A NEW HYPOTHESIS OF DECAPOD PHYLOGENY

BY

CHRISTOPHER J. DIXON¹, SHANE T. AHYONG² and FREDERICK R. SCHRAM¹,³

¹) Institute for Biodiversity and Ecosystem Dynamics, University of Amsterdam, Mauritskade 57, NL-1092 AD Amsterdam, Netherlands
²) Australian Museum, 6 College Street, Sydney, NSW 2010, Australia

ABSTRACT

A cladistic analysis based on external morphology was carried out on 60 taxa of decapod crustaceans. An analysis with unordered characters and one with ordered characters were both in agreement regarding the major relationships. The ordered analysis gave better resolution of more advanced clades, while the unordered analysis gave better resolution of more basal clades. None of the traditional groups Palinura, Anomura, and Macrura is monophyletic. A new classification of decapod crustaceans is proposed. Homarida and Astacida are closely related, as shown by the unique process on the ischium of their first pereiopods. Glyphoeidea forms the sister group to Astacura, within an enlarged Astacidea. Acheleta is the sister group to Meiura (Anomala + Brachyura) in a new clade, Eurysternalia, characterized by a unique antennular morphology and by the eponymous wide sternum of its members. Thalassinida emerge as the sister group to Eurysternalia, in a new clade, Sterropoda, characterized by fusion of the first segments of the thoracic limbs. The fractostern is interpreted to be a eureptant feature, and a possible burrowing habitus is posited for the ancestral Eureptantia.

RÉSUMÉ


³) Corresponding author; e-mail: schram@science.uva.nl

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INTRODUCTION

The order Decapoda is a remarkably diverse group of malacostracans, both morphologically and ecologically, and is a group of great economic and environmental importance. Gruner et al. (1993) estimate 10,000 species in the group, but actual numbers may be at least half again as large. The relationships within the order have been the subject of debate for decades; opinions differed in the early years as to which character(s) should be used to classify decapods, be it tail length (from Linnaeus until Boas, 1880), gill type (Huxley, 1878), number of chelae (Beurlen & Glaessner, 1930), or mode of locomotion (Boas, 1880). These sometimes simplistic approaches have now been replaced by more holistic methods using a wider variety of characters. De Saint Laurent (1979) believed that “les seuls critères de la morphologie externe ... ne permettront pas de résoudre [les] relations phylogénétiques entre les différentes lignées de Décapodes”, but we would argue that whilst larval, spermatozoal, and other characters are useful, external morphology can be enough to work out such relationships. We will nonetheless make reference to other characters and their agreement or disagreement with the scheme we propose based on external morphology.

Boas in his seminal work of 1880 divided Decapoda into Natantia for the swimming forms, and Reptantia for the walking forms. Although Reptantia is a monophyletic group, Natantia appears to be less valid and as long ago as 1907, Bor-radaile suggested that Natantia was actually paraphyletic. Burkenroad (1963) finally deconstructed Natantia, recognizing that the three groups of natant decapods are not closely related. Among Reptantia, Boas recognized six groups: Homariidae, Loricata, Eryonidae, Thalassinidae, Anomala, and Brachyura. Although some names have changed, all these groups are generally conceded to be monophyletic (cf. Martin & Davis, 2001). That belief will also be tested by this study.

It is perhaps a shame that at the turn of the twentieth century, authors reverted to the older system of H. Milne Edwards (1834), dividing Reptantia into Palinura, Astacura, Anomura, and Brachyura, which have remained as traditional groups. None of the four has remained unchallenged as a monophyletic taxon. Several authors (Abele, 1991; Forest & De Saint Laurent, 1989) have concluded that Palinura was untenable as a group, and others have considered the differences between Thalassinida and Anomala (which collectively make up Anomura) to be insurmountable (De Saint Laurent, 1979; Martin & Abele, 1986; Tudge, 1997). Scholtz & Richter (1995) separated the two parts of the Astacura, and there has