

## MORPHOLOGICAL EVOLUTION OF THE MURICINAE

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The Muricidae constitute a taxonomically and morphologically diverse family of marine gastropods. The subfamily Muricinae is the largest in the family with over 180 Recent species recognized. Modern representatives typically are strongly sculptured and possess pronounced axial thickenings (varices) and varical spines. Early fossil representatives of the subfamily generally do not display the strong ornamentation that is characteristic of more modern forms. A study of Recent and fossil muricines in museum collections was made in order to document quantitatively the morphological evolution of this group. Morphometric data were obtained from oriented photographs, X- radiographs and actual specimens. These data were supplemented with limited measurements made from published plates. A preliminary analysis of these data has revealed the following:

1. Neogene and Recent representatives are significantly more ornamented than those of the Cretaceous and Paleogene. Neogene and Recent forms typically have thicker varices and a greater number of well developed varical spines. The diversity of varix and spine morphologies also increases through time. Intervarical nodes also become more developed during the Neogene. A less pronounced trend towards increased spiral ornamentation is also indicated. Similar patterns are observed in both Europe and the western Atlantic and a preliminary analysis of Indo - Pacific fossil taxa suggests that the trend exists in this region as well.

2. Although the appearance and diversification of higher taxa contributes to the above pattern (eg. *Chicoreus*, *Murex*), similar patterns are also observed within previously existing taxa.

3. Elongated siphonal canals become more prevalent in the Neogene, although this pattern is largely the result of the diversification of new higher taxa (eg. *Murex*, *Haustellum*, *Chicoreus* (*Siratus*)).

4. The range of gross shell morphologies described by Raup's coiling parameters increases during the evolution of the subfamily. Taxa with relatively high rates of whorl translation and relatively high whorl expansion rates appear later in the history of the group. However, at the subfamilial level, no obvious directional trend exists and this pattern may be explained as an increase in morphological variance. Nevertheless, the possibility that this pattern is the result of a number of independent unidirectional trends at a lower taxonomic level can not yet be discounted.

5. Mean shell size within the family increases during the Cenozoic.

6. The Miocene appears to be an interval of increased morphological and taxonomic diversification.

Although the function of the diverse sculpture expressed in muricids remains poorly understood, features such as thick varices, spines and spiral ribbing are known to play a role in resisting durophagous predators. Increased size has also been implicated as a means of avoiding predation. It is likely that some varices and spines perform other functions as well and there are indeed morphologies within the Muricidae that do not comfortably fit an anti - predation interpretation. However, the directional patterns of morphological change observed in the Muricinae are broadly consistent with an "arms - race" scenario and strongly suggest that durophagous predation was an important driving force in the morphological evolution of this subfamily.