



## Six genetically distinct clades of *Palola* (Eunicidae, Annelida) from Lizard Island, Great Barrier Reef, Australia

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### Abstract

A total of 36 lots of *Palola* spp. (Eunicidae, Annelida) were collected during the Lizard Island Polychaete Workshop on Lizard Island, Great Barrier Reef, Queensland, Australia. Of these, 21 specimens were sequenced for a portion of the mitochondrial cytochrome *c* oxidase I gene. These sequences were analysed in conjunction with existing sequences of *Palola* spp. from other geographic regions. The samples from Lizard Island form six distinct clades, although none of them can clearly be assigned to any of the nominal species. Four of the six Lizard Island clades fall into species group A and the remaining two into species group B (which also includes the type species, *Palola viridis*). All sequenced specimens were characterized morphologically as far as possible and a dichotomous key was assembled. Based on this key, the remaining samples were identified as belonging to one of the clades.

**Key words:** Lizard Island, Eunicidae, *Palola*

### Introduction

This study investigates the molecular and morphological diversity of the genus *Palola* (Eunicidae, Annelida), from Lizard Island, Great Barrier Reef, Queensland, Australia. To date, *Palola* spp. have rarely been reported from Australian waters although some records exist from the Great Barrier Reef as prey items of cone snails (Marsh 1970, 1971; Taylor & Lewis 1995) and from Sydney Harbor (Hutchings *et al.* 2013). These have been identified as *Palola siciliensis* but, as discussed below, these species identifications are doubtful.

The term “palolo worm” is often loosely applied to any type of polychaete exhibiting mass spawning, also called “swarming” or “rising”. Originally, however, the term refers to the eunicid *Palola viridis* Gray in Stair, 1847 from Samoa. Members of this species are generally cryptic inhabitants of coral rubble, except for once a year, when they cast off their posterior ends, or epitokes, into the water column. The epitokes can be up to a meter long and are packed with eggs and sperm. Within minutes to hours of entering the water column they disintegrate to release the gametes into the environment. These swarming events have great cultural significance in many locations throughout the South Pacific and in Indonesia, where the epitokes are harvested as a delicacy and sometimes seasons are named after the worms (e.g., Craig *et al.* 2008; Hauenschild *et al.* 1968; Levine & Sauafea-Le'au 2013; Mondragón 2004; Pamungkas 2011, 2015).

Characteristic for the epitokes of *P. viridis* are the ventral eyespots. These round to oval eyes are located on the ventral side of each segment and are equipped with cuticular lenses (Schröder 1905; Schulze & Timm 2012; Woodworth 1903). Sometimes ventral eyes are detected in the benthic stages (see Schulze 2006), but they are probably transient features that start forming when swarming is imminent. They are also probably often lost when the worms fragment while being extracted from their habitat.

*Palola* is easily diagnosable by a combination of features, even from incomplete specimens (Fauchald 1992; Schulze 2006; Schulze & Timm 2012). The most characteristic features in the anterior region are the scoop-shaped mandibles. These also occur in *Lysidice*, although usually less heavily calcified than in *Palola*. The two genera can also be distinguished by the number of prostomial appendages: *Palola* has three antennae and two lateral palps,