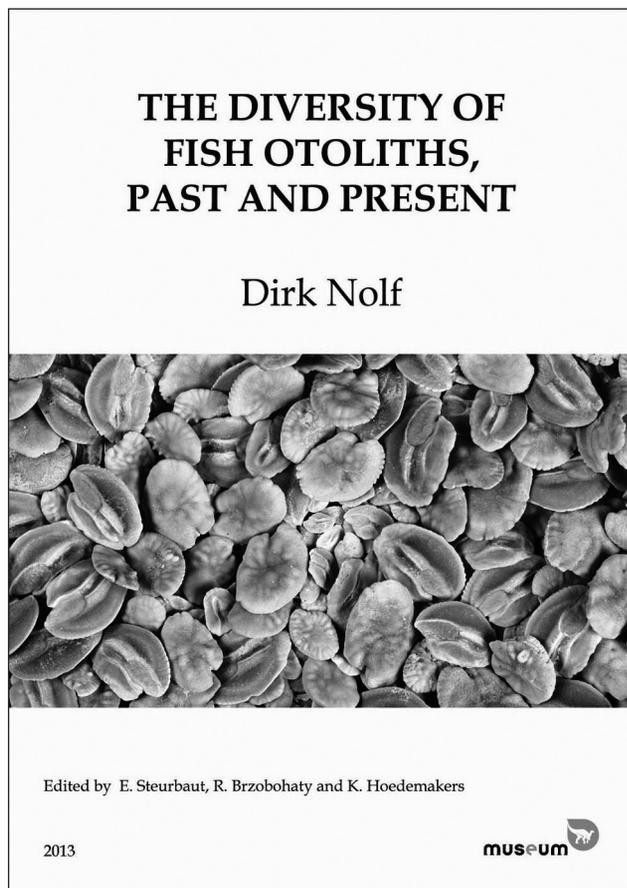


Book reviews



The Diversity of Fish Otoliths, Past and Present (Dirk NOLF)

is a publication by the
Operational Directorate "Earth and History of Life"
of the Royal Belgian Institute of Natural Sciences
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This new book (222 p. & 359 pl.) contains a historical and nomenclatural overview of otolith research in paleontology, with special emphasis on their great impact on the evaluation of the fossil record of teleostean fishes, and a systematic overview (with iconography) of the 1391 fossil species considered to be valid and of all Recent species for which otoliths have been found as fossil.

Otoliths of nearly all recent families and subfamilies are illustrated by at least one example, covering about 95% of all known extant taxa.

For every fossil species, the stratigraphic and geographic origin of the type material is given, and where available, also the collection numbers and depository of the holotype.

Fossil species based on skeletons with otoliths in situ, but which do not have exclusively otolith-based primary types, are also included.

An alphabetic list of all the 1797 nominal otolith-based fossil fish species, with an evaluation of their validity and their actualized nomenclature is provided.

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'The diversity of fish otoliths, past and present', by Dirk Nolf

Victor W.M. van Hinsbergh

In this book Dirk Nolf summarizes his half a century of study on fossil and recent fish otoliths. From the beginning of his career onwards he advocated that fossil fish otoliths cannot be interpreted well without a thorough knowledge of the otoliths of living fishes. Such knowledge not only provides information about consistent features of species and families, but also about otolith variability within species, morphological changes during development, and malformations. All this information is required for proper identification and interpretation of fossil fish otoliths. In over forty-five years Dirk Nolf built up a unique collection of Recent fish otoliths; studied fishes and their otoliths in many famous museums; and travelled around to scrutinize collections and holotypes of fossil fish otoliths. Among his many publications he reissued and extended the classical work of Chaîne & Duvergier on recent fish otoliths stressing the importance of knowledge about this subject (Nolf *et al.*, 2009).

In 'The diversity of fish otoliths, past and present' Dirk Nolf gives a testimony of his observations. He generously offers the reader the opportunity to profit from his own experience, together with his personal interpretation of previously published fossil otoliths and otolith-based nomenclature of fossil bony fishes. The core of the book is the Systematics section. In 104 pages and 359 plates depicting over 5,000 otoliths (around 1,500 species) the author provides a record of representative Recent otoliths of almost all families (and subfamilies) of Holostei and Teleostei as well as – as far as they are known – of many fossil species of these families. The pictures of ontogenic series of otoliths given for many species are also highly informative. On the plates all otoliths are visualized from their most informative inner (sulcus) side, and for most of the species a perpendicular ventral view is also given. The external side of the otolith is not depicted, except for a few exceptions.

The text summarizes for each family or subfamily the depicted Recent example(s), Recent species known as fossils, and otolith-based fossil species, with a brief indication of the origin of the depicted specimens. A small incidental error did occur. *Paraconger notialis* was recognized from the Zanclean by Nolf & Girone (2006), but is now only indicated as a Recent species. This may be confusing, but it seems trivial in the vast amount of information. The book does not give detailed or even short descriptions of the otoliths, for which the interested reader is referred to the original papers which

are cited in 35 pages listing all references for fossil otoliths described up to the end of 2011. In this list a selection of important publications on Recent otoliths is included and separately marked. In the 104 text pages on systematics, only occasionally is a brief discussion given.

One might expect that ample discussion would be important in appendix 1, which is an annotated list (54 pages) of the nominal otolith-based fossil fish species. The annotations are brief and provide mainly the conclusion or the opinion of the author himself, with limited argument. This is surprising given the large number of species that the author proposes to reject. In every branch of descriptive science there are splitters and lumpers, but the chosen authority-based approach does not do justice to the dedicated work of other authors. The criticisms of the work of Werner Schwarzhans in particular seem somewhat undeserved.

Taking all aspects together, I would call the heavy monograph a testimony rather than a handbook, an interesting and valuable testimony. The work done to (re)evaluate many holotypes and museum collections must have been enormous, and the book must reflect a decade of work. It is good that the opinions of a true specialist with half a century of experience have been put together in this work. Preparing such a work by one person runs the risk that it never reaches its conclusion. New technical developments (improved photography; digital techniques), new additional data, and conflicting opinions always compete with finalizing such a book. Dirk Nolf has presented his testimony with a clear opinion, and as such it is not surprising that it will clash sometimes with opinions of other scientists. This may also hold true for the new nomenclature introduced to refer to species of which the family or order is clear, but no appropriate genus name can be given. An interesting and well-balanced analysis is given by Steve Tracey (see below). Personally I would have preferred it if the proposal on nomenclature could have been published in a separate opinion paper, suitable for a lively discussion that could have been settled before the book was finalized. Science is driven by discussion. Authority always had a temporal character in science. However, it is the author's choice. Dirk Nolf must have foreseen this when he introduced his book by a quote from Max Poll. I would rather paraphrase that quote: 'It is not bad at all, it's Dirk Nolf's opinion, and it's indeed quite useful'.

One may say this book is becoming too big. It will no longer be possible for one man to cover this whole field in a single monograph. The future will tell. But even if this may be expected for the future, I hope that the present book will stimulate young and experienced scientists now and also in the future when the time comes to prepare a full overview of all fish otoliths, probably no longer as a monograph, but in digital form completed with descriptions, drawings, photographs and balanced discussions. The contribution of Dirk Nolf shows how great the diversity of fish otoliths can be, both in the past, the present and in the future.

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Notes on Nolf's nomenclatural system

Steve Tracey

Open nomenclatural systems have been widely used for otolith-based nomenclature for many years because of their simplicity and convenience. The more recent systems have had an advantage over standard nomenclature insofar as the supposed systematic position of an otolith species can be deduced from the generic collective-group name, which is not usually the case with standard genus names.

In much of the recent literature on fossil fish Nolf and other authors have assigned otolith species of uncertain generic position to groups with such two-word names as 'Genus Albulidarum' (meaning a genus of the family Albulidae) or 'Genus Albuloideorum' (meaning a genus of the superfamily Albuloidea) *etc.* These group names were all formed in a similar fashion by adapting the ending of a higher ranked taxon (see Schwarzhans, 2012, p. 87 for a detailed history of otolith nomenclature). In the present book Nolf has attempted to avoid the criticism that species assigned to these 'collective-groups' might be considered non-binominal, by proposing new names for the same groups, such as 'Albulida' and 'Albuloideus' for the above examples. These new names are also formed by adapting existing family-group names and higher taxa in similar ways: the suffix '-inae' becomes '-ina', '-idae' becomes '-ida' and '-oidea' becomes '-oideus' (other higher taxa are treated in a similar way).

This alternative system of nomenclature is clearly useful for throwing light on the evolution of fish families. Because they are formed by applying a standard formula to the various family-group names, the new 'collective-group' names introduced in this book may not qualify as standard scientific names, but rather 'zoological formulae', which are defined

in the Glossary of the Code (ICZN 1999) as ‘modification[s] of available names throughout a taxonomic group by the addition of a standard prefix or suffix in order to indicate that the taxa named are members of that group [Article 1.3.7]. Zoological formulae are excluded from the provisions of the Code...’ and words so formed do not enter into zoological nomenclature (ICZN 1922, Opinion 72). Even if, as some might argue, the minutiae of the wording of this Article could be interpreted as not applying to these new groups, they are still *nomina nuda* as they are not accompanied by diagnoses that purport to differentiate them from other generic groups (Article 13.1.1) and they are not explicitly and individually stated to be new taxa as required by Article 16.1. For reasons understood by the author but not stated in words, each generic name is considered to belong to a known family group or higher taxon. The new names appear for the first time in lists in the present work, although the nomenclatural system is first explained on pp.18-19. These names are only identifiable as such by their endings and by the fact that they are in ‘quotes’.

By implementing this system in the new book Nolf has explicitly created a large number of new nominal genus-group taxa and implicitly created many more, one for each family-group name of the Osteichthyes (*e.g.* by using the formula, fossil otoliths thought to belong to the Scarinae, Scaridae or Scaroidea would presumably be included in ‘*Scarina*’, ‘*Scarida*’ or ‘*Scaroideus*’ respectively, even though these names are not specifically introduced in the present work). This is potentially problematical in that some of these hypothetical ‘collective-group’ names would not be available as they are already preoccupied (*e.g.* *Albulina* and *Congrina*).

The author also advocates that nominal species formerly described in exclusively fossil genera should be reassigned to the new ‘collective groups’, perhaps causing potential problems of secondary homonymy. The idea of transferring a properly described fossil species from its valid fossil genus to a ‘collective group’ indicating uncertain affinities is where the system that Nolf advocates diverges from standard nomenclatural practice. The properly described generic names, however, will always have priority in terms of the ICZN Code. It is puzzling why Nolf did not describe these new names (which presumably contain species linked by common characters) as actual genera in the accepted way. Then a degree of certainty would have replaced the, perhaps permanent, uncertainty maintained by such alternative systems.

The various formats used for otolith nomenclature have often caused concern among authors that the availability and priority of new species names proposed under them will be protected.

Some authors, notably Janssen (2012) for gastropods, sought to correct earlier use of the ‘Genus Clionidarum’ format by using the most similar available genus name with a query (*e.g.* ‘*Clione?*’), thus complying with the ICZN Code, and was followed by Schwarzahns (2012) describing otoliths. This has always been a Code-compliant way of describing new species of uncertain affinity. Other variations, such as ‘*Clione*’ or *Clione (s.l.)* would be equally Code-compliant. Nolf, on the other hand, has sought to correct the previous ‘Genus Albulidarum’ format with his new *Albulida* system, names proposed for collective groups of generic rank. Despite their status as *nomina nuda* it is probable that new species names proposed in combination with them would still be available, as the validity or even availability of the generic name used is irrelevant (Article 11.9.3.1). This would not be the case with species described under the ‘Genus Albulidarum’ format, all of which must be unavailable, as these ‘genera’ cannot be treated as scientific names. An application should be made to the ICZN to preserve such specific names in view of their prevailing usage.

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