

The elopiform fish †*Anaethalion angustus* restored, with comments on individual variation

Francisco José POYATO-ARIZA

Abstract

The genus *Anaethalion*, from the Malm of Bavaria and France, is an elopiform fish of great importance for understanding the origin and early diversification of major teleostean lineages. This paper deals with the type species *Anaethalion angustus*, which has been previously described in detail, but whose skull and body restorations were incomplete or unknown. These are provided here. The individual variation observed in the caudal skeleton of *A. angustus* is acknowledged. It involves the number of principal caudal fin-rays and the number of neural and haemal arches of preural centra 2 and 3.

Introduction

The primitive teleostean fish *Anaethalion*, from the Malm of Germany (e.g., Solnhofen, Eichstätt, and other Bavarian outcrops) and France (Cerin), has always been acknowledged as of outstanding relevance to the understanding of the basic organization of the teleostean fishes, as well as the origin and phylogenetic relationships of their major clades. It is the only nominal genus within the family Anaethalionidae GAUDANT 1968, which was considered as Elopomorpha incertae sedis by ARRATIA (1987), and later as Elopiformes by ARRATIA (1997). Several papers dealing with this genus have been published throughout the years (e.g., NYBELIN 1967, GAUDANT 1968, FOREY 1973, ARRATIA 1987, 1997). They have provided excellent descriptions and large amounts of information on the genus, including restorations of the species *Anaethalion angustissimus*, *A. knorri*, and *A. subovatus*. In contrast, only the restoration of the skull of the type species, *A. angustus*, had been rendered (NYBELIN 1967), although photographs and partial camera lucida drawings have been published. It seems surprising that other species, but not the type species, have been reconstructed. NYBELIN's restoration (1967: fig. 1) is quite partial, as it only depicts the "rostral", premaxilla, maxilla, both supramaxillae, "dentalosplenic", angular, and partially the frontal and the opercular bones. No complete restorations of the skull of *A. angustus* and no restorations of the body at all have been produced prior to this contribution. The knowledge of the type species of this important genus was, in this sense, less comprehensive than the knowledge of other species. I faced this problem when I compared the German material of *Anaethalion* with *Ichthyemidion* during the study of the Early Cretaceous *Ichthyemidion vidali*, from El Montsec (Lleida, Spain). *Ichthyemidion* was for a long time thought to belong in the genus *Anaethalion*. "*Anaethalion*" *vidali* was moved to the new genus *Ichthyemidion* by POYATO-ARIZA (1995), who considered it as an Elopidae. The comparison of the Jura Museum specimens of *A. angustus* with "*A.*" *vidali* revealed the necessity for revision and graphic information of the type species of the genus.

A description of *A. angustus* is spared in this paper, since those published by NYBELIN (1967) and ARRATIA (1987) are very complete, and redescribing it would only result in unnecessary redundancy. Some information on the individual variation observed in the caudal skeleton during the study of this species is commented on. The text is subsequently focused on the elaboration of the new restorations, which are intended to serve as a source of supplementary information for further studies on the morphology and on the variation of *Anaethalion*.

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 11th 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.