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Deep-sea chitons from sunken wood in the West Pacific (Mollusca: Polyplacophora: Lepidopleurida): taxonomy, distribution, and seven new species

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Abstract

Natural deposits of sunken wood provide an important habitat for deep-sea invertebrates. Deep-sea chitons in the primitive order Lepidopleurida are typically collected rarely and as single specimens. However, these animals have been recovered in large densities associated with sunken wood in the tropical West Pacific, in groups of up to 50 individuals. Four deep-sea expeditions in the West Pacific, to the Philippines, Solomon Islands, and Vanuatu, recovered a large number of polyplacophorans. We have examined the morphology as well as the range and distribution of these species, based on the largest collection ever examined (more than 1300 individuals). These species show potentially adapted characters associated with exploitation of sunken wood as habitat, such as protruding caps on sensory shell pores (aesthetes) and large intersegmental bristles with potential sensory function. In this study we investigated the twenty-two species recovered, including seven newly described here (*Leptochiton consimilis* **n. sp.**, *L. angustidens* **n. sp.**, *L. dykei* **n. sp.**, *L. samadiae* **n. sp.**, *L. longisetosus* **n. sp.**, *L. clarki* **n. sp.**, *L. schwabei* **n. sp.**), and provide the first identification key to the 34 lepidopleuran chitons known from sunken wood worldwide.

Key words: Philippines, Solomon Islands, Vanuatu, sunken wood

Introduction

Sunken wood is increasingly recognised as an important and faunisticly complex deep-sea marine habitat (Pailleret *et al.* 2007; Bernardino *et al.* 2010). Woodfalls have probably been common elements of deep-sea substrata since the Carboniferous period, when large woody plants first evolved on land (Wolff 1979). Woodfalls have been recognised as deep-sea marine habitats since the nineteenth century; reports of the *Challenger* expeditions (1872–1876) include records of sunken wood from depths up to 3900 m in the Philippines (Murray & Reynard 1891: 98–99; Murray 1895). But sunken wood was probably first recognised as a distinct and important habitat for benthic fauna from the results of the Danish *Galathea* expeditions in 1950–1952 (Wolff 1979).

More recently, other authors have observed close phylogenetic relationships within several molluscan groups known from whale-falls, woodfalls, and other extreme environments such as hydrothermal vents and cold seeps (Distel *et al.* 2000; Kiel & Little 2006; Samadi *et al.* 2007). Woodfalls and whale-falls are reducing environments and the organic substrate undergoes a prolonged decay process. The longevity of the local environment creates a long-lasting and abundant ecosystem that may play a key role in dispersal and evolution of deep-sea organisms (Cayré & Richer de Forges 2002).

Chitons in the order Lepidopleurida represent the earliest-diverging living polyplacophorans and are found in abundance on tropical sunken wood (Sirenko 1997a; Sigwart *et al.* 2011). They are also found worldwide in other deep-sea habitats and occasionally in shallow water at temperate latitudes (Kaas & Van Belle 1985). Lepidopleurans were first recognised as a distinct group by Dall (1889). Although new species are described every year by current workers, the fauna known from sunken wood is limited to relatively few studies (Sirenko 2001; 2004).

Because the precise habitat of deep-sea material is often unknown, early workers did not associate chiton material with sunken wood (e.g. Nierstrasz 1905; Sirenko 1977). *Ferreiraella carribensis* Sirenko, 1988 is the first species explicitly associated with sunken wood Sirenko (1988). Saito (1997) later made observations on several species of lepidopleuran chitons found in sunken wood. The worldwide wood-dwelling fauna was first summarised by Sirenko (1998).

The material used herein is drawn from collecting expeditions led by the Muséum National d'Histoire Naturelle (Paris) in the tropical western Pacific, from 2001–2005. These expeditions aimed to comprehensively collect the benthic invertebrate fauna of the target areas, with animals sorted down to 1 mm size. The material examined by the authors in the course of this work includes a total of 1309 individual chitons, with specimens ranging in size from apparently newly settled juveniles to large adults.

This study furthers the discoveries of Sirenko (2001) and significantly expands the range of several species known from the South Pacific. Several species in the region were previously known from a single collecting locality but are now known to have widespread deep-water distributions. The South Pacific sunken wood habitat is home to a group of closely related species noted for having only four gills per side. Interestingly, a number of these species also possess long articulated bristles that may have some sensory function (Sirenko 2001); this adaptation was previously thought to be restricted to *Leptochiton boucheti* Sirenko, 2001, but is here observed in several related taxa.