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## 8. Addendum

### Otolith nomenclature

Ernst Koken (1860–1912) was the pioneer who established scientific work based on otolith morphology and he was the first to describe otolith-based fossil species in 1884. With this, he established a nomenclatural system in which he placed all fossil otolith-based species in a collective genus *Otolithus* followed by the name of the genus, respectively family in genitive, respectively genitive plural, in brackets followed by the species name. His rationale was that fossil otoliths as isolated remains of fishes would only rarely be assignable to a fish through finds of otoliths in situ and that Recent otoliths were poorly known so that in many instances only placement into a family would be possible for those fossil finds (KOKEN, 1884, p. 502). For instance a species that he would feel comfortable in assigning to the extant genus *Gadus* LINNAEUS 1758 he would describe as *Otolithus (Gadi) tuberculosus* KOKEN 1884, and a species he would only be able to associate with the family Gadidae as *Otolithus (Gadidarum) elegans* KOKEN 1884. The view, as expressed by WEILER (1968) was that it could at a later stage be replaced by a 'proper' genus name whenever adequate knowledge of Recent otoliths of the family Gadidae in this example would have become available. And indeed, GAEMERS (1972) was able to place this very species in the genus *Trisopterus* RAFINESQUE 1814, so that it is reported since as *Trisopterus elegans* (KOKEN 1884).

The general view of otolith researchers was that KOKEN's 'invention' was a fine method to reflect exactly and adequately the pertinent level of knowledge. POSTHUMUS (1924) was the first to mention that KOKEN's nomenclature was not in compliance with the regulations of the ICZN then established and therefore the usage of the collective group name *Otolithus* was soon after stopped for all those

cases, where an otolith-based species was assigned to a genus and it was only kept for those instances where this was not possible. WEILER (1968) stated that the familial name in genitive plural, not in italics, was only meant to represent a taxonomic indication of the author's systematic assessment without nomenclatorial meaning and hence was put between angular brackets, in this example: *Otolithus [Gadidarum] elegans* KOKEN 1884. Nevertheless, WEILER (1968) was of the opinion that the insertion would protect against homonymy for instance of *Otolithus [Gadidarum] elegans* KOKEN 1884, *Otolithus [Sparidarum] elegans* PROCHAZKA 1893 and *Otolithus [Ophidiidarum] elegans* FROST 1934, in contrary to the view of ZILCH (1965). However, this practice is not compliant with article 6.1 of the ICZN, which only allows subgeneric names in brackets between genus and species names.

Also the collective genus name *Otolithus* KOKEN 1884 could be confused with *Otolithes* OKEN 1817, a genus of the family Sciaenidae, which has been written *Otolithus* by CUVIER 1829 and authors. Now, while *Otolithus* CUVIER 1829 represents a junior objective synonym of *Otolithes* OKEN 1817 it also represents a senior homonym to *Otolithus* KOKEN 1884. Therefore, HUDDLESTON (1983) introduced a replacement collective group name *Otolithopsis* for all those otolith-based taxa of unknown generic and familial position, which hitherto had been placed in the 'family' incertae sedis.

The entire original nomenclatural practice of KOKEN was finally abandoned soon after WEILER (1968). GAEMERS (1971) and authors dropped the collective group name to refer to a *Gadidarum elegans* KOKEN 1884. NOLF (1977), and explained in more detail in 1985 (page 30), proposed

a collective group system in which the plural genitive names are preceded by 'genus' instead of '*Otolithus*', for instance "genus *Gadidarum*" *elegans* KOKEN 1884 (to stay with the example), making reference to RICHTER (1948). RICHTER (page 146) indeed discussed the nomenclatural system presented by NOLF, but did not find it optimal, and in respect to otoliths proposed the use of the collective genus name *Otolithus* for all those instances, where a generic affiliation is unresolved. Nevertheless, the nomenclatural systems introduced by GAEMERS and particularly that introduced by NOLF are widely used in contemporaneous otolith research until today. GAEMERS & V. HINSBERGH (1978) stated that they were well aware that this nomenclature system "is not quite in agreement with the ICZN". They recommended to hand in a proposal with the ICZN commission to ask the next amendment of the Code "in such a way that the established practice in otolith systematics becomes legitimate", but they did not take action.

The knowledge of Recent otoliths has tremendously increased since the early days of KOKEN, but of course has not reached a status that could be described as 'nearing completion'. Still in many cases, including the mentioned family Gadidae, our knowledge of Recent otoliths is well adequate to judge, whether a specific fossil otolith-based species represents any of the extant genera of the family or, as the case may be, a fossil otolith-based genus. [Our knowledge of in situ otoliths of fossil skeleton-based genera is rudimentary at best and it is unlikely that it will ever become much better due to the different nature of the fossil preservation of otoliths as compared to skeletons.] While the increased knowledge base of Recent comparative otoliths has led to a much more reliable recognition of the nature and composition of fossil otolith-based fish faunas, most otolith research workers will agree that there is still a need to maintain a nomenclatural system that allows describing of a fossil otolith-based species with unresolved generic assignment.

In a recent monograph dealing with mollusks from the Tertiary of Malta, JANSSEN (2012a) applied the nomenclatural system of otolith research for the first time for molluscan systematics. Shortly thereafter, it was brought to his attention that the "recently introduced species applying 'open generic nomenclature' by using the indication 'Genus Clionidarum' instead of a formal genus name are violating ICZN art. 11.9.3". In a subsequent paper JANSSEN (2012b) stated that he followed "the format generally adopted in otolith literature for taxa that cannot be assigned to known genera, a system so far never questioned for these fossils by editorial boards and/or peer-reviewers of many prestigious periodicals". He went on validating those taxa by combining the new names with an unambiguous genus-name, i.e. the name of the type-genus of the family, followed by a question mark, indicating that those species might as

well belong to any other known or unknown genus in the particular family.

In respect to my foregoing study entitled "The otoliths from the Paleocene of Kressenberg Bavaria and Kroisbach Austria", it has become obvious that it is not advisable to continue the 'collective group' terminology currently in use in otolith research. I have therefore made use of Recent and fossil (otolith-based) genera wherever available and appropriate and used the methodology proposed by JANSSEN (2012b), wherever maintaining of an unresolved generic allocation appeared favorable. This nomenclatural system also allows for a simple transfer and safeguarding of previous species names and authorships recorded under the previous nomenclatural systems used in otolith research. The collective group name *Otolithopsis* HUDDLESTON 1983 is available for all species of unknown familial relationship.

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