

Preface

In the past decade, DNA barcoding has gone from a peripheral technique to a mainstream approach for characterising species and recognising potentially new taxa. In brief, it relies on a short DNA sequence from a standard position in the genome, and for animals this is now almost universally accepted as a specific 650-base-pair region of cytochrome oxidase subunit I (COI) of the mitochondrial genome. The application of DNA barcoding, although criticised in some quarters, has become a valuable tool in many applications, for example in matching immature and adult stages of insects and other groups, in diagnostics of invasive pest species for quarantine purposes, and in revealing the presence of cryptic taxa within single morphospecies. In many respects, DNA barcoding has come of age and is now routinely and widely applied in developing a framework for species-level taxonomy, in particular for testing morphospecies boundaries. It is also clear that when used in conjunction with multi-gene approaches, the boundaries between COI-based taxonomy and molecular phylogenetics become somewhat blurred, to the point where both activities are often undertaken simultaneously. Given the extreme species richness of many invertebrate groups and the often intractable problems that systematists face in recognising taxa based solely on morphological criteria, DNA barcoding has become an invaluable approach, as evidenced by the explosion in projects supported by the International Barcode of Life (see <http://ibol.org/>).

This special issue of *Invertebrate Systematics* was originally conceived during discussions among the organising committee for the Fourth International Barcode of Life Conference held in Adelaide, Australia, from 28 November to 3 December 2011. The conference attracted more than 460 delegates from 60 countries, and included researchers, students from universities, and representatives from government and non-government organisations (NGOs) and industry. The organising committee was keen to see the best papers presented at the conference published in a good peer-reviewed journal, and so asked *Invertebrate Systematics* to invite submissions of high-quality papers dealing with the application of DNA barcoding for the

identification and systematics of invertebrates. The papers that appear in this special issue are those that successfully negotiated the journal's normal peer-review process.

The contents of this special issue cover a significant spectrum of research involving the DNA barcoding of a range of invertebrate groups for numerous purposes, including the recognition of cryptic species. We have grouped the papers by broad subject area. The first section comprises seven papers focussed on DNA barcoding of terrestrial arthropods, primarily insects; this is followed by several shorter sections dealing with the barcoding of invasive insects, forensically important species, Antarctic invertebrates, marine groups, and subterranean groundwater invertebrates. The final section is a single paper that focusses on methods for optimising the PCR and sequencing of long-term alcohol-preserved museum material.

We hope that this special issue will foster wider interest in the application of DNA barcoding for answering questions on the systematics of invertebrates, and that the research reported here makes a contribution to facilitating their identification in studies related to biodiversity, climate change, pest species, forensics, biosecurity, conservation and environmental assessment, to name but a few.

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Co-editors