

Mit fortschreitender Meeresspiegeltransgression zeigt die Entwicklung des Kerns T7 vor ~1500 Jahren eine Lagunentiefe von ~6 m und vor ~1000 Jahren eine Tiefe von 4,1 m. Mit sinkenden Lagunentiefen tritt in beiden Proben wieder die hoch-diverse Miliolid-dominierende Vergesellschaftung auf. Diese Zusammensetzung der benthischen Fauna entspricht ebenfalls den ermittelten Lagunentiefen, die Flachwasserbedingungen mit normal mariner Umgebung aufweisen.

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## OTOLITH CHARACTERS OF SUBSPECIES AND POPULATIONS – A STUDY ON *APHANIUS* SPP. (TELEOSTEI, CYPRINODONTIFORMES) FROM ANATOLIA (TURKEY)

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Otoliths are aragonitic biomineralisations in the inner ear of teleostean fishes. There are three pairs of otoliths, which are termed as sagitta, asteriscus, and lapillus with regard to their position in the inner ear. They can be discriminated from each other because of their mirror-symmetrically shape as “right” and as “left” otolith, relating to the position in the right or in the left side of the inner ear.

In most teleostean fishes, the sagitta is the largest otolith. The significance of the sagitta morphology is well established for fossil and Recent taxa for species determination and also for classification on a higher taxonomic level. Many fossil fish faunas were reconstructed from Jurassic to Pleistocene sediments by means of isolated fossil sagittae. However, ichthyologists investigating systematics and taxonomy of living fish generally do not consider otoliths in their studies.

The topic of the present research is to demonstrate that otoliths provide an important data set of morphological characters also for studies on living teleostean fishes, especially for the analysis of species diversity (see also REICHENBACHER & SIENKNECHT, 2001; accept.). The Anatolian species and subspecies of *Aphanius* NARDO (Cyprinodontiformes, tooth carps) are well suited as a case study, as a lot of data is available from literature with regard to their interspecific and intraspecific relationships (studies on morphology, osteology and dentition, crossbreeding experiments and molecularbiological researches; e.g., VILLWOCK, 1958, 1982; PARENTI, 1981; HRBEK et al., 2002; HRBEK & MEYER, 2003). HRBEK & MEYER (2003)

estimate the age of the radiation of the central Anatolian *Aphanius* species at about 14 million years and the diversification of *A. anatoliae* of the Lake District in southwest Anatolia at 7 to 8 million years. According to VILLWOCK (1982), the different populations of *Aphanius anatoliae* even reflect different stages of 'species in statu nascendi'. Thus, the challenge of our investigation is, to examine if otoliths reveal differences in their morphology among subspecies and populations, respectively.

So far, we have investigated the morphological characters of 488 left and right sagittae of the four endemic Anatolian species: *Aphanius anatoliae*, including the subspecies *anatoliae*, *sureyanus* (endemic to Lake Burdur) and *transgrediens* (endemic to Lake Acı), *A. asquamatus* (endemic to Lake Hazer), *A. danfordii*, and *A. villwocki*. Moreover, we examined eight populations of *A. anatoliae anatoliae* and four populations of *A. danfordii*.

The otoliths of the subspecies *A. a. anatoliae* from Salda Gölü and Düğer and *A. a. sureyanus* are very similar to each other. But otoliths of the remaining *A. a. anatoliae* populations display greater differences among one another which is particularly the case for those from Avlan Gölü and Akkaya at Niğde. Sagittae of *A. a. transgrediens* are characterized by a somewhat rectangular shape and thus, differ from the other two subspecies mentioned above. Otoliths of *A. danfordii* from Karpuzatan at Kayseri show a contour different from those of Soysallı at Kayseri and the Kızılırmak populations, whereas the latter ones are resembling *A. villwocki* (= *A. sp. aff. danfordii* in HRBEK et al., 2002) has distinctly different sagittae, so that the classification as a separate species (HRBEK & WILDEKAMP, 2003) now is additionally confirmed on the basis of the otolith morphology. Finally, sagittae of *A. asquamatus* are unique in their strongly rectangular shaped contour among all other Anatolian *Aphanius* species.

The sagittae enabled us to distinguish part of the investigated subspecies and populations. But further, especially quantitative analyses will follow on more extensive material.

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