



New tanaidomorph Tanaidacea (Crustacea: Peracarida) from submarine mud-volcanoes in the Gulf of Cadiz (North-east Atlantic)

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Abstract

Faunal collections from mud-volcano sites in the Gulf of Cadiz, at depths between 355 and 3061 m, have revealed a high diversity (and in some cases high density) of tanaidaceans. The present study reports on nine new tanaidomorph species from eight different genera from this material. These include representatives of genera known elsewhere from non-vent-associated deep-sea habitats, but notably only the second and third (respectively) representatives of two genera, *Coalecerotanais* and *Cristatotanais*, known previously from cold-seep-habitats in the Gulf of Mexico. The genus *Spinitanaopsis* is synonymized with *Cristatotanais*. The tanaidacean records to date from hydrothermal vents or cold seeps are collated as a context for the present material. The possibilities of habitat-endemism in tanaidacean taxa associated with reducing environments and their biogeography are discussed.

Key words: mud volcanoes, Gulf of Cadiz, deep-sea, *Araphura*, *Coalecerotanais*, *Cristatotanais*, *Haplocope*, *Mesotanais*, *Pseudotanais*, *Spinitanaopsis*, *Torquella*, *Typhlotanais*

Introduction

During the last two decades, exploration of the seabed in the Gulf of Cadiz has discovered an extensive area of mud-volcanoes and submarine vents, a result of the pressure generated by the collision between the African and the European plates leading to tectonic structures including thrust faults, extensional faults, strike-slip faults and diapirs (Pinheiro *et al.* 2003; Wulff-Barreiro 2009; Medialdea *et al.* 2009). Many structures associated with fluid escape, including mud-volcanoes, mud-carbonate mounds, pockmarks and slides, have been identified, with most of the mud-volcanoes at 350 to 2000 m depth in the eastern domain of the Gulf, but also on the lower slope at 2300 to 3900 m depth. These tectonic structures have provided escape pathways for over-pressured material and fluids, including the occurrence of generally thermogenic, but significantly CH₄-enriched, light volatile hydrocarbon gases (Fernández-Puga *et al.* 2007; Hensen *et al.* 2007; Medialdea *et al.* 2009).

The Gulf of Cadiz lies to the northwest of the Straits of Gibraltar, at the conjunction of the Mediterranean inflow/outflow, warmer waters are rich in organic nutrients, and the more oligotrophic, colder cross-Atlantic zonal jet from the west. This combination of water circulation (for potential migration), trophic input and chemically-reduced habitat will determine the benthic communities of this region. Studies have found it to be an area of rich biodiversity, with mostly-decaying reefs of cold-water corals (*Lophelia pertusa* (L.), *Madrepora oculata* L., *Dendrophylla* spp), sponges, decapods, polychaetes, bivalves and echinoderms, including typically seep-associated taxa such as siboglinid frenulates, and solemyid, thyasirid, lucinid, vesicomyid and bathymodiolin bivalves (e.g. Pinheiro *et al.* 2003; Dworschak & Cunha 2007; Genio *et al.* 2008; Rodrigues *et al.* 2008; Hilário *et al.* 2010).

A number of the smaller taxa, including tanaidaceans, have been less-well studied at these habitats, and to date only Bird (1999), Larsen (2003; 2006) and Larsen *et al.* (2006) have reported on deep-sea vent-associated species of this typically deep-sea-diverse taxon.

The present paper reports on the first analysis of a number of species of tanaidacean collected from mud-volcanoes in the Gulf of Cadiz, at depths between 355 and 3061 m, during the TTR12, TTR14 and TTR15 cruises. A total of over one thousand specimens were collected, representing over 35 distinct putative taxa, although some species were so infrequent as to preclude full taxonomic analysis. Nine of the tanaidomorph species are described herein; apseudomorphs will be treated separately. All the species below are new to science, including only the second and third (respectively) representatives of two genera, *Coalecerotanais* and *Cristatotanais*, known previously from cold seep habitats in the Gulf of Mexico. With taxa not yet found away from reducing habitats, yet from disparate parts of the ocean, the possibilities of habitat-endemism in tanaidacean taxa associated with reducing environments and their biogeography are discussed.

Methods

Samples were collected between 2002 and 2005 during the TTR12, TTR 14, and TTR15 cruises onboard R/V *Prof. Logachev*. The material was collected using TV-assisted grabs or USNEL box-corers. Occasionally tanaid specimens were also recovered from Kasten-corer or gravity corer samples that were carried out for different purposes. Whenever possible the specimens were sorted onboard and preserved in 70 or 96% ethanol (the latter preserved for molecular analysis).