

*CD rom review*

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## Otoliths of North Sea fish

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Leopold, M.F., van Damme, C.J.G., Philippart, C.J.M. & Winter, C.J.N., 2001. *Otoliths of North Sea fish*. CD rom, ETI, Universiteit van Amsterdam, Mauritskade 61, NL-1092 AD Amsterdam (ISBN 90-75000-22-7), € 99.

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Jointly, the Expert Centre for Taxonomic Identification (ETI, Amsterdam; linked with UNESCO), the Netherlands Institute for Research of the Sea (NIOZ, Texel) and Alterra (Wageningen University) have just put a new CD rom on the market, discussing and illustrating otoliths of fishes of the North Sea. The authors are all involved in the study of fish predators.

There are six main 'chapters', namely Introduction, Species, Glossary, Index, IdentifyIt and Literature, as well as a word of welcome to this ETI production, a list of contributors (other than the authors) and additional information on ETI, NIOZ and Alterra. The 'Introduction' comprises the sections Preface, Introduction, Sampling, Measurements and Regression. In the 'Preface', the preservation potential of otoliths, their use in the identification of fossil and extant fishes, daily/annual growth increments and age determination are discussed. The next section, the 'Introduction' proper, outlines which fish have (good) otoliths, presents data on fish hearing and balance and, mainly, on otolith degradation in predator stomachs. For some groups, other identifiable hard structures are treated, such as pharyngeal bones and chewing pads of cyprinids, dermal denticles and vertebrae of pipefish and lump sucker, and stickleback spines, all of which are well illustrated (Species, Multimedia). Here there are two errors: to describe cyprinid sagittae as potato-shaped is wrong (in fact, they are arrowhead-shaped), and in many cases fossil otoliths are certainly not more brittle than extant ones.

'Sampling' was done mainly in the southern North Sea and Wadden Sea, and in freshwater in the Netherlands. In

'Measurements' there is a new term, 'indented otolith length', which appears useful when rostral and/or posterior points are worn. Other measures and weights presented are total, fork and standard lengths of fish, fish width, fresh wet mass of fish, and otolith length and width; the latter, however, usually referred to as otolith height. Otolith thickness is not given, which is unfortunate since there are no lateral illustrations of otoliths. In 'Regression', the authors assume the fish length (or width) to otolith length ratio to invariably be a linear relation during growth – in some it actually is (*e.g.*, hake), but in many species it is not, which would result in a curved line instead of a straight one in a growth diagram.

The chapter 'Species' is the largest, comprising the sections Description, Predators, Allometry, Synonyms, Taxonomy, Literature and Multimedia. 'Description' consists of 1. Otolith description, 2. Fish length and distribution and 3. Sample origin. Under 1 mainly the morphology of adult otoliths is presented, but authors apparently have little experience in describing otoliths. Moreover, they have probably read only one taxonomic paper (Härkönen's book), as they appear unfamiliar with a fair number of common terms, such as cristae, colliculi, collum, pseudo-colliculum, area and ventral groove, which are not mentioned at all. There are lots of errors and obscurities, and descriptions and comparisons often lack the most specific characteristics and differences. As an example the following remarks and corrections must be made for herring otoliths; 1. the general shape is not ovoidly pointed, 2. it is not true that ostium and cauda cannot be distinguished (the boundary is clear by the extension of the ostial colliculum),

3. the meaning of 'the surface of the sulcus is irregular at the ostium side' is unclear, 4. it is unclear what is meant by: the inner surface has 'some irregularity at the edges of the sulcus in some specimens', 5. anterior and posterior margins are not indented in small juvenile otoliths, 6. the outside is not smooth; ornament of lobes and grooves is well visible in the photograph, 7. the posterior part of the sulcus is closed in juveniles, 8. the meaning of 'less developed sulcus in other clupeids' remains obscure.

In the 'Allometry' section regression tables are given, but diagrams would have been more convenient in showing fish length vs otolith length and fish weight vs otolith length (or better weight), and the computed regression lines. In 'Synonyms' vernacular names for the fish species are given in English, Dutch, German, French, Danish and Norwegian.

In the 'Multimedia' section, most SEM illustrations are of good quality, but lack data on otolith length, fish length and weight. Applaudable is the fact that often otoliths of very young specimens are included, giving some valuable insight into allometric otolith growth. However, in several illustrations of adult otoliths the angle differs from the most ideal orientation, which results in otoliths that look more or less deformed (many gadids and some others). Organic material still sticking to juvenile otoliths tends to obscure valuable details. Some damaged specimens have been used for SEM imaging (e.g., *Alosa fallax*, *Pungitius pungitius*, *Raniceps raninus*, *Pomatoschistus pictus*). Some otolith pictures are upside down: the juvenile *Melanogrammus aeglefinus*, all *Belone belone* and *Capros aper*; the latter is also rotated, leading to an erroneous description. The otoliths affected by HCl and identified as *Pollachius pollachius* actually belong to its relative *P. virens*; the fishes from which the otoliths were taken, have been misidentified. This is clear from the much more slender general shape and the lengthwise torsion of the otoliths. With *Cobitis taenia*, the authors illustrate the lapillus and are apparently unaware of this, since the description of the otolith is entirely beside the point. The 'IdentifyIt' program does not work properly, and this is due to the but partially reliable descriptions of otoliths and forgotten items and procedures.

Of the 348 publications listed in the chapter 'Literature', just eighteen deal with subjects other than diet studies and predators; only three are palaeontological papers, none of them on taxonomy, although otolith taxonomy mainly has been elaborated in palaeontology. Older works are clearly underrepresented. It is a real pity that the authors did not make any reference to, or use of, existing otolith bibliographies.

In comparison with Härkönen's (1986) book, which has more pictures of otoliths invariably photographed under the right angle, there are species missing from the present CD rom, but there are also those that feature on this CD and are not covered by Härkönen. The CD rom covers 90 species,

Härkönen's book 105, but 24 species occurring in the southern North Sea according to Nijssen & De Groot (1980) are missing from both sources. Härkönen's literature list is much shorter but more varied, and presents many references that are absent from the CD rom. In several respects, these publications are thus complementary.

A more realistic title would have been 'Otoliths of fishes of the southern North Sea and adjacent Dutch waters'. As far as a sequel to this CD is concerned, I can only hope for much improvement, amplification and a range extension. Unfortunately, the price of the CD is very high compared to the number of species and data, and their quality, presented. There are, moreover, many other CDs in the ETI/UNESCO series which offer much more value for the same money. The publisher should not stick to a standard price, but adjust it proportionally.

## References

- Härkönen, T. 1986. *Guide to the otoliths of the bony fishes of the northeast Atlantic*, 256 pp. Hellerup (Danbiu ApS Biological Consultants).
- Nijssen, H. & de Groot, S.J. 1980. Zeevissen van de Nederlandse kust. *Wetenschappelijke Mededelingen, Koninklijke Nederlandse Natuurhistorische Vereniging* 143, 1-109.

[A more extensive review of this CD rom may be obtained from the author upon request]