

Diversification of the greater hydrophilines clade of giant water scavenger beetles dated back to the Middle Eocene (Coleoptera : Hydrophilidae : Hydrophilina)

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Abstract. Fossil representatives of the hydrophilid genera *Hydrochara* Berthold, 1827, *Hydrobiomorpha* Blackburn, 1888 and *Hydrophilus* Geoffroy, 1762 were recorded at the lower Middle Eocene locality Grube Messel in Germany. Four morphospecies were recognised, including *Hydrobiomorpha eopalpalis*, sp. nov. showing sexually dimorphic maxillary palpomere 2 unknown in any recent or fossil species of the genus. These fossils are the oldest known records of the mentioned genera and indicate a minimum age of 47 million years for the divergence of the *Hydrobiomorpha* and *Hydrophilus* clades. Based on these data, we assume that the diversification of the ‘greater hydrophilines’ clade predated the lower Middle Eocene. The fossil record of the subtribe Hydrophilina is briefly reviewed, the reasons of the scarcity or absence of some genera in the fossil record are discussed, and the paleoenvironmental significance of the presented fossils is discussed.

Additional keywords: Cenozoic, Europe, fossil record, Hydrophiloidea, Messel.

Introduction

Giant water scavenger beetles (subtribe Hydrophilina of the family Hydrophilidae) represent the largest and most massive representatives of aquatic beetles. The group is nowadays distributed throughout all biogeographical regions and occurs especially in various kinds of standing waters. Because of their large size, strong sclerotisation of their bodies, and aquatic habits, they are rather frequently represented in the fossil record.

Nearly 200 extant species are known at present, attributed to seven genera (Hansen 1999; Short and Hebauer 2006; Short 2010): *Brownepphilus* Mouchamps, *Hydrobiomorpha* Blackburn, *Hydrochara* Berthold, *Hydrophilus* Geoffroy, *Protistolophus* Short, *Sternolophus* Solier, and *Tropisternus* Solier. Phylogenetic relationships of extant representatives of the subtribe have been examined recently by Short (2010), who has also defined the synapomorphies of particular clades and listed the diagnostic characters of all extant genera. Moreover, he recognised the trend towards successive phyletic gigantism within the tribe: all large representatives are included into the monophyletic ‘greater hydrophilines’ clade comprising the genera *Hydrochara*, *Brownepphilus*, *Hydrobiomorpha* and *Hydrophilus*.

Although the phylogeny is resolved down to the generic level, the knowledge of the taxonomy on the species level is still rather incomplete even for extant species. Except for the monotypic genera *Brownepphilus* and *Protistolophus*, only the taxonomy of the extant species of the genus *Hydrochara* has been reliably treated by Smetana (1980). The remaining genera have been revised only in some biogeographical regions, especially in the Neotropics and Australia (e.g. Bachmann 1965, 1966, 1988; Watts 1988, 1989, 1990; Short 2004). Palearctic, Afrotropical and Oriental species of most genera have not been considered by recent authors and their identification is often rather difficult, requiring in some cases the use of papers published more than 100 years ago (e.g. Kuwert 1893; Régimbart 1901).

Within the fossil record, 28 species of the subtribe Hydrophilina have been described so far, all of them attributed to the extant genera *Hydrobiomorpha* (1 sp.), *Hydrochara* (10 spp.), *Hydrophilus* (12 spp.), *Sternolophus* (1 sp.) and *Tropisternus* (4 spp.); fossil representatives of the remaining extant genera are not known (for references see Table 2). Most fossil species were described during the 19th and the beginning of the 20th century, often on the basis of isolated body parts (usually elytra), and/or diagnosed only by body measurements;