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Micrmolluscs in molecular systematics: Experiences and best practices

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Abstract

The use of molecular techniques is pervasive in contemporary systematics. We stress the importance of depositing voucher material, particularly for the less well-known micromolluscs, along with images from which specimens can be identified. Appropriate storage is paramount to ensure long-term survival of those voucher specimens. We detail methods of animal extraction that retain the shell as a voucher specimen, and detail salvage of radula and operculum from DNA spin columns. DNA can be extracted from freshly collected micromolluscs, but most dry and wet material in museum collections is not usable for molecular studies. Fixation problems may arise due to bulk collection of material in formalin, washing marine samples in fresh water (osmotic shock), and large surface to volume ratios of micromollusc animals and possible oxidative processes. The most successful strategy to PCR-amplify difficult fragments is the use of multiple thermostable DNA polymerase variants.

Keywords: museology, molecular systematics, DNA, methods, voucher

Introduction

Molecular approaches are permeating malacology in all its subdisciplines, including systematics ranging from alpha-taxonomy to broad-scale phylogenetics. In many cases the molecular tools add a new level of detail to reasonably well-known taxa (*e.g.*, Williams & Reid 2004; Reid 2007; Meyer 2003; Williams & Ozawa 2006), and yield new insights and a more differentiated view. The molecular studies may also provide first indications regarding the placement of a problematic taxon (*e.g.*, Geiger & Thacker 2005). It is fair to say that micromolluscs as defined in this volume harbor a disproportionate number of problematic taxa compared to their large-bodied counterparts. There are several reasons for that general pattern. Micromolluscs are less well-known in general; species identities and species boundaries are less certain, while many micromolluscan species remain to be described, not only from the megadiverse areas of the Indo-Malayan Archipelago, but from all areas of the globe. Accordingly, the inclusion of micromolluscs in molecular systematics offers both exciting opportunities, but is also fraught with potential pitfalls. Here some of the issues are highlighted, experiences based on Vetigastropoda are detailed, and some recommendations are laid out.

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