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Spengelidae (Hemichordata: Enteropneusta) from the Eastern Pacific including a new species, *Schizocardium californicum*, from California

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Abstract

Twenty one enteropneusts have been described from the west coast of North America, but those reports include no Spengelidae. Here we describe two species of acorn worms in the genus *Schizocardium* (*S. californicum* and *S. peruvianum*) on the basis of morphology. The former represent the first spengelid worm described from North American waters. The latter is a previously described species, and here we expand on its morphological description and extend its geographic range north from Peru to California. Notes on the habit and localization of each species, as well as a dichotomous key to the genera of the family Spengelidae are provided. Based on morphology, spengelids appears to represent an intermediate between the enteropneust families Harrimaniidae and Ptychoderidae, and *Schizocardium* is sister taxon to the ptychoderids. The disjunct and widely distributed populations of *S. peruvianum* and *S. brasiliense*, with populations in South American and North America, but none between, could represent the relict populations of formerly wide spread species, or the two extremes of ranges.

Key words: Enteropneusta, acorn worm, Spengelidae, California, dichotomous key

Introduction

Recent years have seen renewed excitement in hemichordate systematics as one family, the Saxipendidae, was absorbed into the Harrimaniidae (Deland *et al.* 2010, Cameron *et al.* 2010), and a new family, the Torquaratoridae, has emerged from specimens collected and photos taken in the deep sea (Holland *et al.* 2005, Osborn *et al.* 2011). Of the remaining two families, the Ptychoderidae, and the Spengelidae, the latter is the least known. The family Spengelidae includes 4 genera—*Spengelia*, *Glandiceps*, *Willeyia* and *Schizocardium* and 18 species. Members of the family are distributed globally, but are uncommon; none are described from North American waters.

Here we report on two species of *Schizocardium* from the coast of California. These are based on specimens from the collections of W.E. Ritter and T.H. Bullock, deposited at the Smithsonian Museum (US Natural History Museum, Washington). The *S. californiensis* specimens were taken by Bullock in 1952 and 1953. We also elaborate on the taxonomic description of *S. peruvianum*, for its original description was of an incomplete specimen (Spengel, 1893) and we also expand its known range from Peru, north to California.

Our efforts to revise the alpha taxonomy of the Enteropneusta and expand on the known species from North America has, at least with the Harrimaniidae, shed some light on the phylogenetic relationships within the family (Deland *et al.* 2010) and on the zoogeography and evolution of acorn worms in general (Cameron *et al.* 2010). In an attempt to repeat this exercise, this time with the family Spengelidae, we discovered only one new species in the Bullock collection, the first from North American waters, to add to the group. Consequently, with only the material in hand, any rigorous revision of the spengelids is not possible, and only a few general remarks can be made on the zoogeography of the group.

The objectives of this study are then to i) describe a new species of *Schizocardium californicum* from the coast of California, ii) and expand on the taxonomic description of *Schizocardium peruvianum* (Spengel, 1893), originally taken from Independence Bay, Pisco, Peru.