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# ZOOTAXA

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## **A Phylogeny and Classification of the Senticaudata subord. nov. (Crustacea: Amphipoda)**

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## Abstract

The Amphipoda includes a large clade defined by the presence of a previously unrecognised synapomorphy, apical robust setae on the rami of uropods 1–2. We term this clade the Senticaudata **subord. nov.** (Latin: *sentis* = thorn). It includes almost all freshwater species as well as a number of marine benthic taxa, formerly part of the ‘Gammaridea’. The phylogeny of the senticaudates was determined by cladistic analysis of morphological characters and character states. Within the suborder Senticaudata there are six infraorders: Carangoliopsida, Talitrida, Hadziida, Corophiida, Bogidiellida and Gammarida. A classification is provided and all the senticaudate families are diagnosed. We introduce for the first time in amphipod classification, the level parvorder between infraorder and superfamily. Four new families are described: Kairosidae; Eriopisidae; Nuuanuidae and Kergueleniolidae.

**Key words:** Phylogeny, Classification, Crustacea, Amphipoda, New Suborder, Senticaudata, New Infraorders, Bogidiellida, Carangoliopsida, Corophiida, Gammarida, Hadziida, Talitrida, New Parvorders, Bogidiellidira, Caprelliidira, Carangoliopsidira, Corophiidira, Crangonyctidira, Gammaridira, Melitidira, Talitridira, New Superfamilies, Allocrangonyctoidea, Biancolinoidea, Bogidielloidea, Calliopioida, Carangoliopsoidea, Caspicoloidea, New Families, Eriopisidae, Kairosidae, Kergueleniolidae, Nuuanuidae

## Introduction

The current higher classification of the Amphipoda is not phylogenetic and consequently is in need of revision. In this paper we provide a morphologically based higher classification of one suborder of the Amphipoda. We commenced this process in an earlier paper (Myers & Lowry 2003) and this is the second in a series of planned papers which will address the issue of higher classification and produce a modern testable phylogenetic classification for the Amphipoda.

Historically there have been four suborders in the Amphipoda: Gammaridea Latreille, 1802; Caprellidea Leach 1814; Hyperidea Milne Edwards, 1830 and Ingolfiellidea Hansen, 1903. The caprellideans, hyperiideans and ingolfiellideans have always been recognizable entities defined by one or more apomorphic characters. The Gammaridea has no synapomorphies and was originally defined on symplesiomorphies, i.e. a well developed abdomen to distinguish it from the caprellideans and a well developed maxilliped to distinguish it from the hyperiideans. As such the Gammaridea became the repository for any family-level taxon that did not fall into one of the other groups. This situation remained until Myers & Lowry (2003) established the suborder Corophiidea, removed it from the Gammaridea and showed that the Caprellidea was a highly derived part of the corophiidean clade.

In this paper we establish the new suborder Senticaudata **subord. nov.**, which incorporates 95 families formerly in the Gammaridea. We recognise six infraorders in the suborder Senticaudata: Carangoliopsida, Talitrida, Hadziida, Corophiida, Bogidiellida and Gammarida. We have previously considered the suborder Corophiidea (Myers & Lowry, 2003), which is herein demoted to the infraorder Corophiida with parvorders Corophiidira and Caprellidira in order to facilitate the higher levels of classification in the Senticaudata while retaining diagnosable family level taxa (see later).

There has been much discussion about what group of amphipods are ancestral. Taxa proposed include gammarids (J.L. Barnard 1969a) and corophiidans (Barnard & Barnard 1983). From a behavioural perspective proposals include swimmers (Bousfield & Shih 1994) or 'clingers' (Steele 1988). We agree with Steele (1988) that the ancestral amphipod was a 'clinger' in anastomoses that was able to perform fast escape reactions by means of rapid straightening of a reflexed urosome. This combination of behavioural characteristics would explain the unique characters of amphipods: a) the reflexed urosome (explosive locomotion) as opposed to six in-line pleosome segments and b) the opposable pereopods, pereopods 3 and 4 working against the rotated pereopods 6–7 (clinging) as compared with all legs working in the same plane. The nearest approximation of this form in extant amphipod taxa would probably be an amphiloichid. Although clinging might be the primary behaviour of these ancestral forms, the need to swim from one anastomosis to another would have led to free swimming amphipods such as eusirids and lysianassids. Swimmers would then have radiated into benthic forms and sediment burrowers that retained swimming males for reproductive purposes.

A large clade derived from the early 'clingers' possesses as a synapomorphy, apical robust setae on the rami of uropods 1–2 (Fig. 1). We term this clade the suborder Senticaudata **subord. nov.** (Latin: *sentis* = thorn). This