The crystallochemical study of phlogopites in cumulates evidences the factors responsible for the significant Ti- and Al-enrichment in these minerals. The Ti-incorporation results from two mechanisms: $^{[6]}Ti^{4+} + 2^{[4]}Al^{3+} = (^{[6]}Mg^{2+}, ^{[6]}Fe^{2+}) + 2^{[4]}Si^{4+}$ and $^{[6]}Ti^{4+} + ^{[6]}\square = 2(^{[6]}Mg^{2+}, ^{[6]}Fe^{2+})$. The Al-incorporation may be explained by: $(^{[6]}Mg^{2+}, ^{[6]}Fe^{2+}) + ^{[4]}Si^{4+} = ^{[6]}Al^{3+} + ^{[4]}Al^{3+}$. These different substitution mechanisms are related to the crystallisation temperature of phlogopites. A series of spectroscopic analyses (infra-red and Mössbauer) also revealed the presence of Fe^{3+} and water in the network of these micas and the low abundance of vacancies in octahedral sites.

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Changes in the malacofauna of Lake Malawi since mid-Holocene times

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It is generally accepted that Lake Malawi, the second largest African rift lake (surface: 29,000 km^2), is a prime example of an 'ancient lake', i.e., an extensive lacustrine system that persisted for at least 100,000 years (Gorthner, 1994). The assumption that the modern Malawi fauna is the result of a long-lasting evolutionary process is principally based on the marked diversity and endemism of its modern fish and molluscan communities. During the missions of the Hominid Corridor Research Project under the direction of Prof. Dr. Friedemann Schrenk in the nineties, a well preserved fossil mollusc assemblage of mid-Holocene age (^{14}C: 5,845 ± 85 BP) was discovered at the southern outlet of the lake, allowing a glance at the fauna in the near geological past.

A morphological and conchyometric study was carried out on the named fossil assemblages, comparing the mid-Holocene shells with series of modern specimens. Differences in community structure were also analysed and the results were correlated with available data on fluctuations of abiotic factors in the Malawi Basin during the Holocene. The purpose of this study was to assess the evolutionary changes in morphology and community structure that took place in this endemic 'ancient lake' fauna over a period of *c*. 6,000 years.

The modern malacofauna of Lake Malawi consists of a mixture of lake endemics and non-endemics. This in contrast to that of 'ancient lake' Tanganyika, which is exclusively endemic. At present five gastropod genera occur in Lake Malawi, namely *Bellamya* represented by a clade of 3 endemic species and 1 non-endemic species, *Lanistes* (3 endemics/2 non-endemic), *Gabbiella* (1 endemic), *Melanoides* (7 or 8 endemics /1 non-endemic) and *Bulinus* (2 endemics/2 non-endemics) (Mandahl-Barth, 1972; Brown 1994). The mid-Holocene community consists of the same five gastropod genera with the following endemic/non-endemic ratio: *Bellamya* (0/1), *Lanistes* (3/2), *Gabbiella* (1/0), *Melanoides* (5/0) and *Bulinus* (2/1). This shows that all gastropod genera, except *Gabbiella*, underwent marked changes since the mid-Holocene and the comparative morphological study shows that most modern clades of endemics did originate from non-endemic lineages during the last 5,000 to 10,000 years. As to the bivalves, at least one of the three genera with an endemic representative in L. Malawi shows marked morphological changes since the mid-Holocene. The young age of the endemic lineages is corroborated by recent genetic research on the parthenogenetic *Melanoides* clade, which appears to consist of different, genetically virtually identical, stable morphs (Genner *et al*., unpublished).

Since the mid-Holocene a distinct trend of decrease in shell size and shell thickness in all genera and a shift in dominance in favour of the most opportunistic non-endemic lineage (i.e. *M. tuberculata*) in the genus *Melanoides* suggest suboptimal ecological conditions in the modern lake compared to 6,000 years ago.

The general conclusion of the study is that most species of the endemic malacofauna of Lake Malawi, supposedly one of the most important 'ancient lakes' in the world, are only 5,000 to 10,000 years old. The persistence of a lake over a period of several hundred thousands of years does hence not imply the persistence of its fauna and therefore major parts of the lacustrine ecosystem. From the present study it would appear that the unstable climate conditions in subequatorial Africa since the Pleistocene caused oscillatory patterns in lake levels and physico-chemical characteristics of the lacustrine ecosystem. These oscillations were of such magnitude that they caused a cyclic pattern of brief extinctions and radiation events in slow moving epi- and endofaunal biota, e.g. the mollusca, that are more vulnerable to such changes than more mobile groups such as fishes and crabs.

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