates or tooth whorls under this category, removing them only when it could be demonstrated that free palatoquadrates exist.

Phylogenetic analysis of isolated tooth plates can be a fruitless exercise, but the record of these remains does indicate that the holocephalian fishes declined after the Carboniferous and by Mesozoic time had largely ceded their niche to batoid elasmobranchs and perhaps certain specialized osteichthyans. Of the myriad of Paleozoic holocephalians – cochliodonts, chondrenchelyids, copodonts, psammodonts, and

The whole contribution can be purchased as a PDF file.

To avoid unlicensed distribution of the PDF files we use an encryption method which which attaches the permission to open the PDF files to the customers computer.

The installation of these PDF files does exclusively run on IBM compatibles (**not** Apple Macintosh).

Prices
Articles in journals and single contributions or chapters in books:
10 € **basic price** (the first 10 pages are included), and
0.50 € **page price**, beginning with the 11th page.

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. Using the oder 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
- After we charged your credit card, you will receive the **PDF file(s)** together with an **installer** ("**install.exe**") per e-mail. Larger PDF files can be downloaded from our webspace, if necessary, or we send it by mail on CD.
- To open the encrypted PDF files, the plugin "**fOpen32.api**" must be existing in the "**Plug_ins**" directory of Acrobat Reader or Acrobat. Running the installer, you will be informed if this plugin is missing.
- Running "install.exe" on your computer, a new directory "**PDF-Pfeil**" will be created.
- During installation, a "**Product ID**" [e.g., 1234509876] and an "**Input string**" [e.g., ABCXYZMNO] are shown.
- Clicking on the "**Create E-Mail**" button, your e-mail program will open, and both the "Product ID" and the "Input string" will automatically be transferred to a new e-mail.
- Submit this e-mail and stop installation.
- As soon as possible, depending on our business hours, you will receive an e-mail with an "**authorization string**" [e.g., XOOFQOXSV].
- Run the installer again and transfer this string to the corresponding box. The PDF file can now be opened.

Libraries and standing orders
If you wish to subscribe a PDF version of a journal or you want to order publications for a public library, please contact us per e-mail.

Dieser Beitrag kann als PDF-Datei erworben werden.

Um die unlizensierte Weitergabe der PDF-Dateien zu verhindern, verwenden wir eine spezielle Verschlüsselungstechnik, die die Berechtigung zum Öffnen der PDF-Dateien an einen Rechner bindet.

Die Installation dieser PDF-Dateien läuft nur auf IBM-kompatiblen Computern (**nicht** Apple Macintosh).

Preise
Zeitschriftenbeiträge und einzelne Kapitel aus Sammelbänden bzw. Büchern:
10 € **Grundbetrag** (einschließlich der ersten 10 Seiten), und
0,50 € **Seitenpreis** ab der 11. Seite.

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
- Nach Abbuchung des Betrages von Ihrer Kreditkarte schicken wir Ihnen die **PDF-Datei(en)** zusammen mit einem **Installer** (»**install.exe**«) per E-Mail. Größere Dateien bieten wir Ihnen gegebenenfalls zum Download von unserem Webspace an, bzw. schicken sie auf CD per Post.
- Um die verschlüsselten PDF-Dateien öffnen zu können, muss sich das Plugin »**fOpen32.api**« im »**Plug_ins**«-Verzeichnis von Acrobat Reader bzw. Acrobat befinden. Bei der Ausführung des Installers werden Sie gegebenenfalls darauf hingewiesen.
- Führen Sie den Installer auf Ihrem Computer aus, so wird ein Verzeichnis »**PDF-Pfeil**« angelegt.
- Im Verlauf der Installation werden eine »**Product ID**« [z.B. 1234509876] und ein »**Input string**« [z.B. ABCXYZMNO] angezeigt.
- Klicken Sie im angezeigten Fenster auf »**Create E-Mail**«, so öffnet sich Ihr E-Mail-Programm und die »Product ID« und der »Input string« werden automatisch in eine neue E-Mail übertragen.
- Schicken Sie die E-Mail ab und brechen Sie die Installation ab.
- So bald wie möglich, aber abhängig von unseren Bürozeiten, senden wir Ihnen einen »**Authorization string**« [z.B. XOOFQOXSV] zurück.
- Geben Sie diesen String bei erneuter Installation ein. Anschließend kann die PDF-Datei geöffnet werden.

Bibliotheken und Zeitschriftenabonnements
Wenn Sie die PDF-Version einer Zeitschrift abonnieren oder für eine Bibliothek bestellen wollen, setzen Sie sich bitte per E-Mail mit uns in Verbindung.