



## Integrative taxonomy justifies a new genus, *Nodastrella* gen. nov., for North Atlantic "*Rossella*" species (Porifera: Hexactinellida: Rossellidae)

MARTIN DOHRMANN<sup>1,4</sup>, CHRISTIAN GÖCKE<sup>2</sup>, JOHN REED<sup>3</sup> & DORTE JANUSSEN<sup>2</sup>

<sup>1</sup>Department of Invertebrate Zoology, National Museum of Natural History, MRC-163, Smithsonian Institution, P.O. Box 37012, Washington, DC 20013-7012, USA. E-mail: mdohrma@gmail.com. Present address: Feldbergstraße 6, 55118 Mainz, Germany

<sup>2</sup>Forschungsinstitut und Naturmuseum Senckenberg, Senckenberganlage 25, 60325 Frankfurt am Main, Germany.

E-mail: Dorte.Januszen@senckenberg.de, Christian.Goecke@senckenberg.de

<sup>3</sup>Harbor Branch Oceanographic Institute at Florida Atlantic University, 5600 US 1 North, Fort Pierce, Florida 34946, USA.

E-mail: Jreed12@hboi.fau.edu

<sup>4</sup>Corresponding author

### Abstract

Molecular systematic studies have indicated that the hexactinellid sponge species *Rossella nodastrella* Topsent (Lyssacinosa, Rossellidae), previously only known from the NE Atlantic, is only distantly related to its congeners, which are restricted to the Southern Ocean, representing the only case thus far reported of a diphyletic genus in the class Hexactinellida. Here we describe new material of "*Rossella*" *nodastrella* from cold-water coral reefs in the NW Atlantic (Florida). Morphological comparison with the holotype from the Azores and specimens recently reported from off Ireland reveal at least two distinct species, which we corroborate with molecular data. Because the diphyletic nature of "*Rossella*" is further supported with inclusion of the new specimens in the molecular phylogeny, we erect a new genus, *Nodastrella* gen. nov., for these two species. The Irish specimens are synonymized with our new species *Nodastrella asconemaoida* sp. nov. Subtle morphological and molecular differences between the E and W Atlantic specimens are for the time being ascribed to intraspecific geographic variation, but indicate that *Nodastrella* might contain more (sub)species, pending investigation of additional specimens, especially from intermediate locations.

**Key words:** *Asconema*, cold-water coral reefs, glass sponges, molecular systematics, new genus, North Atlantic Ocean, *Rossella nodastrella*

### Introduction

Integrative taxonomy aims at combining morphological characters with additional, especially molecular, data to delimit species and higher taxa and is a promising approach to construct more natural classification systems (Padial *et al.* 2010; Schlick-Steiner *et al.* 2010), especially for organisms with depauperate or highly plastic morphology such as sponges (Porifera) (Cárdenas *et al.* 2012). Unlike Demospongiae and Calcarea, for which molecular phylogenies largely contradict morphology-based classification systems (Wörheide *et al.* 2012), sponges of the class Hexactinellida have a higher number of informative morphological characters, especially spicule types and their combinations, and consequently there is a better correspondence between molecular-based phylogenetic hypotheses and traditional taxonomy of this group (Dohrmann *et al.* 2008). However, even in Hexactinellida there are incongruencies, mostly concerning weakly supported taxonomic hypotheses such as subfamilial divisions (Dohrmann *et al.* 2012) or family assignment of certain genera (Dohrmann *et al.* 2011). In this paper, we focus on perhaps the most striking example of conflict between molecular phylogeny and Linnean classification in Hexactinellida, the placement of *Rossella nodastrella* Topsent (Hexasterophora, Lyssacinosa, Rossellidae).

*Rossella nodastrella* was initially described by Topsent (1915) based on a single small specimen collected in bathyal depths off the Azores, and has thus far been considered the sole North Atlantic species of the genus *Rossella* Carter, which is otherwise restricted to the Southern Ocean (SO) (Tabachnick 2002a). Observations of a mass occurrence ascribed to this species, which was originally attributed to the genus *Asconema* Kent, in a deep-water