

The Systematics and Phylogenetics of the Anaspidacea (Crustacea: Malacostraca: Syncarida).

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ABSTRACT

The current classification of the Anaspidacea includes 6 families, 14 extant genera, 2 fossil genera and species) and 23 described extant species. A history of the discovery and classification of the Order Anaspidacea and the Palaeocaridacea is reviewed. The morphological characters for defining the Anaspidacea morphological taxonomy are re-examined and reinterpreted from the literature and a detailed re-examination of Australian species and specimens from existing collections. The distribution of each taxon is defined through the compilation of over 1080 distribution records as well as the collection and description of new taxa including 1 new extant family, 2 new fossil families, 3 new subfamilies within the Koonungidae, 12 new genera and 19 new species.

A re-examination of the higher classification of the Superorder Syncarida is also presented where the current Suborders Stygocaridinea and Anaspidinea are abolished and are replaced with three Orders: the extant Anaspidacea and Stygocaridacea, and the fossil Palaeocaridacea. The taxonomic and phylogenetic analysis has resulted in the previous Order Anaspidacea being divided into two orders containing a total of 3 suborders within the Koonungidae, 8 families, 26 genera and 38 species with revised diagnoses and family compositions for the new classification provided. The Orders Anaspidacea Calman 1904 now encapsulates only the Anaspididae, whereas the Stygocaridacea Noodt 1965 contains all other families. The new taxa presented represent only a small sample of the diversity of short range endemic species and highly localised genera that as a result of this study is now known to be a characteristic of this order of ancient freshwater crustaceans.

This revision of all species of Anaspidacea presents new hypotheses for the evolution and distribution of the Syncarida in general, with a specific focus on the Anaspidacea. It also recognises more morphological relationships between the families via the discovery that the structure of features such as the mouthparts and male genitalia were diagnostic at all levels of the taxonomic hierarchy.

DECLARATION

I certify that the substance of this thesis, submitted to the Zoology Department, University of New England in total fulfillment for the award for Doctor of Philosophy, has not already been submitted for any degree and is not currently being submitted for any other degree or qualification.

I certify that I certify that the substance of this thesis has not already been submitted for any degree and is not currently being submitted for any other degree or qualification.

I certify that any help received in preparing this thesis and all sources used have been acknowledged in this thesis.

Peter Serov BSc (Hons)



PREFACE

The chapters in this thesis, in particular each of the family sections within Chapter 3 - the Taxonomy, have been prepared as separate papers. Therefore, some repetition of content is unavoidable. Every attempt has been made to keep any repetition to a minimum. There are no co-authors in any content presented. The interpretation, ideas and conclusions as presented reflects solely my own original work.

ACKNOWLEDGEMENTS

This project has been a journey extraordinaire that I thought on many occasions would never be finished. I now realise it is just the beginning as this work has only scratched the surface of the biodiversity of this group. There are so many people that have given so much of their friendship, kindness, assistance and faith in me through this study without which I could not have completed this work. Of course, my first acknowledgement has to be my supervisors Dr Nigel Andrew, Professor Hugh Ford, Dr. Horst Kurt Schminke, whose incredible patience and understanding enabled this to happen. My thanks go to Rod Browne, who, as my acting manager within the then Department of Natural Resources, had the foresight and understanding to grant me time in my employment to pursue my studies. Others who have given their time, thoughts, invaluable support and specimens include Dr John Hawking, Dr Roy Swain, Dr Alastair Richardson, Dr Andrew Boulton, Judy Rainbird (Queen Victoria Museum), Laura Kuginis (OEH), Glenn Byrne (NOW), Dr Trev Mount (NOW), Tom Sloane, Dr. Wolfgang Zeidler (SAM), Dr Gary Jollyroger (CSIRO), Dr Tom Krasnicky, Dr Joane Taylor and Dr Richard Marchant (Museum of Victoria), Arthur Clarke, Dr Penny Berents and Dr. Stephen Keable from the Australian Museum, Dr Stephanie Clarke, Phillipa Cox (Tasmanian Museum and Art Gallery), and Andy Spate. I also wish to thank: Tikiri Tennakoon for his assistance with data; Moya Tomlinson for her assistance with information on her study sites; Dawit Berhane for his friendship, help in the field and for discovering the value of the Maules Creek aquifer community as well as the Phil Laird and the Maules Creek community for field support and hospitality; and a special thanks the King island NEARM committee including Heather Coleman, Helen Strickland, Ken Baker, Nigel and Mavis Burgess, and the King Island community for their support with fieldwork, incredible hospitality and friendship. Special thanks go to the groundwater monitoring team from the Hobart DPIW who made this work possible by conducting the first stygofauna survey of monitoring bores across Tasmania. I also wish to thank Dr. Marcela Peralto from the Fundación Miguel Lillo, Argentina for her invaluable assistance with information for the manuscript. Sincere thanks go to John Polglase for showing me the way with GIS mapping and the Dr Stephanie Clark and Professor Jeremy Bruhl (UNE) for their individual assistance with the phylogenetic analysis. Most of all I wish to acknowledge my family for their support and to apologise for putting them through it. Lastly I wish to thank my wife Adriana for the enormous assistance she has given me in the preparation of the drawing plates, without which, this thesis could not have been completed. This research was supported by the NSW Office of Water and the University of New England Postgraduate Grant.

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